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UNITED STATES OF AMERICA

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NUCLEAR REGULATORY COMMISSION

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WORKSHOP ON SPENT FUEL TRANSPORTATION
CASK TESTING PROTOCOLS

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WEDNESDAY

MARCH 19, 2003
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ROSEMONT, ILLINOIS

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The Package Performance Public Meeting at The Embassy Suites at O'Hare, 5500 North River Road, Rosemont, Illinois, at 8:00 a.m., Chip Cameron, presiding.

P R O C E E D I N G S

(8:25 A.M.)

MR. CAMERON: Good morning, everyone. My name is Chip Cameron. I'm the Special Counsel for Public Liaison at the Nuclear Regulatory Commission. And I'd like to welcome all of you to our meeting today. And today's subject is the NRC, the Nuclear Regulatory Commission's plans for doing full scale testing of spent fuel transportation cask. And that plan is embodied in a document that I think you all have called the Package Performance Study Test Protocols. And it is a draft. And I have been facilitating the meetings, the round table meetings that we've had on this. And it's been my pleasure to serve as the facilitator for those meetings.

I've also been assisted in the convening by Mr. Chet Poslusny, who's right here, and after I go through some brief meeting process comments for you, I'm going to turn it over to Chet to facilitate the rest of the meeting today.

And in terms of meeting process, I wanted to cover basically three things. Why the NRC is here today, what the format and ground rules for the meeting are and to just briefly go over the agenda for today's meeting so that you know what to expect and also so that we can check in with you, do an agenda check so that we can make sure that

we have all the issues that you want to see covered actually covered in the agenda.

In terms of the purpose, the first objective today is to have the NRC clearly explain what its plans are in terms of full scale testing, why we are doing this, what is planned and how we propose to accomplish it. The second objective and the most important one is to hear your views and recommendations on these draft plans. The ultimate goal will be to use the commentary that we hear from you today as well as in the other workshops we've done and the written comments that we're asking for. To use all of that to illuminate our final test protocol and final test plans.

In terms of the format you can see that we're in a so called round table format today. And we're fundamentally interested in each of your views, your individual views. But the purpose of having a round table is to not only hear those individual views but to engage in a discussion from your colleagues around the table on what they think of those particular views. And we hope that that gives us another perspective on the issues than we would get just by having the written comments come in to us, which reflect the individual views but they're never, never get the benefit of hearing from any of the other peers on those particular views. So, we have representatives of the broad

spectrum of interest around the table and may be affected by spent fuel transportation. And we're looking forward to this discussion.

In terms of ground rules, I guess the most important one might be to try to be focused and concise in your comments. Today the round table affords us a richness of views but the downside is is that it doesn't give us all the time we would like to hear a full explanation of individual views. So, I would ask you to focus on the high points, to listen to what your colleagues around the table are saying and respond to those views and to allow your written comments to give us the full details on that. I would also ask you to give us the reasons for any conclusions or statements that you make, give us the rationale for that.

You do have name tents in front of you and when you do, when you want to talk if you could just put this up like that and then Chet will know who wants to say something and you won't have to keep raising your hand. He may not take all the cards in the order they're raised so that discussion threads can be followed. We are taking a transcript of the meeting. And our transcriber, Ron, knows who you are so that you won't have to keep saying your name every time. And I would ask that only one person at a time

speak so that we can get a clean transcript and also so that we can give our full attention to whomever has the floor at the moment. And we won't ignore the audience. We realize there is interest and important comments out here. And at various times during the day Chet will go out to see if anybody has any questions or comments. And when he does that, if you could just give us your name and affiliation, if appropriate here.

We have a mix of experience at that table. Some of you have been at all of the meetings. We did one in Rockville two weeks ago. We did one in Las Vegas last week and this is the final one here in Chicago. We've gotten some excellent input from the State of Nevada, Bob Halstead down there. And also Fred Dilger is with us from Clark County. We have mostly new people at the table and we'll want to hear your views and we'll get the benefit of hearing from those who have been with us before, John Vincent also. He was at the Rockville meeting.

So, with that I think what I'll do now is go through the agenda quickly and then I'm going to turn it over to Chet. And we want to give you some context to start off with on the NRC's responsibilities and what are plans are. And we're going to start with that, with Bill Brach, who's down here and Andy Murphy next to him and Ken Sorenson

from Sandia and Chet will be introducing them in more detail. We're going to do those presentations right in a row, hopefully not keep you sitting too long with those and then go to you for questions.

Next, we're going to around the table and hear a couple of minutes from each of you on what your interest and concerns are on this issue. And we found that this provides a good backdrop for the rest of the day's discussion and also helps us to hear issues that we might not have thought of and put in the agenda that we will make sure we get on the agenda. After that we're going to go our first discussion area which is over arching issues. What objectives is the NRC trying to accomplish in doing this full scale cask testing? What are the advantages and disadvantages of full scale cask testing? How do you define things like public confidence? What role should it play in the testing program?

Then we're going to take a break. We'll go to general testing issues. You'll see them listed on your handout. And then lunch. Then in the afternoon we're going to get specific. We're going to take a look at the test protocols in terms of the fire test. And Amy Schneider, who is right up here, is going to give us what I call a tee-up on those issues. And then as part of that discussion we're

also going to hear from Chris Bajwa from the NRC staff who is going to tell us about the Baltimore tunnel fire. And after that discussion on fire we're going to go to the impact test and close up with other issues. In terms of the over-arching issues discussion, there may be process points that you want to make in terms of how the NRC should be guided in completing this program. So that might be a good time to talk about that.

And I guess I would thank you all for being here with us today and I'm going to turn it over to Chet. It's hard for me to relinquish this talking stick but I'm going to do that and sit and enjoy your discussion today. Chet?

MR. POSLUSNY: Thanks very much. And again I welcome you all to this very important meeting. And before, let me go over a couple of admin issues before we start. We've got a sign out sheet out front. I hope you've all signed it. Also, there's an NRC feedback sheet. This is something that's, although it's pre-printed, please use it to let us know what you think, you got out of the meeting today. Did we do things right? How could we improve in our next forum that we might do? If you feel uncomfortable filling it out, send us some comments, written comments on the report or talk to us on the side. That's another option. But we'd like to know what you thought about the

meeting. We hope it's positive.

Today I want to emphasize that the NRC is in a listening mode. We expect to hear some good comments on the report. Some new things we haven't thought about. We found that out at the last meetings we've done over the past couple of weeks. So, we are in a listening mode and don't expect we'll say, hey, that's a great idea. We're going to do it. Because we need to let everybody take a turn providing comments either in meetings, electronically, or in writing by May 30th. So every comment has equal weight. In addition, if you can't tell us everything you want to tell us in limited time today, please do it in writing. And we, again, will look at it.

Before we get started into the real agenda, let's quickly go around the table and let us know who you are and where you work. Don, could you start?

MR. FLATER: Don Flater with the Iowa Department of Public Health.

MR. WRIGHT: Ned Wright with Lynn County, Iowa, home of -- Energy Center. That's Iowa's Nuclear Power Plant.

MR. CAMERON: Can you hear that? Okay, fine. Yes, George.

MR. CROCKER: George Crocker, North American

Water office out of Minnesota.

MR. VINCENT: John Vincent, Nuclear Energy Institute out of Washington, D.C.

MR. BENNETT: David Bennett with Tri State Motor Transit Company but I'm representing the council, the U.S. Transport Council.

MR. DOIG: Scott Doig with the Prairie Island Dakota community

MR. RESNIKOFF: Marvin Resnikoff, Radioactive Waste Management Associates in New York City on behalf of the State of Nevada.

MR. HALSTEAD: Bob Halstead, Transportation Advisor, Agency for Nuclear Projects, State of Nevada.

MS. SNYDER: Amy Snyder, NRC, Spent Fuel Project Office.

MR. BRACH: Bill Brach, NRC, Spent Fuel Project Office.

MR. MURPHY: Andy Murphy, NRC Research Office.

MR. SORENSON: Ken Sorenson, Sandia National Laboratories.

MR. CONROY: Michael Conroy, Department of Energy, Office of Environmental Management, Office of Transportation.

MR. STRONG: I'm Thor Strong, I'm with the State

of Michigan at the Lowell Radioactive Waste Authority.

MR. RUNYON: I'm Tim Runyon with with Illinois Department of Nuclear Safety in the Midwest Radioactive Materials Transportation Committee.

MR. LARSON: I'm Dean Larson with the Lake County, Indiana, LAPC.

MR. CROSE: Dave Crose, Indiana State Emergency Management, also a member of the Midwest Radioactive Materials Transportation Committee.

MR. ERIKSON: John Erikson with the Governor's Policy Research Office for the State of Nebraska.

MR. WERNER: Jim Werner with the Department of Natural Resources in Missouri.

MS. SUPKO: Eileen Supko, Energy Resources International Consultant on Spent Fuel Storage, Transport and Disposal.

MR. LEVIN: Adam Levin, Exelon Generation.

MR. CAMERON: Thanks again. Okay, let's get started into the agenda. First discussion will be made by Mr. William Brach from the NRC. I'll tell you a little bit about his background. Bill has been the director of the Spent Fuel Project Office since 1999. He has 30 years experience with the AEC, which became the Nuclear Regulatory Commission. He began as an inspector in 1971 in the

Oakridge, Tennessee field office and that was followed by a wide range of activities through management at the NRC. Some of the activities included safeguard licensing issues, vendor inspection, reactor license performance evaluation, low level waste and decommissioning, medical and industrial use of nuclear materials. As I said, he's been with the Spent Fuel Project since 1999 and his office is responsible for the certification of casks for both storage and transportation of spent fuel.

With that, Bill?

MR. BRACH: Good morning. On behalf of the NRC I, too, want to welcome you to the round table discussion and workshop today. I noted to Chet last night, I believe, this is the fourth meeting and this is actually the first one we've had a round table at the meeting. So, I just note that.

As Chet mentioned, I'm Bill Brach and Director of the Spent Fuel Project Office. And our office has the responsibility for licensing and inspecting and developing inspection program for spent fuel storage facilities and also for the certification of packages used for the transportation of radioactive material including the transportation of spent fuel.

NRC's principle and guiding mission is

protecting the public health and safety, common defense and security, and the environment. NRC's primary role in transportation of spent fuel to a repository would be in the certification of packages used for the transport. NRC is well positioned, I believe, to maintain its independent focus on maintaining safety in this important activity.

The NRC staff believes that shipments of spent fuel in the U.S. are safe using the current regulations and programs. This is an important point. Let me restate that and then explain why I think it's so important. The first point I'm stressing is that the NRC staff believes that shipments of spent fuel in the U.S. are safe using current regulations and programs. Today we're going to be talking about the Package Performance Study, a study we're looking at to test the robustness and capability of spent fuel packages to withstand accident conditions significantly beyond the regulatory limits.

From that questions have come up at previous meetings and workshops. From the study, and the same as in other parts of the NRC's regulatory activities, information that the staff learns clearly is considered in those programs, and that is the case as we're looking at the safety of transport of spent fuel. If from the Package Performance Study we learn information that should make us

and does make us question the adequacy of current programs, adequacy of our processees, we clearly will consider that information as we're moving forward.

Now, let me continue. The belief, if you will, we have in the current safety of transport of spent fuel is based on NRC's confidence in the robustness of the shipping containers that we certify and the ongoing research in transportation safety. Also, as noted in the third bullet, this confidence is based on industries compliance with the safety regulations and the conditions of certificates that's resulted in an outstanding transport safety record.

The NRC has been studying the issues of transport safety, transportation safety for more than 25 years. And we continually find that the likelihood of release from an accident and the associated risk to the public are extremely low. Even so, the NRC continues to be vigilant about transportation safety as an essential part of our mission. The NRC follows an extensive program to investigate and assess the continued safety of spent fuel shipments, including analyzing spent fuel transportation experience and records to better understand safety issues, evaluating new transportation issues such as the potential for increased shipment levels, increase in changing cask contents, populations along the routes and other factors as

well as using new technology such as enhanced modeling and analysis tools to estimate current and future levels of potential risk to the public.

The Package Performance Study, or the PPS, and I'll offer that's an acronym that we'll be using quite frequently today. We try to avoid acronyms but PPS is one many of us will slip into frequently. The Package Performance Study is an important part of NRC's confirmatory research program for spent fuel transport. The Office of Nuclear Regulatory Research has the NRC lead for the study with assistance from the Spent Fuel Project Office for programmatic direction and public outreach activities.

Now, we recognize that some stake holders do not share NRC's confidence in its regulatory programs. We believe the Package Performance Study can be an appropriate means for others to understand and to hopefully gain and share our confidence in transportation safety.

Now I want to provide just a brief overview of the Package Performance Study from its inception leading up to today's meeting. The Package Performance Study began with a series of public meetings to collect views on possible future work on shipments of spent fuel and to identify possible follow on work if following our issuance of new Reg 6672, that was a report we issued in March of

2000, which was a report on the re-examination of the risk of spent fuel transportation.

In 1999 we held a first series of public meetings. After this first set of meetings, NRC published the issues report in June of 2000. This report compiled state coder input obtained from four public meetings held in 1999 and letters and e-mail comments we received. Commenting stake holders included nuclear industry groups, transportation industry groups, the Department of Energy, Department of Transportation, state and local and tribal governments, public interest groups and members of the public.

Now to discuss whether the Issues Report accurately captured the comments and suggestions and to discuss recommendations to resolve these comments, four additional public meetings were held in the year 2000. After these meetings, the NRC took the Issues Report recommendations and comments and began and extensive planning phase for the Package Performance Study.

The first major product of this phase of the Package Performance Study is the topic of today's meeting. And that is to present the draft test protocols and to receive your comments, your views and recommendations. I'll note, as Chet's mentioned as well, we've had three previous

meetings and we've received an extensive and wide ranging number of comments.

We've also just recently received eight letters from Congress. Senators Reed and Epsen sent a letter to the NRC just last week identifying comments and suggestions for consideration in the Package Performance Study. And just last night I was informed by our office that Senator Durbin of Illinois, the state we're meeting in today as well, has also sent a letter dated yesterday, March 18th, to the NRC as well identifying, suggesting considerations for our consideration in the Package Performance Study.

A topic of discussion at all three of the previous Package Performance Study meetings is what is it we're trying to do with the Package Performance Study, our outreach activities and our efforts to, if you will, to instill confidence or gain public confidence in what we're doing with regard to transportation and safety.

I've identified on the overhead a few points that I want to give a little bit of back drop as far as what we, in this effort today, in our previous efforts and our following efforts will be attempting to do to more greatly involve the public in our activities. First, let me mention the Package Performance Study is the first large NRC research project with significant public input;

participation in the scoping, the planning in a protocol development as well as the follow on activities we're planning.

We're attempting to provide information to the public on how the tests relate to current regulatory requirements and will demonstrate further how the NRC, how the robust NRC certified and approved designs perform under conditions that exceed regulatory design requirements. It's important that we consider the test conditions and insure that we can relate them to real accidents, real world conditions so that all of us can understand what the tests represent and what they don't represent.

We need to convince ourselves as well, as stake holders, that the program is an appropriate use of taxpayers and rate payer's money. That is the tests are useful and meaningful. In the conduct of the study we've provided feedback on public inputs and we've modified plans based on comments and suggestions from stake holders. We as well, as part of the study, plan to invite stake holders to witness the test, to see firsthand and better understand the conduct and the results. Reports and other communication tools will be used to inform stake holders about the results, what we'll do with them as a regulator and how they will affect the safety of future shipments of spent fuel.

And let me summarize what our efforts in public confidence and outreach activities to the point that was stressed on an earlier slide. That we recognize that some stake holders, some of you here, do you not share NRC's confidence in its regulatory programs for transportation and safety. We believe that the Package Performance Study can be an appropriate means for others to hopefully understand, share and gain our confidence.

Now, what do I see as a success for today's meeting? The Package Performance Study, draft Test Protocol Report summarizes the field test that NRC proposes to perform in the study as well as the analysis performed to develop the test summaries. The test we propose involve previously NRC certified designs and are not directed to or are not related to the NRC current certification of any specific cask design.

We've issued this report for a 90 day public comment period ending May 30. The report and comment period were announced via a federal registered notice dated February 21st of this year along with meeting notices, a press release, a mass mailing of over 500 copies to the PPS mailing list and the report's available on the Package Performance Study web site. If anyone here is not on the mailing list and would like to be added, just let one of us

at the NRC know or if you will, you can note that on the sign up sheet that was on the table outside the room.

Now, the purpose of today's meeting is to obtain comments on these proposals. I want to emphasize that no decisions have been made yet. As Chet has mentioned, we're here to listen, understand your comments as we consider and move forward with regard to our finalization of a draft test protocols. I'm happy to see such a large group of qualified participants at the round table and in the audience. And I'm confident and hopeful that your comments will help the NRC develop the best and most appropriate test plan for the Package Performance Study.

And finally let me note, as Chet did, that we're interested in hearing from you if you find this meeting in its format useful or productive. A meeting evaluation forms are at the back table outside the room with the other handouts. And as Chet had mentioned, I want to emphasize we are looking for feedback not only on the conduct of the Package Performance Study but also in the broader context of our efforts and outreach activities to communicate, have meetings such as this in the forum we have for this communications. So, we're interested in your feedback there as well. So, on the meeting evaluation forms or as Chet has mentioned, as you're providing comments to us, written

comments that are due by May 30, if you prefer to incorporate or include those comments there, we'd appreciate it.

I look forward today to a very productive dialogue and discussion. And I thank you very much.

MR. CAMERON: Thanks, Bill.

Let's move on to our second speaker, Andrew Murphy, who works for the Office of Nuclear Reactor Research. He's the project manager for the Package Performance Study. And most recently he's been working on the development of the Protocols Report that we're talking about today. He's got about 24 years of service with the NRC working in the areas of earth science, seismic areas and structural engineering areas. He's worked on the seismic hazard estimates for nuclear facility site. And he's managed large scaled testing programs for nuclear power plant structures and systems. Before joining the NRC he served as a research scientist at Clemon University Laman Dority Earth Observatory. He has a Bachelor's in Geophysical Science, Engineering, rather, and a graduate in Seismology.

With that, Andy.

MR. MURPHY: Thank you, Chet, for the introduction.

On this first slide we indicate the folks that work with me in the NRC's offices on the development of the Package Protocols. Shortly, Ken Sorenson will show you a list of the folks that work at Sandia, providing considerable help for us to get this document together.

The next one?

In the documents out front, particularly the federal registered notice, there are a number of web sites and individuals listed for particular portions of the document and feedback information. But I'm giving you this, my name, as a point of contact with the appropriate attributes there so that you do have specifically a single point of contact if you have any difficulties getting a hold of us to provide comment or to ask questions.

Next, please?

What am I going to talk about this morning? I'll say the objectives of the Package Performance Study, the expectations for this meeting, the status of the project at this time. A very brief discussion of the staff's proposal. And that's what it is at this stage, a proposal. And as Bill warned you about acronyms, we, me in particular, may be slipping back and forth and telling you things. We've decided to do this. We've decided to do that. What we have done is decided to propose these things.

And if I make that -- that's what we're talking about. This is a proposal from the NRC staff on how to conduct these physical testing.

And then we'll very briefly touch on some of the specific comments, specific items that we would like you to comment on at the end of this presentation.

Next one.

The objectives, we've listed basically three objectives and how many do you see up there? Four. The principle objectives have been to enhance public confidence. We've had considerable discussion at the other three meetings as to what this means. Some folks have suggested that we should be talking about public trust and public understanding. And that if we wanted to do confidence, that would grow from the trust and understanding.

Second item is that we're interested in validating, this is the engineering part of it, we're interested in validating the computer codes and models that we have for the response of the casks during transportation accidents. We are also interested in obtaining data information to refine the risk estimates that we have done and have published recently a new Reg CR6672, which is a document that outlines a risk study associated with the transportation of nuclear fuel, spent nuclear fuel.

The extra item that we've added on here is that we're trying to obtain a level of realism in the test program. It has been very interesting on how folks look at this word realism again. Some of our folks have been looking at that as a particular frequency or probability of occurrence. One individual at our Las Vegas or Nevada meetings has indicated that realism, doing a realistic testing meant for the fire test on the rail cask to select a fire that was fueled by the hottest burning material that is shipped in bulk on the U.S. railroads. So, there's a little bit of difference on what realism means. And we'd be interested, obviously, on your thoughts on this.

The next one, please?

Status; right now we're out for public comment on what we've been calling the Test Protocols. In very simple terms, these are simply the staff's proposal as preliminary or draft plans for conducting the physical testing of the rail and truck casks that are used for transporting spent nuclear fuel.

The next important thing here, I'll say the second important thing out of this talk, is the point of contact and this web site address as the location for you to find a copy of the test protocols. And also there is a link to a web site where you can leave your comments. As Bill

has just said, it's out for 90 day public comment period and that ends at the 30th of May this year. And after we have received the comments and digested them, we will be developing the detailed test plans for the actual conduct of the tests.

Next one, please.

Okay. Now, I'll give you a real quick run through on the staff's proposal for the rail impact test. I'll start by saying in order to carry out the preliminary calculations and so forth, we had to make a decision on particular casks in which to work. And for the rail we picked the Holtec. This is no kind of a commercial or public endorsement of the Holtec. It was simply a cask was available and fit our criteria of being a certified cask with some likelihood of actually being used for the transportation of spent nuclear fuel.

We proposed a carry out full size or actual cask testing. We're proposing to drop the cask from a tower to obtain the velocity of 75 miles an hour. We will be dropping it, as it says, onto an unyielding target. This will be a mass of some three million tons of concrete at the right dimensions. The orientation that we're proposing is a center of gravity over a lid corner so it'll be coming down at an, if driving vertically but it'll be coming down at an

angle. Again, the speed that we're proposing is 75 miles per hour. We'll get into a little bit of discussion of that later on in one of the specific sessions.

We're proposing to have a surrogate fuel assembly in the cask. For the Holtec, this would mean 24, it will hold 24 pressurized reactor fuel assemblies. We will have one of those assemblies replaced as a very close surrogate. You'll basically not be able to tell the difference between the real thing and the surrogate with the exception of the radiation. We will not be using radioactive materials in this test. The other 23 fuel assemblies in the canister will be dummies. This simply means that they will be weight and mass equivalents of fuel assemblies. But they will not be real fuel.

Next, Chris?

Just a quick figure sketch of the Holtec Hi Star 100 real cask. On the right we have a drawing sketch of the cask itself. And on, excuse me, on the left we have the cask and on the right we have the cask with the partially inserted multi purpose canister.

Next, Chris.

This is a picture of the Holtec Cask on a rail car. The carriage that is there is not actually the one that will be used for long distance transport. But was

available from Holtec.

Next.

For the truck cask we selected the General Atomic GA-4 Cask. Again, we'll be using an actual cask, again, dropping it from a tower. The orientation we're proposing at this time is a back breaker. So, imagine the cask as a dumbbell. It'll come down and hit an unyielding target as a semi-circle that would represent a, something like a bridge abutment. One of the reasons for selecting this particular orientation and experiment was that there was considerable comment in earlier public meetings about an experiment in which the impact limiters, the shock absorbers on ends of the cask, were bypassed. And this back breaker orientation will do that. Again, we're proposing 75 miles an hour onto an unyielding target. The GA-4 holds four assemblies. And one of those assemblies will be a surrogate and the other three will be dummies.

Next, we have a drawing of the GA-4 cask with a number of the important elements identified. The thermal testing will follow sequentially from the impact test. We're proposing, again, tests on both casks. We're talking about fully engulfing optically dense hydrocarbon fires with a duration of more than a half an hour. To explain the full engulfing, I think you could understand. It just means that

the fire will fully engulf, fully surround the cask. The optically dense means that you cannot see through it. And the importance of this is that the cask cannot see outside of the fire. So, it is, the fire is physically inputting heat directly to the cask and that there is not a source of relief from that heat input. Hydrocarbon fire means we'll be using something like jet fuel for the fire. And the duration, we have proposed to have it longer than the half hour certification fire. But at this time we have not picked a specific duration for that.

Next, please.

We've identified a number of specific issues that the NRC staff was looking for comment on. These are listed in the Executive Summary of the Protocol Report. We had in mind 11 items that we were specifically interested in. They're not all listed here. But based upon the comments from the last two meetings, the last three meetings at two locations, we've added the one about test of failure. There was considerable comment at the previous meetings that we should be testing the failure. We've added that item to this list at this time and we would, again, specifically we would like to have comments on whether or not it's appropriate to test to failure.

Okay, and that concludes my presentation this

morning. Thank you.

MR. POSLUSNY: Thanks, Andy.

I think one point to reemphasize is the fact that this is a proposal and nothing is in concrete at this point in time.

Okay, the next speaker is Ken Sorenson. Ken is the manager of Transportation Risk and Packaging Department at Sandia National Laboratories. He's been there for about 20 years. He's worked in the area of transportation of nuclear materials, computer analysis on cask responses to accidents, testing of tasks and risk assessment. He's currently the chair of the Package and Transport Division of the Institute of Nuclear Materials Management. He also is on the Editorial Board of the Institute International Journal of Radioactive Materials Transport. He's earned a Bachelor's in civil engineering at the University of Arizona, a Master's in Civil Engineering at Colorado State and an MBA at the University of New Mexico.

With that, Ken?

MR. SORENSON: Thank you, Chet. And good morning, everybody. Let me say on behalf of Sandia it is a pleasure to be here this morning. As Bill Brach mentioned earlier, this is the fourth meeting that we've had. The previous three I think we got a lot of really good comments

and had a lot of good discussion. And we look forward to a similar day today.

Sandia is the technical support organization for the NRC on the Package Performance Study. So, the analysis that you see and the discussion of the testing in the protocols was basically done at Sandia National Laboratories.

I would like to recognize the analyst at Sandia who actually worked on this program, done the analysis. They are shown here; Doug Ammerman, Robert Kalan, Carlos Lopez, and Jeremy Sprung.

I want to reiterate really what the protocols that you have before you are really all about. They are a snapshot of proposed, proposed path forward for the Package Performance Study with the caveat that we really are looking for comments on these in terms of how best to proceed on this. We do identify casks in the protocols. But as Andy mentioned in the last talk, we really use these candid casks as a vehicle to do preliminary analysis so that we can provide a benchmark, if you will, or a calibration of how these casks are going to respond in these different severe mechanical and thermal accident environments.

And we also use these casks to do these preliminary computer code analysis in a mechanical

environment and the thermal environment to see really what levels of severe accidents that we're postulating and how the casks would respond to those types of accidents. Again, you'll see in the designs that were chosen, depending on the different designs, you really do get different responses out of these casks to these severe environments.

And then, thirdly, the protocols really are provided to solicit public comment and feedback. I think it's important, too, to say what they're not. And basically they are not a prescriptive definition of what's going to be done through the Package Performance Study. They really are a snapshot to give the public a chance to review and comment on the proposal.

So, Andy, I think, gave a very good background on the protocols. Let me, just to stimulate a little bit of your creative juices a little bit for discussion, talk a little bit about some of the basic analysis, computer analysis that were done. The first picture here is a computer analysis of the Holtec Hi-Star 100 rail cask. Andy mentioned this analysis that you see here is a center of gravity over a corner impact at 75 miles per hour. And the center of gravity over corner is really an orientation like this where the cask is falling. And the entire weight of that package is going right through the impact point, shown

up there in the upper left hand corner of the cask. So, it really is a very severe orientation.

There are other orientations for different cask designs that could create higher G-loadings, for example. But this really is a very severe orientation that is really focused on potential pathway leakage for the containment, which is at the closure end of the cask.

The other important point to note about this is that this analysis was done on what we term an unyielding surface. And the point about that is that all of the energy developed during that drop goes into deformation of the impact parameter on the cask, that big donut, ripple structure there on the cask, and it does not go into deformation of the target that it hits. There's been a lot of discussion in the past three meetings about the realism of the test. And talk about impacting the cask into a roadbed, for example, or a granite outcropping, a bridge abutment, things like that.

And those are good comments in terms of realism of the test. This, from a technical standpoint, provides really the hardest target that you could impact this package into. And for a cask that's 140 tons, it's very difficult in the real world, really, to find a perfectly unyielding target like what we're suggesting in the Package Performance

Study and the protocols.

The graph on the right shows the acceleration or deceleration of the cask. And this particular analysis for the Hi-Star 100 has a function of time, which is on the X axis there. And you can see it peaks out at about 100 g's. And we did a similar analysis on this cask for this orientation at the regulatory nine meter drop. And that's the bold horizontal red line. And you see that resulted in a deceleration of that cask of about 30 g's, a little bit over 30 g's. So, for this particular analysis, the 75 miles per hour onto an unyielding target, the 100 g's is a severe test relative to the nine meter drop test in the current regulations.

The second picture we have here is the Back Breaker Test that Andy talked about on the GA 4 cask. Again, this was an orientation that we thought about when it was decided to look at both the rail truck and a truck, excuse me, a rail cask and a truck cask drop test. We're thinking how could we do a different test on the truck cask that would provide us new information other than what we're gleaming from the rail cask test.

And a lot of the public comment we got two years ago in 2000 was to look at an orientation where you would bypass the impact limiters and you would hit the cask

containment boundary directly. And that's what this, excuse me, Back Breaker Test simulates. And you could think about this as a truck cask going down the road and they have an accident. And possibly the cask goes into a bridge abutment like you see here.

And as you can see, this results in a lot of deformation on the cask body itself. Again, we have the G loadings versus the time and this one, for this analysis, the GA4 cask, you're getting a 75 miles per hour. It peaks out at about 150 g's and you have an averaged deceleration of about 100 g's. As Bob Halstead mentioned earlier, this really is a test that looks at a lose of shielding as opposed to lose of containment. This is a depleted geranium gamma shield. And you would definitely get cracking of the gamma shield. Although we don't anticipate that you would get lose of containment in this particular orientation and speed.

The other thing I think is important to recognize between these two casks, the Holtec Hi-Star cask, the rail cask, has an internal canister that canisters the spent fuel. The GA-4 cask is what we call a bear fuel cask shipment. So, the fuel assemblies inside the GA-4 cask are not canister.

This is some analysis done of the rail cask, the

Holtec rail cask thermal analysis. On the left was show some analyses of a pool fire test. And what we're looking at here on the bottom is if the cask was at the level of the pool, the fuel, the middle picture there is that the regulatory one meter distance above the pool fire. And then the top picture is at three meters above the pool.

And what we're looking at, if you look at the top picture there's a relative dark area underneath the cask and in the middle picture as well. This is what we call the Vapor Dome. You don't get complete combustion of the fuel mixture there because of lack of oxygen. So you have a relatively cool area underneath that cask surface. And so we're looking at the affect of that vapor dome relative to the position of the cask to see how that affected the surface temperatures of the cask during the test.

The big picture of the cask in the middle is the, again, the rail cask. And that shows a picture of the cask at the one meter above the pool fire orientation. And you can see the, that's a plot of the surface temperatures on that cask. And you can see there's a relatively cool area in the bottom of the cask relative to the rest of the cask because of that vapor dome. Again, the plot here is a plot of surface temperature of the cask at various points in the cask relative to time.

So, this is a snapshot of what we're looking at from the thermal analysis for the protocols. There's been, I think, some good comment on protocols in terms of balance between the discussion in the protocols and the mechanical testing versus the thermal testing. One of the issues with the thermal testing is being able to properly define the actual fire environment. In a mechanical test environment, it's really quite easy to define that environment. Dropping the cask, it follows the first laws of physics and it's really not difficult to construct a test in the mechanical regime. In the fire regime, it's much more difficult with the fire itself. The phenomenon of the fire physics make it a much more difficult problem. And so we really are looking for your comment and feedback in terms of how best to capture this environment and due the proper type of test that will get us the most information on how these casks respond to the thermal environments.

So that concludes my talk. Thank you.

MR. POSLUSNY: Thank you, Ken.

A couple of observations. Andy talked about the fact that one of the objectives of the program is to update or revalidate our analysis for accidents that go beyond the regulations. And I think Ken's graphs clearly showed 130 g's versus 30 g's under regulatory analysis is a big

difference in the forces that would be seen in the test.

I'd like to take a few minutes to address some comments from the folks at the round table. And then we'll go into a brief discussion from each person as to what issues you think are most important. We'll spend a couple of minutes there and we'll go around again. And then get into the over-arching issues.

So, are there any comments or questions on the discussions we just had? Yes, Bob?

MR. HALSTEAD: Thank you, Chet. I'm Bob Halstead and I'm speaking on behalf of the State of Nevada this morning. I'd like to make three comments on these opening presentations, Chet.

First of all, the State of Nevada is deeply appreciative of the fact that the NRC is conducting this proceeding. Those of you who know, when we disagree with the NRC we're not shy about saying it. And in this case we think the NRC has correctly identified probably the single most important transportation safety issue in the fact that they're conducting this proceeding on a topic that we've been asking for action on for, to my knowledge, at least since 1990, is very important. And because of the peculiarly heavy transportation impacts that occur at the end of the funnel, as transportation planners describe it,

Nevada has a special interest in these transportation safety issues.

So, point number one, kudos for holding this proceeding and deep appreciation from Nevada, who frankly has a competing proposal for cask testing. And the gracious and generous way that the NRC has allowed this proceeding to allow a very open ended debate is probably the first time in the 25 years that I've personally worked on nuclear issues and been in a lot of NRC proceedings in that time. That's probably the best thing you've done to promote public confidence in my memory.

Point number two, validating the NRC's willingness to listen to input. Now, I've had the benefit of listening to the last four rounds of these opening presentations. I believe you've done a good job listening to the input on those presentations because this presentation's very different than the one in Rockville.

I particularly appreciate three points. First of all I appreciate the addition of test to failure as a consideration brought before the group at the beginning of the meeting. And the second point here is that the NRC has streamlined their discussion, thrown out some of the important but sidetracking issues. For example, this morning we don't have to have a debate over the use of

probabalistic risk analysis and the State of Nevada's concerns about new Reg CR6672, which we would argue is the foundation document for a lot of the current risk analysis. But it's highly controversial. And I don't believe it necessarily advanced our discussion last week to spend a half an hour debating it. And I appreciate the fact that the NRC responded to our concern that that should be dealt with separately at another forum so that we wouldn't have to sit here talking about public confidence as it relates to the last couple of proceedings that we've been involved in.

And finally, I want to thank the NRC. It may be a thoughtful site selection on their part or serendipity, but while Nevada asks for most of these meetings to be held in Nevada so that our people can attend them, we've also argued it's important to have it in the most appropriate transportation corridor states. According to the Department Energy's maps, which we've brought with us for those who want to look at them, about 70 percent of all the shipments to Yucca Mountain, regardless of which motor mix and transportation scenario is used, go through the State of Illinois.

We are here about three miles north of the Union Pacific's Proviso yard. Under DLE's calculation, about one out of every three rail cask would go through the Proviso

yard. And on a good day, Tim, I suppose we're 30 minutes north of the I-80, I-90 corridor. It's not a lot of miles but some days it's a lot of minutes. And that corridor would likely receive about one out of every three truck shipments to Yucca Mountain under either the -- rail.

So, without wanting to sound too polyanish, the State of Nevada is very appreciative of the way you've conducted this proceeding. We're appreciative of the way that you've been listening as you go along. And we're really happy to be here today to focus on the very specific issues now of what the technical inputs to these test protocols should be.

Thank you.

MR. POSLUSNY: I promise we will get to the audience just before lunch. So, hold your questions till then.

MR. WERNER: Chet, I just have a process question. I look at the agenda and it looks like we have 9:15 is participant interests, over-arching issues. And you said there was a time to go around the table --

MR. POSLUSNY: We're going to do that right now. So, right now I'd like to basically talk about, you know, hopefully you've read the report and what are the things you'd like to bring to the table today, very briefly. So,

we'll start with each person starting with you, again, Don.

MR. FLATER: My main purpose for being here is in the State of Iowa, like the State of Illinois, is a primary corridor state where the material is going to cross. And what I'm looking for is what I can take back to our folks to tell them that, you know, we really don't have a problem relative to the transport of this material. In the State of Iowa we have a lot more things that are a lot more problems than this kind of material going across the state. I mean, you speak about ammonia and things like that that cross our states, go through the middle of our large towns.

So, what I'm looking for is the testing that's going to be done, how it's going to be different from what was done previously. In looking at the casks, they look pretty much the same. Are we just reproving what we have already proved back on the earlier tests? I would be interested to know how the casks are going to be different, if they are going to be different. Or do we have a good design? That kind of thing.

So, basically what I'm here for is to see what's going to happen, see what the tests are going to be and try to convince our folks that we don't have a problem with this stuff coming across the State of Iowa.

MR. POSLUSNY: Thanks, Don. I think you'll hear

answers to all those questions.

MR. FLATER: Thank you.

MR. WRIGHT: Ned Wright with Lynn County, Iowa. We also not only have the power plant but we also have the transportation routes come through our community. I also have the two haz-mat teams that would respond to emergencies in the eastern part of the state. So, a lot of the things that you guys are talking about, my guys have to respond to it. So, I have a responsibility to them to make sure that they know what's out there. And part of the problems that we're getting is the information that's coming out, I have far left and far right. Either it's not a problem or, you know, don't even respond because you're dead before you get there.

And one of the problems that I have is trying to use the material that we're getting here so I can go back and show my people and confirm to them that they know what they're doing and stuff like that. Part of what we're looking at is our haz-mat teams and the first responders rely very heavily on the DOT guidebook for hazardous materials. And they know what to do with all this other junk that comes through here, and I have more than my fair share coming through the community, so our responders know what that is.

We're also getting conflicting information that either, and I always ask our technicians, if I take a bundle and drop it on the ground, forget all the shielding and stuff like that, how bad is it? And I've got everything from, you know, the safe distance is a hundred yards. Then I have other report says five miles. I say, all right, guys, we've got to get tighter shot group on this.

And that's what I'm looking at is making sure that the information we have here is important. And I also have to address the public concerns because my other problem in the fact that of all the other emergency management things we do because of the nuclear power plants, that we have any concern that happens in any place of the 103 facilities, I have to respond to that because someone keeps faxing all this to the media about how bad it is. If it's bad in Point A, obviously your community has a problem. So, I spend a lot of my time explaining to the public, we do not have a problem. And if we do have a problem then a whole lot of people have been lying to me.

So, I've got a lot of confidence in what has been going on. And I need to be able to, from my own self, confirm that confidence so that I can, again, because I'm responsible for the people that's actually going to go out and touch it.

MR. POSLUSNY: I'm not sure we're going to be able to answer that second question during this discussion. But I think maybe myself or some folks from the region could chat with you about that off line. But the one on safe distance, given a reach task, we'll talk about that later.

MS. SNYDER: We can address that later. Thanks.

MR. WRIGHT: Sure.

MR. POSLUSNY: Fred?

MR. DILGER: Good morning. I'm Fred Dilger, I'm here from Clark County, Nevada. Clark County, Nevada is where Las Vegas is and virtually all of the shipments will have to pass through Clark County in route to Yucca Mountain, should Yucca Mountain be actually constructed.

We're very glad for the opportunity to be here today. I want to echo Bob Halstead's comments and say that it's been a very, very good experience to come to all of these meetings and listen as the NRC has refined its own presentations and adjusted, I think, to the comments that they've heard as these meetings have gone on. And what I see now is that we're focused in a very, is that the earlier meetings were useful because today we're focused on really some of the essentials or we'll be able to do that, to get really the heart of the matter in a number of different

areas and to touch on some of the technical problems or the technical questions that still remain.

So, anyway, I think that this process and the way it's been implemented have been really, really very, very positive and we look forward to today's work.

MR. POSLUSNY: Thanks, Fred. George?

MR. CROCKER: Thank you. My name is George Crocker, again, from Minnesota. I, too, am very appreciative of this opportunity to be here. I thank you kindly for that.

You kind of stole my thunder already, though, when you go talking about testing to failure, which is really one of the key things on my agenda to help that happen. Almost any widget you care to look at in order to find out what's wrong with it or where will it break or how to make it better, the engineers test it to failure. There's whole protocol in almost anything on how to do that. It seems to me absolutely critical when we're talking about this kind of material that we do, in fact, to failure in as many failure modes as we can possibly conceive of.

So, that, that's a real important point on my agenda. And to see that it's already on yours, I didn't notice it in the draft that I had. So, I'm very appreciative to see that there is that kind of

responsiveness even going into this meeting today. So, thanks for that.

There are a number of other concerns that I do have. One of them has to do with the fact that when we are actually shipping waste, why we will not have placebo material, we'll have material that has a thermal load to it in particular. How do we account for the thermal load, the interior thermal loading as we find ourselves in these extreme environments? In other words; I don't know the answer to that but I haven't heard any discussion of it. And that is deeply troubling to me.

Likewise, there's sort of a similar problem with, there was some discussion in the draft having to do with the cask atmosphere. Of course, these things are in a helium or -- atmospheres as they're shipped. And there's reasons for that. What happens when we lose that atmosphere due to an extreme environment it comes into? And what does that do in terms of the potential for internal degradation to happen that wouldn't happen if you didn't lose the internal atmosphere. So, that's an issue. And I think the test protocol has to do a better job of coming to grips with that particular problem with it.

Another problem, which is sort of more of a generic one is that we're moving or at least there are

forces that want to move quite willy-nilly into a massive casking operation. That means we're going to make a lot of them. Right? It's going to be a lot of people fabricating casks. Now, you've tested your casks. But how do you know the one that gets the hit meets spec, right? Where is your quality control? Where is your quality assurance that the material that's rolling down the rails and down the highways actually is capable of performing at the level that your test protocol says it will? And there I think we're screaming down a black hole. I don't see anything that allows any assurance. And I'm looking for reassurance that there is, in fact, something there. But I don't see it and I want to see it before we go too much farther.

Then the final thing that is on my mind, of course, is something that ought to be on all of our minds a lot more, and that is the potential for sabotage. I don't know. You can go into any library and take out Jay's magazine and take a look at what anti-tank ground warfare weapons do. You know. They're the shoulder fired rockets, single person. You don't need line of sight. You can guide them in with a joy stick. Now there's even drowns. You can fire them off from a hundred miles away and they'll track.

I mean, these are very sophisticated weapons. And they'll go through three feet of tank armor, chubba

minor, layered steel, in one side and out the other of anything you've got. Anything. And there's no response to it. That's not appropriate. We're going to have to get serious. If we're serious enough to do this green, red, orange, blue stuff, you know? If we're so concerned about our security to do what W's now doing, let's make it real on this side, too.

So, that's a challenge. How to robust superstructure over these things so that incoming detonates on the superstructure rather than the target. And if you don't do that, if you don't figure out how to do that, you're not serious about what I heard in your opening presentation, which wasn't on the slide but you did say something about in addition to safety. You said something about defense and security. So, let's get serious about it rather than just the bodyguard of lies.

Thank you.

MR. POSLUSNY: Okay, thanks, George. Would the staff want to address either QA or sabotage at this point or do you want to wait till later?

MR. BRACH: I'd suggest we go around. There are a number of topics. I think we may spend a good part of the day in that interaction --

MR. POSLUSNY: Okay, all right. Either later or

-- okay. John.

MR. VINCENT: I think as I've said before at previous meetings, the nuclear industry does not believe that full scope testing is required to ensure public health and safety either as a pre-condition to the designing and licensing of the casks or for the purposes here. In fact, we know in one of the suggestions that's been received already is that in some of the data collection that the NRC wants to do, part scale testing will do very nicely for that. And, in fact, for the certification process the industry uses part scale testing, actual component mock up testing and computer evaluations using our vastly improved computer evaluation techniques to accomplish this goal.

We've been doing that for a number of years now and our ability to predict the performance of the cask to be a computer simulation is much improved over what it used to me. In fact, we can do things now and measure particular parameters in those computer evaluations. It would probably be very difficult to monitor and measure as an actual fact of the testing. And we can do those things over and over and over again until we understand the exact performance of the package.

Another thing that's important here I think is that the exemplary transportation history that we have

illustrates that we must be doing something right. We were doing what we need to do to ensure the safety of the packages by first guaranteeing their robust nature. And then secondarily, moving them appropriately in commerce.

Now, having said that, the industry does believe that there's probably some benefit in doing the full scaled testing for the business of improving public confidence in the regulations and the actual transport of these materials and the casks themselves. The PPS or the Package Performance Study, stay away from the acronyms, can be very helpful in that regard if it's done properly.

However, it's not clear that it's satisfying both of the goals, that is the scientific data collection and the public confidence building are not mutually exclusive in a large way. The technical data collection is one that requires that you understand very precisely what the conditions of the testing are in order to be able to relate the measurements you're making to the physics involved. Whereas on the public confidence side, we're not sure that doing something that is not specifically real world type of scenario improves that circumstance.

So, we would argue that maybe you need to look at that. It may have a possibility for bifurcating the process of the testing. You may need more testing or some

part scaled testing as well. But that needs to be investigated.

Again, I want to emphasize that we think the real world testing scenarios will support improvements in public confidence, especially if they have an input into what those should look like. But they may not provide the scientific rigor that is needed to support the evaluation of the materials and the design properties that you're trying to do. And it's entirely possible that the NRC on that score could end up satisfying neither group, that is the engineers or the public sufficiently to accommodate what their goals are as stated in the Package Performance Study protocols.

Whatever testing is done it should be risk informed. And particularly that should involved a cost benefit analysis. And we're also moving into an environment where much more of our regulations are going to be risked informed and these tests, in some fashion, should serve to promote the NRC's moving in that direction.

Again, as I said previously at the meeting in D.C., the industry does not believe testing to failure or destruction proves anything. You have to define what it is you're trying to test, figure out how you're going to do that and then figure out how you're going to measure it and

make sure you were able to get the measurements once you design the test. So, just saying you want to test to failure or test to destruction doesn't necessarily prove very much. And I'm not sure that it would be helpful.

We need to have the test design criteria established very specifically and we need to have the data acceptance criteria established before you even do the test so you understand what it is you're collecting and why you're testing it. And how you're going to except the data as doing what you were trying to do, especially if it is, as you eluded, the mode of trying to validate computer simulations in the areas for the cask information and its primary issues.

It was mentioned at some other meetings and hasn't been mentioned here yet, but at the completion of the Package Performance Study should be done prior to the beginning of any future shipping campaigns. And the industry believes this is totally not justified. It should not be a necessary pre-condition to DOE beginning its shipments to the Federal Repository, wherever that turns out to be, or to those, the private fuel storage project.

MR. POSLUSNY: Okay, thank you. David?

MR. BENNETT: Yes, my name is David Bennett. I represent one company but in essence a consortium of an axle

of people transport, build, use and have stakes pretty high in this project. We fully support and appreciate NRC's openness. I think it's wonderful to get such valid feedback and input both ways. I think it's helpful. I think it's helpful from the standpoint of the public's security. However, we as an industry have been moving this material since 1954, the Tri-State in particular, and we have found so far NRC has done more than its job because the public has become so unaware of what's going on because it was done so well.

So, we're here to support that, sort of be an alley, a reference, a resource. We believe the cost benefits should be a consideration versus overkill. Not to exempt the statement of overkill to be unsafe but just, as John referred to, full scale testing has not been done and yet there has been no incidents. That doesn't say it would not help. But we are concerned about how much you do and what benefits you actually get because in essence we come from the standpoint, a little bit, someone's got to pay the bill. And when it comes to being safe versus overkill, we think dollars should be spent wisely.

We appreciate this and we're here to help and really as a reference and listen more than raise any issues.

MR. DOIG: My name is Scott Doig and the

community I work for is Dakota Community, has become something of a storage site unwittingly. We currently have 17 dry storage casks and there's legislation for increased storage. And the community is about 600 yards from that spent fuel storage facility. So Prairie Island is interested in removing that fuel to a more secure site, wherever that might be. Part of the problem is that the existing rail line that presumably that fuel would use crosses the only evacuated route off the Island. It is indeed an island that we share with the nuclear power plant.

With that said, the safety of that fuel coming off the island, there are a few issues that hopefully through the day some of the engineers could help out in terms of the integrity of the containers that they're going to be held in. A couple of the questions that the community has are the affects of multiple incidents on these containers. It doesn't seem to be too far of a reach that an impact could easily be followed by a long, a sustained fire on the same task. I'm wondering if you're going to be looking at those.

Also, on the subject of testing to failure, although I haven't done works in that type of modeling, I have done some in natural resource predictive modeling and

regression curves. And the one thing that is commonly known in those types of models is that in order to do predictive modeling of what occurs, you have to have samples at the beginning and the end of the curve or the model to determine what happens in between. Anything that occurs outside of those, that sampling range, your confidence or R squared is quite low. So, we do believe the testing to failure is important.

Also, George had mentioned the impact of terrorist event, a shoulder to fire missiles, those kinds of things. The Prairie Island community is surrounded by a number of blow offs which give, which open it more so than other facilities maybe to that kind of impact.

So, hopefully those are some of the questions that we can get answered today.

MR. POSLUSNY: Marvin?

MR. RESNIKOFF: My name is Marvin Resnikoff and we're consultants to the State of Nevada and also to the State of Utah working on transportation and dry storage issues, accident analysis and environmental impacts. I have to say my view of, I'm glad that things have changed over time. But my view stretches way back almost as far back as Bill Brach's view, back to 1975 when I worked for Attorney General Lefcowicz on transportation of plutonium nitrite,

liquid plutonium out of West Valley Nuclear Fuel Services out of Kennedy Airport in containers that couldn't withstand a 30 foot drop.

And we were resisted by the NRC in court until finally the U.S. Congress simply said in an appropriations bill that these containers have to withstand an air crush. And subsequently the NRC did -- these containers. So, my view of the NRC is colored by those past events. But they also reach now into present day. And it arose again when one of the previous speakers spoke.

One issue I have is how is, the data is going to be used to refine the risk estimates. Then what? Then those risk estimates what? Will change how rad trend is used perhaps? On how we estimate the likelihood of an accident along particular transportation routes. But would that information go into environmental impact statements and will they affect licensing proceedings?

At the PFS licensing proceeding they were using Table S4, which is based on Wash 1238, which is 1972 document. I think the NRC really has, if they're going to refine the risk estimates, that information has to be brought into environmental impact statements, today's environmental impact statements. You cannot use 1972 data and 1972 reports. So, that's the first point I wanted to

make.

The second is I realize that you're not looking at what happens to a fuel assembly. You're only looking at what happens to a cask in this proceeding. But let me just say quickly, what happens to a fuel assembly is very important in these risk estimates. And I know this is going on separately in a separate proceeding that you're going to handle. But let me mention just two quick points about it. It's very important that in a radiated, radiated fuel cladding be used up to the burn ups that are expected now a days, not up to 25,000 megawatt days per metric ton, but at least 40,000 megawatt days per metric ton.

It's very important that one test, what cesium, what 137 is in the gap. That one not relay on Lorenz and Parker Studies of 1960's and early '70's to do that. You should have new studies which actually measures cesium in the gap, which those studies did not do. So, I just want to mention that, that that needs to be factored into the risk estimates, which you're now handling here at this time.

Finally, it's important that the NRC bring to the public the information that it has and do it in a timely manner. The NIST Study, which the NRC contracted for, was done in August of 2002 and it was not released, you know, until several months later. And it would have been useful

for the public to have those results. Similarly, the fire studies that have been mentioned here today, it would be useful for us to actually see a write up of the inputs and, you know, what the assumptions are so that we can make informed comments, you know, in this kind of proceeding.

MR. HALSTEAD: Bob Halstead, State of Nevada. let me quickly overview for you six reasons why the State of Nevada has made such a big deal out of the absence of full scale cask testing and why we think it should be done.

First of all, most of us who are familiar with this field know that the codes have become more elegant over the years, our analytical abilities have grown greatly but we're still, because we're not testing cask full scale, have opacity of measured physical data on cask performance in severe accidents. We need to do the full scale testing to get the physical data that we need to put into these elegant new computer codes.

Secondly, the new cask designs are dramatically different from past and current designs. They differ in their size. They differ in their weight. They differ in the configurations and materials used for the construction of the walls, the radiation shielding, the closure mechanisms and so forth. The very fact that these designs are different from the designs that the fabricators are used

to making, that the carriers are used to handling are that the NRC is used to regulating underscore the need for full scale testing here.

Third point; the radiological hazard goes up as the payload of the cask goes up. The new cask designs have four to six times the payload of current designs. What that means is if you assume average cooling time for the shipments to Yucca Mountain, every rail cask contains more than 800,000 curries of cesium 137 alone. Every truck cask contains more than 175,000 curries of cesium 137 alone. It's an enormous potential radiological hazard.

Point number four; the modes and numbers of shipments to Yucca Mountain and understand, Yucca Mountain shipments, if the project is licensed, will represent probably greater than 95 percent of all the spec nuclear fuel shipments in the United States over the next 50 years or so. So, that's why we're focused on the Yucca Mountain shipments.

Because there is no rail access to Yucca Mountain and because rail access to Yucca Mountain will be extremely difficult and expensive to achieve, and because the Department of Energy is lately telling us they've abandoned their backup plan, which was to use heavy haul trucks for inter mobile transport from a rail in Nevada to

Yucca Mountain in the event that they couldn't build the rails for it. We must consider the possibility that there will be 100 percent truck shipments as well as the possibility that there will be about 98 percent rail shipments.

So, the Department of Energy has actually appropriately bounded what might happen from the transportation planner's standpoint. Over the next 38 years assuming, that is over 38 years from 2010, which is the opening date, you could very well have 109,000 or more truck shipments with an average of about 2900 per year over the next, over the four decades of operation.

If the Department is lucky, and I don't think they'll be this lucky in hitting their target, they might have a much lower number of large rail cask. The number now looks to be somewhere in the neighborhood of 19,000 rail cask, about 3,000 truck shipments over 38 years. The point here is in the NRC's planning for the types of casks that are tested, and in all of our understandings about the transportation risks we'll meet in the future, you cannot say, as the Department of Energy has said, that there will only be 175 shipments for year. I wish that were the case. I've been advocating maximum use of rail for 25 years. I don't see any evidence that it will happen.

Point number five; while the industry has a good accident history in terms of not having massive failures, the last release from the transportation accident that we're aware of was in 1964. On the other hand when you look statistically at their record in terms of incidents per million miles travelled, it's not an establishly enviable record. The accident rate since 1964 for commercial spent fuel shipments is greater than one reportable accident per million miles travelled. And for rail shipments it's greater than five per million miles travelled. So, it's a good record in terms of not have catastrophic events. Let's not assume that it's a better record than it is in terms of the need for more accident prevention.

Point number six; Nevada is very concerned about terrorism and sabotage. But we've chosen to address this issue separately in a petition for rule making filed with the Nuclear Regulatory Commission in June of 1999. And the fact that we're not spending a lot of time raising those issues in this proceeding does not mean we're not concerned about them. It's just both for legal and security reasons we stay with the original approach we took of addressing those issues under Part 73 of Chapter 10 in the Federal Code of Regulations.

Finally, a seven point will seem strange to you

that Nevada has a concern about barges, but it's very important to understand that 24 of the shipping sites in the country have no rail access. And DOE has talked about the possibility of 17 of those sites shipping by barge, including four sites on Lake Michigan. There's no consideration in this proceeding for looking at the emergence standard either as occurs under the sequential test nor is there any attention to physical testing to see if these casks meet the IAEA standard, which is that an undamaged cask must survive the pressures equivalent to a 200 meter ocean submerging.

Now, we would note that there are a number of locations in Lake Michigan that exceed the international safety standard as there are canyons that run in the 200 to 280 meter depth level that would significantly exceed the safety standard in the international regulations.

Thank you.

MR. POSLUSNY: I know it seems like this is taking a long time but these are good issues. I'm sure they're going to make the discussions very useful.

Mike?

MR. CONROY: Thank you. Again, I'm Michael Conroy from U.S. Department of Energy. We concur with the NRC's statements that are in the Test Protocols Report that

the current regulations and programs for transporting spent nuclear fuel do result in a high degree of safety. NRC certification of the cask has contributed to an excellent safety record for transporting spent fuel. And that safety protection is well established. Over the past 50 years, as some of the speakers have mentioned, there's been a good deal of experience gained in the transportation of spent fuel. In the U.S. there's been over 2700 shipments of spent fuel that have travelled over 1.6 million miles. None of those shipments have resulted in the release of radioactive contents. Also, there's been thousands of other shipments that have been made safely throughout the world.

NRC's risk studies have concluded that the risk of spent fuel transported under the regulations is low. What we're talking about here in the Package Performance Study is examining the adequacy of the analytical methods and the data that are used to estimate the response of cask to improbable extreme accidents that might cause a release. We should point out that in a fellow register notice NRC notes that their previous risk studies have estimated that their certifications standards encompass well over 99 percent of possible transportation accidents. So, what the package performance study is doing is looking at those things out on the far end of probability.

What the Package Performance Study is not intended to involve the development of new standards for transportation casks, although I'm sure NRC will keep an open mind on that. But we do anticipate that the tests that are described will demonstrate the validity of computational methods used for both impact and thermal test. And what we would like to see is that NRC make clear that the tests described in the test protocols are not being proposed as new standards for package certification. We'd also like to see that the test conditions used get correlated to real world conditions so that people have an understanding of what an impact on an unyielding surface, how that corresponds to something you'd see in a real world accident.

MR. POSLUSNY: Okay, thank you. Thor?

MR. STRONG: My name is Thor Strong. I'm with the State of Michigan and I've been Michigan's representative to Midwest Council of State Government's High Level Waste Transportation Committee for about 12 years.

I'm not a nuclear engineer, I'm not a nuclear physicist. I'm kind of a simple bureaucrat. And so some of this is far over my head in terms of the very technical issues being discussed. But I'm one who's been very interested, involved in issues of risk assessment and risk communication and relative risk issues. I've been in

support of full scale cask testing since our Midwest Committee took up the issue and voted on a resolution encouraging full scale cask testing way back in 1993.

Not that I have a great deal of skepticism about the value of computer modeling and scale testing and this sort of thing. I've traveled across the Mackinaw Bridge a couple of weeks ago and realized that before that was built there was no full scale testing done on that structure.

In terms of the issues that I'd like to bring up or advocate I guess relate to the issue of drop tests versus horizontal impact tests. And I know that's one issue I guess that's being discussed more specifically later in the afternoon. So, I'll just wait and comment on it then. Thank you.

MR. RUNYON: I'm Tim Runyon with the Illinois Department of Nuclear Safety and I'm also representing the Midwestern Radioactive Materials Transportation Committee, of which I've been a member now for about ten years as well. And as Thor indicated, we've developed a resolution supporting full scale cask testing back in about 1993. And I think the midwest along with the rest of the regional groups have supported the concept of full scale testing for at least a decade now.

Putting my Illinois hat back on, we in Illinois

have been home to the only private fuel storage facility at GE Morris. We have more operating electric generating reactors than any other state in the United States. We realize, because of our geographical location, that we will be intimately involved in dealing with transport of spent fuel by whatever mode. But we also have a considerable history with it already by virtue of the existing facilities.

A lot of our programs that we have right now within the State of Illinois were developed in response to public input and public concern about the transport of spent fuel. As such we have used some of the existing test protocols, some of the historical video from the early Sandia tests. I can't tell you how many times I have shown those films to the public, to first responders, to interested parties as a reflection of the level of testing of casks are subject to and in our own efforts to, I guess, develop some public confidence.

I think we do support the updating, if you will, some of the protocols; validating some of the codes or some of the physical information that will be used to drive the codes. Along with Thor I think I value the more real world tests. I think I value those types of tests that reflect real world accidents. And I'm looking forward to some

additional discussion and hearing some additional opinions on relative to the fire testing and also why the preference for drop testing versus horizontal testing. Those, a little more technical detail on those issues.

To sum degree, one might consider a lot of the discussion that's going on right now, move in terms of the current world condition, in terms of the post 9-11 world. I would agree that if you want to put a hole in a spent fuel cask, you could probably do it. I would agree that you could probably build a cask that would withstand a terrorist attack. I would agree that you could probably build a cask that would withstand a shoulder launched rocket. But once you've built it, could you pull it anywhere?

I can look at those as somewhat separate issues and I feel like there still needs to be a lot of work done in terms of physical security and development of those aspects of transportation. But I don't necessarily think it relates directly to this particular performance study meeting.

MR. POSLUSNY: Dean?

MR. LARSON: My name is Dean Larson, I'm representing Lake County, Indiana, LAPC, and I thank you very much for the invitation.

One of the things that I would commend to you is

when you are completed with this test and you revise the risk, that you spend a fair amount of time figuring out how you're going to communicate that to the public. Our county sits in northwest Indiana. I-80 goes right through our county so we're very concerned about the truck shipments that would come through there and the rail shipments when they come through here.

We're also a county that has had significant experience with a bureaucracy when they attempt to do something like recycle napalm and if you don't spend the right amount of time in the risk communication it's going to blow up in your face. And I don't mean this, the napalm blew up in their face but when the Navy attempted to recycle napalm in our county, there was a huge human cry that was raised. And it goes back to Bill, and I thank you for, you said the precursor of public confidence is trust and understanding.

When people said the words napalm, there was people that had a completely unjustified response just because the word napalm. I would suggest to you that you're going to have exactly, and we've all experienced that same type of response, anything we talk about risk of radioactivity, any contamination risk, anything to do with transportation.

So, I would say when your tests are done, you spend the time explaining it to the public and explain that we can't protect for every risk. I echo the comments about why aren't we testing to the point of finding out would these sub-stand anything of a terrorist activity. I understand that and I understand that that should not slow us down in doing what you're doing now.

Again, I thank the NRC for this invitation.

MR. CROSE: My name is David Crose. I'm the Governor's appointee to the Midwest Radiation Group. Also, I am the appointee to the Southern States Energy Board. I've held those positions since 1991. I chaired the Midwest Group in '96 and '97. Mr. Runyon is the current chair of that group. Mr. Thor Strong is the vice chair. I appreciate the opportunity to be here. I've had occasion over the few years I've been involved to have interaction with Mr. Resnikoff, Mr. Halstead, a lot of the people around the table.

I think one of the main issues we need to think about here is public confidence is the number one issue. The second issue is confidence in responders. As far as testing to failure, we've not, since this is the first time we've really been exposed to this, we don't have a current position on test to failure. We will make written comments

on that.

I think the other big concern is a breach of the cask and also release. That's the two major concerns, if there is going to be a release that would affect the public or responders. Another thing I think's interesting is the issue of a full cask testing. And we do advocate that. As Tim mentioned, we sent a resolution to that affect to the Department of Energy in 1993 and to NRC. I think we need to take a look at, with the younger generation, of the computer modeling. It probably would be interesting to do some kind of a survey, especially with the younger people, which they would have the most confidence in. Whether they would have the most confidence in the full scale testing or whether they would have more confidence in computer modeling. And I think if that has not been done, it might be interesting to take a look at.

We generally agree with what we've seen here and what's been presented in the past on full scale testing protocols. The other thing that's been brought up that I agree with is I think you're going to have to have some kind of a quality control. When you start doing mass production of cask, you need to have some kind of a really good quality control on those casks.

Another thing is in the real world now is the

sabotage. Also we refer the Emergency Management Committee on a lot of other areas. Is like what we call the worse case scenario. And I think that's what we've talked about a lot around the room here and it will continue to be an issue. So, you do have to take a look at that.

The other thing is, I think you just need to be sure, as Mr. Larson's mentioned, the most important thing we've found in the State of Indiana is to educate the public, make sure they get the real facts, not different, you know, people trying to just stress what their point is. But get the facts and then they'll make the decision. And also, they're going to depend on what your emergency management, what your Governor's Office, the other elected officials, response people put out. That's who they're going to listen to.

A quick example of that. We've had shipments coming from Fernaldo, Ohio, for several years now. 60 cars dedicated trains that run every two weeks the full length of the State of Indiana. What we did prior to those shipments starting, we had people from that facility come with us, we held public meetings. And after those public meetings we have not heard anything else about that issue at all. What was interesting, the person they listened to at those meetings was the fire chief in that community. You can sit

there and debate back and forth. And we had -- officials in there. But the person that they listened to was that fire chief and those local responders in that community. And that's who they'll listen to.

One other thing our state has experience with looking at worse case scenarios and also protecting the public. We have one of the seven chemical storage sites in the country. We have 1200 tons of VX nerve agent stored in New Port Chemical Depot on the, close to the border with Illinois. In fact, we work the State of Illinois. And we've found that educating the public has been the answer there and especially the young people and in the schools. And that's the same thing we need to address the issue right here. You need to address the issue with the young people and let them know what the facts are and go from there.

Thank you.

MR. POSLUSNY: John.

MR. ERIKSON: My name is John Erikson, Policy Advisor to the Governor of the State of Nebraska, also a member of this Midwest Radioactive Material Transportation Committee.

My purpose for being here and what I'm looking for is to ensure that there is adequate state involvement. I appreciate the NRC and we, in our regional groups, work

with federal agencies, we continually have to stress the importance of state involvement. Not only individual states but regional perspective.

One of the things that concerns me, and it's already been mentioned, is the concept of risk communication, how you do that, how you temper those with the scientific engineering mind that have a very high confidence in their facts compared with the public perception to it, who would rather see a video that's very dramatic, visual presentation. And so I would tend to agree with the question raised about the need for horizontal testing versus a vertical drop. It's much more of a visual presentation.

Test to failure is a concern. One of the things that concerns me about the whole idea of test to failure is what is the signal that you're sending by proving that you can break something. It could easily give those that are opposed to nuclear power and the whole transportation of nuclear waste more ammunition to say, well, obviously it's not safe because we haven't designed a container that's full proof or that's unbreakable.

So, I guess there has to be some middle ground of looking at where, what's the rationale for the test to failure? Does it actually give us the in point data, that's

been mentioned before. And if we're going to do that, then how do we communicate what we've done in test to failure so that we're not just saying, yes, it can be broken.

MR. POSLUSNY: Jim?

MR. WERNER: Good morning. I'm Jim Werner with the State of Missouri. I'm the Director of the Anna Land Protection Division. And I guess I, I come to this with a little bit mixed perspective. I guess the first question I had is why are we even here today? And I think there are two equally valid answers to that. And one is to work on this PPS and the technical protocols and determine what the best technical answer is to ensure safety. But the second that I think is at least equally important is to help build sufficient public trust and confidence. And when Bill Brach spoke this morning it sounded like logically that's the only reason for NRC to be here is because NRC asserted that they already have, there is, you know, confidence in the existing system, that technically it's sufficient.

And so if it is currently technically sufficient then there could be no other reason but to build sufficient public trust and confidence. And I do think that is a valid reason for you to put this effort together and I applaud you for doing that. And I specifically applaud NRC for going forward proposing the full scale cask testing. And with the

investment of money, money being short, hopefully get the best bang for our buck there in going forward with those sorts of tests.

Missouri, of course, is another corridor community but has a couple of other unique things about it besides being at the cross roads east and west and north and south. One of the things I live with every day is I've got a staff that, like you, has the emergency response. We have a less robust local county system, such as Lynn County, and ours is more on a state level. So, I've got my staff located in six regional offices. So, we need to make sure that they are adequately prepared for the issues. But also have an adequate trust and confidence in the whole system.

Part of the reason maybe we have such a large emergency response system is we have the unique blessing of being the methylamine capital of the world, which might be irrelevant normally to this proceeding but we have 2,100, who's counting, last year meth cases. So, we get like half a dozen meth labs discovered a day. So, we have a very large population of people who are accustomed to dealing with hazardous explosive chemicals and hydros ammonia. The number is larger than all of New York and all of California. So, in a per capital basis it's 20 times larger than any other state. And so we do worry about the ready

availability.

And one of the, in a way of a recommendations I always make is, let me start with the fundamentals. I would urge the NRC to look at this not as cask testing and isolation but really part of a larger transportation system. And I know you're doing that to some extent but make sure that connections are made so that you're looking at the overall system and then the role of the cask technology plays in that overall transportation system. And you're spending your money on cask testing to look at the circumstances that might be real world appropriate things. And that might include an inventory of the issues with each of the states.

And in coming through our state, if you came to us, we might throw out things like the readily availability of these chemicals in a large population of people, ready to use them and having them at hand; the large number of shaped charges, explosive charges and, you know, other unique things about our state. Also the ability to deplete uranium materials in Missouri. My deal on that is I understand there's a separate proceeding on that but, again, to look at this in an overall system.

And I guess my comments come not just from my experience and responsibility managing the programs in

Missouri, but also from my experience at the Department of Energy where for eight years I was the Director of Environmental policy and I'm pleased to have one of the representatives from the, it used to be our transportation office. We created the Transportation Office. I'm glad it's still going and they're still employing people there, back in the early '90's when we established that.

And we had the experience of running the foreign spent fuel shipments. And we learned a lot about both the technical issues and transportation, all the practical things that have to go into it. The transfers, the communications, the advance response, the planning, the cask, the journal, but also the public communication. And we initially, I think, we learned a lot of lessons from that, we being the Department of Energy. When I was running that program I was responsible for the foreign spent fuel shipment program before we turned it over and made it more routine. And again we did not have any accidents. And that was our experience. It has become routine. It's happening all the time. People don't even know it's going.

But it was born of a lot of experience and some hard lessons learned. And one of the lessons managerial is we had a group that was very technically capable of evaluating casks. We used Sandia and Sandia, by the way was

terrific. And I would urge you to use all of their technical skills, their creativity, the practicality that they have to offer.

But we regarded that technical community as just an element in the overall planning management and that there was an equally important non-technical public participation, public involvement segment that had to be brought to bear and actually managing it to accomplish the task because it wasn't just a technical task. If it was a technical task it would have been a lot easier, it would have been a lot faster. It wasn't. That was not the big thing.

I should congratulate you also in having such a small little forum. I've spent a lot of time in front of forums of 250 people who are concerned, to make it an understatement, about the shipments of foreign spent fuel and whether our casks were robust enough. And as you may know, the casks used for shipping foreign spent fuel were never tested at full scale. And that became an issue. But it was not, I won't say just a hiccup in the process, but it was the one we were able to overcome partly because the technical was only part of a larger system and part of the public participation, public involvement process. Not being disrespectful to the technical element but the technical people are only one part of the larger management system to

really have success in it.

I would urge you to go back to some of the work that was done by the Nuclear Waste Technical Review Board on public trust and confidence. It really is sort of an in-house work, to look at the important role, Paul Slovack's work up in Oregon. And to really think about the question not as to how do we increase public trust and confidence. But if your goal is to accomplish a mission, how do you provide sufficient public trust and confidence? You know, it's not just you increase it one percent and, hey, we increased it so we succeeded. It is what is the threshold. And it's not an easily quantified thing. And, you know, as an engineer it's hard for me to, you know, even say I have expertise, but just to think in terms of your accomplished mission. You don't just increase it and say that's good enough. You've got to figure out what is that but what is sufficient? What line do we cross? It's not a clear line. It's not a black and white, easily measurable thing.

I would ask, and perhaps this is going on, whether there is some other forums going on addressing classified issues. There's a number of issues regarding Missouri that is inappropriate for me to raise here. Presumably there is a classified discussion going on with the appropriate people with the appropriate clearances who

can discuss the unique potential threats and issues so that's being evaluated. I don't know if that is going on. I would urge that you consider it and do so. It was relatively easy for the Department of Energy because we all had Q Clearances already. We could have access to the information to the at the facilities to have a discussion.

And with regard to the question of test to failure, I guess I would ask, why not technically do a test of failure? If you're going to spend the money and if it does provided additional technical data, why not do it? And one concern was raised from a public relations point of view because it may give some anti-nuclear people ammunition. Well, that puts it back into the communication. I think he said that. If you do it, make sure you communicate it effectively.

And finally, for states and first responders, for my people who I worry about, I've got to look them in the eye every day, for us to be able to participate effectively in all these various forms, we really are going to need the resources to do so. We're facing added burdens to deal with a whole lot of issues including meth labs and home land security and different terrorism surveillance that we do and we're not getting the resources to do it. So, I hope you would make sure that you're responsive to the state

and local planning needs for this.

Thank you.

MR. POSLUSNY: Eileen.

MS. SUPKO: I'm Eileen Supko from Energy Resources International. I'd like NRC to focus on the metrics that they've discussed in Appendix A1. Maybe not necessarily during the meeting but after looking through all the comments to determine whether you need to revise your metrics. I'm just briefly going to go through them and give you a little bit of comment on what I think about them.

The three metrics, the first one is associated with the probability of the actual occurrence of the test perimeters. And what you basically say is that staff would determine a speed that would represent beyond design basis accident. But would not select a higher speed that has essentially no realistic probability of occurring.

I would suggest to you that you selected the wrong perimeter. Speed is not the issue. I think I've said this from the peanut gallery at the meeting in Rockville. The question that you should be asking is what is the appropriate force that is not, that essentially has no realistic probability of occurring. And I would suggest that a 75 mile an hour into an unyielding surface has no probability of occurring in a real world accident. The 75

mile an hour speed may be probable. But the force involved in that impact is way beyond design basis, not just beyond design basis.

The second metric that you talk about is the Package Performance Study objectives associated with analysis or validation of your codes, computer codes and the fact that you want to achieve plastic deformation. Well, if you do indeed select, associated with your first metric, a force that is within the realm of realism, you probably cannot get plastic deformation in the container test that you've designed and that you've proposed to us. So, I would say that your first metric and your second metric are mutually exclusive and you can't meet both of them the way you propose the current tests.

And then the third one, your third metric involves public confidence. Bill Brach's presentation earlier talked about NRC's mission being providing public health and safety and the environment; safety for public health and the environment. And I think you should focus on your regulations. You know, what is it that you want confidence in? Is it confidence in your regulation for spent fuel packages? Part 71? Part 73? How will you measure this? If you're calling this a metric that tells me, that means you must have some value. As Jim was just

implying for how it is that you're going to measure whether you've achieved public confidence. And I don't know, I haven't seen that you know how to measure that. And it's something you really need to look at and decide what it is that you, what is it that you want confidence in?

I think there's some people in this room that have confidence. You stated that you have confidence that your current regulations are adequate. There are people who don't believe that they're adequate. And you need to figure out, you know, what is it that you need to accomplish in order to gain confidence in your regulations. One of the things might be transparency. And I think these meetings help with transparency. You know, public participation at the actual tests will provide some transparency. On the extent to which you provide information after the tests and access to the information will provide transparency.

And, again, that may or may not. It depends on who the public is. There are very many different publics. And all of the different publics that you're talking about aren't going to agree necessarily on the outcome. And I think that's going to be a very difficult metric for you to measure and I'd just like you to think about that. Thank you.

MR. POSLUSNY: Adam.

MR. LEVIN: I'm the last one here so I'll stick to my scripted words so we can get this done quickly. My name is Adam Levin with Exelon Generation.

Since this is our home state, let me start by saying that Exelon firmly supports absolutely safe transportation of radioactive waste, including spent fuel. And we recognize our obligation to the public to maintain our exemplary safety record.

I'd like to make three very important points. The first is that we agree to, excuse me, we agree with the need to demonstrate compliance with NRC safety regulations as they apply to spent fuel shipping casks and with the need to provide the public with the sound understanding of the ruggedness of these packages. However, we believe that the only technical goal of the Package Performance Study should be to provide experimental benchmarks for the computer stimulations used in cask design.

My second point is that I believe the NRC must be clear with its communication with the public. That is its intent is to provide an extra-regulatory test sequence expected to have a small probability of occurrence in which a package seal may fail and which, frankly, you may not actually have a release. It should also be made clear to the public that the reason for conducting tests of this

nature is to validate the computer simulations used to predict package performance and not to demonstrate any margin of safety which already exist in the test requirements for hypothetical accidents, 10C471.

My final point is that the Package Performance Study input and output data including design and measurement data must be made available to all concerned parties adhering to sensible security arrangements. All vendors must be allowed the ability to perform benchmark calculations with their own computer simulations or with new simulations they wish to use in future applications. This negates the need for full scale testing of other designs or future designs and forms a leveled playing field for cask vendor competition, which can only give rise to even better designs.

Thank you.

MR. POSLUSNY: Thank you very much. I see a thread of a number common ideas, many of which are real comments on the proposal itself and we'll address that in the process. But there are some things here perhaps the staff would want to address very briefly. Perhaps the QA QC question. I think two folks brought that up.

Bill, would you like to deal with that one?

MR. BRACH: Chet, I think I have maybe a few

more issues --

MR. POSLUSNY: All right, sure.

MR. BRACH: -- on the overhead. But there's one comment, let me, a couple of comments I want to make. One, I want to offer, and I should have included this in the opening comments but I didn't. Bob Halstead made reference to our meeting here in the midwest and Tim and Thor and others made reference to their participation in the Midwest Council of State Governments. About a year ago, the Midwest Council State Governments asked NRC that as we're planning the Package Performance Study and our series of meetings that we're conducting right now that we consider holding a meeting in the midwest.

And one, I want to thank Lisa Statler from Midwest but also Tim and Thor and all the representatives here as far as their assistance in, if you will, preparing for the meeting as well as participation here today. And I agree very much. It's important that we have a meeting in the midwest. I've mentioned a number of folks. The quarter state matter, if you will, and the States of Illinois, Missiouri, and many other states in the midwest to the extent Yucca Mountain were to become licensed and operating facility, private fuel storage, if that also were to become an operating, licensed and operating facility, there would

be quite a bit of spent fuel transport occurring from the east to the west through the midwest. I apologize for not having recognized the earlier request from the Midwest Council of State Governments to the NRC as being a primary driver for our meeting today.

Now, back to, Chet, some of the issues you've asked us to discuss. One, the comment on quality assurance and quality control is an extremely important comment. One, NRC, whether it be for spent fuel storage or spent fuel transportation, one has regulations in our regulations, Part 71 for transportation, Part 72 for storage, that specify the quality program requirements that must be applicable, and I'm using the word must. These are not optional considerations. That must be considered and applied in the design, fabrication and the use of these packages.

And the earlier comment, George, with regard to the manufacturer of casks, those programs are very rigorous. Those that might be familiar with the Appendix B 210 CFR Part 50, the quality assurance program that has been in place for many years for power reactor plants; other industry standards in QA 1 and international standards, ISO9000 I believe is the correct references. The standards are very similar. The IEA as well has a quality assurance document out pertaining to transportation.

These standards are rigorous. They cover all aspects of material procurement, fabrication, quality control during fabrication and assurance that the package, when it is fabricated, is in conformance with the design. Goes back to the earlier comment about, in our testing in this package, testing the Package Performance Study, in our testing in the certification processees. The NRC, in our certification review activities, we're certifying a design. And it's clearly ambient and it's the responsibility on the user, the licensee, the fabricator, that the fabricated package must be in conformance, full conformance with the design and that the quality assurance program requirements are envisioned to provide that assurance that the manufactured package does comply with and meet with the design specifications and material and methods of fabrication.

Other issues; one topic was, that also was raised was a comment on sabotage. And clearly in the era that we're in, not only post 9-11 but also figuratively today or maybe this evening, concerns on sabotaging terrorism are real. Our understandings today are different than they were two years ago, I'll offer, in the terrorism arena. The Package Performance Study and the tests that we're talking about are from an accident standpoint if you

go from a safety standpoint. That doesn't mean that we're not, one, paying attention to or concerned about sabotage and physical protection.

There are other activities that the NRC currently has underway to be addressing security and sabotage activities. Since September 11th, the NRC has issued a number of advisories and orders to licensees directing additional measures be taken that go above and beyond the existing licenses and the existing regulations. The securities regulations are in -- Part 73, just for reference.

I cannot go into the specifics or the details but there was a specific order that was issued pertinent to transport of spent fuel. It addresses issues involving communications, protective measures, coordination of the states that go above and beyond existing requirements and those activities are in place today. And as I mentioned, for security classification reason I can't go into the details. But the agency has taken measures in the sabotage physical protection arena. As well as there are currently studies underway looking at what, I'll have to say tools, but what means might be available to terrorist or sabotage that we need to be understanding and evaluating not just spent fuel cask for transport but all of the activities that

we regulate at the NRC, whether it be power plant activities, fuel facilities, materials, et cetera.

There are activities they are looking at and addressing to assure from our perspective that we are, as best we can, understanding those issues and then also looking at the protective measures that are needed to provide that level of protection that's needed to assure the continued safety and protection of whether it be spent fuel transportation, other material transportation or other regulated activities.

I also want to say with regard to the Package Performance Study, and it's been mentioned by a number of the participants, the test that we have identified in the draft test protocol, one, we've identified an impact, a drop test and a fire test. A number of the comments we've received, some from, I mentioned earlier some congressional correspondence. But also at previous meetings I've raised questions why we're not testing or looking at the other regulatory tests; the puncture test, the emergent test? That's input that we are looking for.

Now, I will offer that in the earlier series of Package Performance Study meetings in our preparation of the Issues Report about two, almost three years ago now, we were summarizing what we were hearing at that point in time with

regard to off state stake holders, very broadly; members of the public, industry, states, local governments, tribal nations. What were the issues that were being put on the table as those that we need to focus on.

The primary earlier focus was directed toward significant extra regulatory impact test. Speed was a major comment. The 30 foot drop test, if you will, that's currently in our regulations, if you were to equate that 30 foot drop, it was approximately 30 miles per hour. And in a general context, all of us see trucks and trains going faster than 30 miles per hour. Now, that's 30 miles per hour onto an unyielding surface. And I think Ken or Andy had mentioned that in the real world, an unyielding surface is extremely difficult to find.

Clearly there are bridge abutments. There are granite surfaces. There may be tunnels or structural configurations for tunnels. There are all types of earth, sand or soil types of impacts. Those are not unyielding surfaces. So, roughly a 30 foot drop onto an unyielding surface is somewhat equivalent to a 50 to 60 mile per hour impact onto a yielding surface. Now, I'm not defining yielding because we could go everything from a yielding surface to something that has very little resistance to something as a hard rock structure.

Maybe I'm rambling a little bit and I apologize. But what I'm leading to is that from the Package Performance Study and what we're looking at, we are anticipating that in the impact test, the fire test, there will be information that we learn from those tests that will be very pertinent to our consideration as we look at other type of, if you will, sabotage or terrorism type of concerns with regard to the robustness and the ability of the cask to withstand a significant impact force or to withstand a significant fire challenge, if you will, whether that be from an accident or whether it be from a sabotage consideration.

MR. POSLUSNY: Okay, there's a question on if a cask was breached and the fuel was exposed, safe distances?

MS. SNYDER: Excuse me, I have a comment on the QA that I'd like to add.

MR. POSLUSNY: Okay, sure.

MS. SNYDER: In addition to the stringent regulations that Bill has referred to for quality assurance, we also have inspectors that, in the Spent Fuel Project Office, who inspect the manufacturing of casks and the licensees programs pertaining to spent fuel. We also, the test protocols is a confirmatory research project. And within that project we will have a quality assurance aspect

to that. Casks that we were to test, proposing that they'd be certified casks, but they must be manufactured. Also the test, the field testing itself in the field set up, we will ensure that there's a quality assurance aspect to the research project.

Thank you.

MR. POSLUSNY: Okay, there was a comment about exposure to a breached cask and safe distances. Is there anything you can say about that?

MS. SNYDER: Well, what I'd like to say is that spent fuel is highly radioactive and potentially very harmful. Standing there unshielded, spent fuel could be fatal because of the high radiation levels. Ten years after removal of spent fuel from a reactor the radiation doses exceed 20,000 REM per hour. And a dose of 5,000 REMS would be expected to cause immediate incapacitation and death within one week. We're talking about unshielded spent fuel.

NRC has stringent design testing and monitoring requirements and a barrier or a shield which is to be placed between the spent fuel and human beings. So, the design of the spent fuel cask is the primary, primary element that will bring protection to the public. And we have an Office of Nuclear Security and Incident Response. And those people in that office deal with these issues and are very

knowledgeable in that.

MR. BRACH: I just want to add a little bit more to what Amy has just mentioned. Clearly, as she described, spent fuel is a hazardous material. It's an extremely hazardous material. Some of the schematics that I believe Ken, both Ken and Andy had earlier showed the materials that, if you will, that surround the transport package. Those materials are there for shielding and protective reasons.

Also, I draw the attention to the one schematic other thing. Ken Sorenson in his overhead where it showed the, from the modeling standpoint, what a, I think it was what a Holtec rail cask impact may look like at a 75 mile per hour impact onto an unyielding surface. And I know Eileen's earlier comment, and we're interested in realism but a number of you all have asked comments from a responder's standpoint.

I'd only draw your attention that that modeling of a 75 mile per hour real impact cask showed the deformation, if you will, of the impact limiter. I did not show, and from our modeling, did not a breach of the canister. And I point that out because the safety mission we have is an extremely important mission. And clearly from everyone's safety and also a responder's actions in

responding to an event or an accident, the cask will be maintaining their containment. That's an important element of the cask design and the cask testing is to assure that the spent fuel is not laying bare in the public, if you will. But that spent fuel is maintained inside of its containment, inside of the transport package and that there is no breach.

But clearly from the standpoint of safety and if there's information we should be aware of and learning, that's a part of what the study is about, what we're looking at and looking to you all for your help in. But we're clearly from the cask designs that we review and approve and the information we have, the material, the spent fuel stays inside of its containment, inside of the transport package.

So, from a first responder's, and clearly there are procedures first responders have in responding to events of hazardous material events, nuclear and the other eight classes of hazardous materials. But from our review and information, the spent fuel does not get released and laying bare out where a responder or any other member of the public would be at jeopardy from its exposure or from their exposure.

MR. POSLUSNY: George, you had another --

MR. CROCKER: Yes, I'm aware, Bill, that, you

know, Part 71 is a potential for -- and I'm aware that the NRC has regulations for quality control, quality assurance. I think the thrust of the point that I would urge more attention to is the fact that historically cask fabrication, the rate of cask fabrication is something different than what we are likely to expect if we move forward with this type of adventure. And that means that there will be significant additional pressure and regulatory oversight requirement than anything we've seen.

So, just because you have a protocol and have a set of regulations and have some inspectors running around doesn't mean you have quality control, quality assurance. And what I'm looking for is the kind of attention that says, we have the regulations, we have the inspectors and it works. That's the thrust.

MR. POSLUSNY: Bob, you're next, I believe.

MR. HALSTEAD: Yeah, Chet, a quick comment on the issue of testing failure. Nevada's pushed hard for exploration of the lost of shielding type of accident because our study of historical accidents suggest to us that while we have to be concerned about lose of containment, frankly we're more likely to have a lose of shielding. And in the lose of shielding accident, the exposures to the first responders and, of course, some victims that might be

at the scene of an accident, are also an issue.

But you're not so much concerned about exposures to the public down wind. You're primarily in the lose of shielding talking about people who are within a thousand meters of the cask. The general guidance that we give our first responders or basically we give our on-scene commanders is in a situation where you think your people might get a dose of up to ten REM, you know, one occurrence rescue operation, that's basically seen as the commander's call.

If it is an area where, if the conditions are such that you think your people might get more than a 20 REM dose, the on-scene commander is generally advised not to send people in. And, of course, the hard part is that grey area where the expected exposure to an emergency responder is between ten and 20 REM. And that's where the hard calls go.

Now, it's true, as Amy said, that to get an expectation of immediate death, you've got to get a really big dose. Generally speaking it's lower than 5,000 but it's generally considered to be higher than five or 600. And that would be a very rare circumstance. But the thing that we train first response commanders is to deal with a more likely accident where a lower exposure is of concern.

And without getting, you know, in too many of the details, any time you get an acute exposure over ten to 20 REM you are thinking about some blood damage, you are thinking particularly about concerns if you have a woman responder who may or may not be pregnant. There are a whole lot of issues that go into that. So that's why we try to set these probably safe and probably not safe, that, boy, difficult judgment call between levels.

Testing to failure for lose of containment doesn't mean we're arguing that these casks have to be tested to see if an assembly drops out on the road because that would be a true catastrophic event and I don't expect to see it in my lifetime or your lifetime or accumulatively all the lifetimes of the people in this room.

What we are concerned about is a physically minor but radiologically significant lose of containment, the creation of a pathway out of a cask most likely because of an impact to a lid closure region or a seal failure accompanied by a high thermal environment, particularly one that might cause spent fuel cladding breach and the release of the cesium, what's in the gap between the pellet and the cladding.

So, when we say testing to failure, don't think we're talking a big hole in the cask and the assembly jumps

out. We're talking about a very small pathway in the containment system coupled with probably a thermal impact, although there certainly is, you know, some thinking that there are some physical impacts that could cause release of this highly volatile cesium 137 from the fuel cladding without a fire. I think those are low probability.

So, lost of containment we're specifically thinking about protecting first responders. I'm sorry, a lose of shielding we're talking about protecting first responders. Lose of containment we're, of course, concerned about first responders. But that's the type of accident which we're concerned about the general public getting wind being affected by respirable particulates that might be carried in the flume of a fire.

MR. POSLUSNY: Ned.

MR. WRIGHT: I think the concern, and I just want to clarify that, my two haz-mat teams are very highly trained not only locally but through the State of Iowa. And part of their concern is the information that they've been getting from all the sources. At the same we're getting other information that's basically saying the information that you've been told is true is a lie. And this is my problem is that now I'm having to address a concern where someone is saying you have been given primary response

protocols procedures, et cetera. However, that's not the truth.

And that's my problem of the public's perception. And this is what I'm hoping that we'll be able to get out of this is that the information that's getting out to the public through various sources, I spend a lot of my time having to then counter this and whether it's from congressional or special interest or whatever. And I'm basically being forced to say that, you know, whatever the facts, whatever the media's bringing in or who else, that either, I'm basically saying someone's a liar because the information you're putting out is so off the scale and I'll just use it -- I can't think of -- if we want to test something and, you know, we know that the truck can only go so fast. But if we're going to test it to go 500 miles an hour to crash into an immovable object, that can't happen. I mean, today with their technology, we can't get there so why are worried about that?

But again, that's adding a level of confusion to say, okay, the testing and everything that you're doing and we've protected everything from A to Z to every realistic thing that you can happen. And then someone says, well, gee, you know, why didn't you add one more degree or one more foot or one more other thing because obviously if you

didn't, you're not completely doing it.

And I think that's going to be one of the problems talking to the public. And I've never met Eileen before but I think I know her so well because I've seen the videos she's been in over and over and over again. But it's the point where all the things we're trying to do to tell the public that what we're doing is safe is now being challenged. And I've got much more greater things in my community that is an immediate risk. And I'm talking immediate death and destruction that no one cares about. But they're worried about something that may potentially give you cancer in 50 years.

And, I mean, those are some of the issues I'm looking at. I'm spending a lot of resources on things that the probability is way off the scale that keeps me and the other responders in my counterparts in Emergency Management from focusing on the things that provide them the immediate risk right now of catastrophic destruction in their communities, chemicals or whatever. And that's the other messages.

We fully support what you're doing and we believe, and I'm fully confident in the cask, the dry cask storage and all those other things because I've been shown the tests and stuff like that. But the stuff that's getting

out into the public right now is so 180 for whatever reason, that's creating another problem. And I think when we get down to the public's perception, and again, how much is enough?

MR. POSLUSNY: Yeah, I think we've heard a number of comments on how do you take the product from the study and translate it into real plain language that anybody can understand. You can always poke holes at a study but we've got to really consider how do we translate the findings both analytically to technically and also in plain understandable bits of information. I think that's a good point.

Yes, Amy?

MS. SNYDER: I'd like to add a comment and get a clarification. The fact that I'm hearing this morning is that there's layer of confusion as far as testing to failure. Eileen has mentioned, she talked about the objectives that are in the test protocols that the first two were, in her opinion, mutually exclusive, meaning the probability of occurrence of an accident in speed and the second was validation of the codes to plastic deformation. And I think that's an important issue as far as realism. Do we set up a test that's going to be real but will it achieve plastic deformation?

And the other point that, the clarification that I'd like to, I think that I heard is that are you saying that it would be helpful in the test protocol, we plan on doing detailed procedures and specifications as Ken Sorenson said earlier this morning that it's just a snapshot. But when you do those details and when we actually do the tests, would it be helpful if we describe it as far as what it means for first responders, real life situations as far as shielding and containment?

MR. WRIGHT: Well, I think from the first responder's point of view, especially when they're looking at the other hazardous materials that are out there, the first thing they're looking at is what is, where do I need to set the hot zone and stuff like that, one for the responders to put for the public because we have to make a decision very quickly. Do we need to shelter or evacuate. And that's on any hazardous materials. And one of the concerns that we're getting right now is the test protocols and show, you know, we're okay. And I've said we've got truck shipments and derailments from stuff like that. They know because there's the placarding and whatever that tells me. Okay, until we confirm that we have a release, and I'm talking about a rail car laying on its side, we need to set these protocols up to set safe areas and then we start

working towards that.

And right now what we're getting is the confusion part of saying, okay, you're safe from this but this other studies that are coming out says, oh, no, you're not. You need to be just far way away. And so that's causing the confusion because they're going to go by, and I'll just use the DOT guidebook. They're not going to be going for 47 scientific studies and doctoral dissertations. They've got one response manual. And they said if I've got a container of X, whatever is placarded, this is what tells me to do until we do the further testing. And that's what they're looking at is that first ten minutes because after that we've got people to come in and do the testing and sampling and all that other stuff no matter what it is.

But right now they're being told, okay, go in, go out. You know, run, stop, whatever. And that's the confusing part. It's once we get all of these things done, we need to have it so that the first responder has, if you have a truck transport that has X in it, however much is in it, that you need to be a minimum of this far away to start with. And if it's a rail shipment you need to be this far away to start with. And part of the problem is if they don't have that information, their good friends at OSHA will come in and fine them for responding and getting too close.

And we've had incidents in Iowa where the first responders got closer than the DOT guidebook and there was an explosion and there was a lose of life. The fire department was fined because they were 50 feet too close. And part of that is to, you know, instill the safety in whatever. And we're all for that. But right now the responders are so confused because there's so many studies and there's so many, so much stuff out there. We need someone to say this is what you need to start with.

MR. POSLUSNY: I've heard this, I sat in this meeting twice already. And from what I've heard from the staff is this study is going way beyond reality in that it's exceeding those conditions that it weren't asked to meet for certification. So, I'm not sure that the products that I've heard about so far would meet your intent because it's so far from it.

MR. WRIGHT: A part of it is we'll be talking to the public. And after we get all this done, and like I said right now we're already showing the information that's there. And people, I feel, are relatively confident in what the products that they're looking at right now. The problem is we're getting a lot of other people are coming out and saying what you're now seeing is not correct. And that's what's causing the confusion.

MS. SNYDER: So, are you suggesting that for the test protocols that what would, what are you suggesting as far as test protocols and how that might help with the issues that you brought up?

MR. WRIGHT: Well, I think part of that is being able to, and we're talking about some of the things when the shielding and stuff like that, and certain things, I think part of it is we don't get to that part. We're saying, okay, the cask is fine and stuff like that. We need to say, what does that mean? Are we talking about the structure of the shipping container and the material inside is still safe or are we, you know, because part of it is on how you watch the films and read the information. If the shipping cask is damaged, that also means that the shipment inside is damaged. And that may just be, you know, you have this set period but the shipment is safe.

And I said part of that is the perception is that if it's broken and we're saying this testing to failure and stuff like that, if the container is damaged, we've got to be able to say is the shipment inside damaged? And that's the part that's not getting completely through. And I may not have said that well but if you see a broken container, our guys, you know, if they see a broken truck, there's stuff coming out of it because they know that the

chemical shipments are not to the same standard.

But we're saying we've got a cylinder inside of a container, inside of a shipping cask. They need to know that even though there's a scratch on the outside of the shipping cask, the interior material is still safe. And that's the part that's confusing. That's the message that's not getting out because we're focusing on, I think, the outer shield of this thing. But we're not telling the public that the inner part's still fine. Now, if that's not true then we need to be able to say that, you know, A leads to B and I don't think that's what you're saying.

MR. POSLUSNY: Let me suggest, then, when we talk about the drop test, perhaps, and we try to factor some of this in, what it will do and what it won't do, and what's your analysis as it's projected so far.

MR. WRIGHT: Because we're more concerned about what's inside, it's in the middle. And if everything in the middle is still safe, then we're fine. We're okay with that.

MR. POSLUSNY: Okay, good. Let's quickly go through these two cards here and then we're going to take a break which we all need.

Tim, you were first.

MR. RUNYON: I guess I just needed to address

somewhat to Bob Halstead. It appears that if the back breaker test is actually going to be a test that you're going to predict a breach in the shielding or at least some of the DU shielding. Would you consider that a test to failure if you're showing a breach in the shielding?

MR. HALSTEAD: Well, excuse me, we're the people, Tim, who promoted that back breaking test over the years. Bill Ryan, SAIC and -- came up with the idea in 1979. So, on the one hand we think it's good to have that type of a test in so that we can evaluate a potential lose of shielding because we'd have a lose of containment. The concern we have is that we only had to do on impact test on the truck cask. And it may be that it's more important to do the end impact on the lid closure on a truck cask followed by a fire because that would be the accident that we would argue is more likely to result in the lose of containment, which would, you know, be a much, I think is a much greater concern both for safety and for confidence.

And frankly, we're trying to figure out how much testing can be squeezed out of these test articles. One of the issues that came up last time is it doesn't make sense, perhaps, to do the regulatory drop test end wise on the truck cask and then possibly as an addend to do a back breaker because that's a previously probably, as Eileen

would say, that part of the cask didn't get much force in that.

Eileen's is an easy answer but we thought looking at the lose of shielding accident was important. And the same concern Eileen had was raised by Rick Boyle from DOT. It's hard to imagine a 75 mile per hour sideways impact on an unyielding structure. And so that's one of the things I think we'll talk about this afternoon in more detail.

I'd just like to respond to the Iowa concern. I think all of us who have worked with states have this concern of training first responders. And I think our Iowa colleague's concern, maybe that's addressed if we had some commitment that after all this testing is done, some or all of us may want to go back and look at the curriculum materials that we use for training first responders. Now, I personally like the -- and Remington Package done back in 1984. I think it's superior to every training package that's been done in the last 20 years. So there's some among us who are arguing for old training packages precisely because they error on the side of caution. And when you tell your commander to stop people from going in based on an expectation of the dose that they'll get. But understand if there's not a fire going in, it's a big difference whether

there's a fire or no fire in how you set your initial perimeter and how you decide what to do as soon as an on-scene command post is established.

But I think we should just defer all that. We ought to agree that if we come up with findings here that the lose of shielding was worse than what we think and, say, creates the potential that a first responder a hundred yards away might catch a dose in excess of 20 REM, that we're going to have to go back and reexamine our training materials and reassess our tactics.

So, I hope we could agree that that's one of the things, if you'd write that up, Chet --

MR. POSLUSNY: I've got that.

MR. HALSTEAD: -- we need to have some real comprehensive follow up translating all this specifically into emergency response.

MR. POSLUSNY: And for information, training update, question mark, post BBS. Yeah.

Okay, one more.

MR. WERNER: First, a follow up thread about emergency training. I would urge you all to get with the states and work with us about how our emergency response actually works. We have a system where we have widespread trained haz-mat people readily available. They may not be

the first person on the scene but they are quickly on the scene. And the way we manage it is that they are linked into a larger communication system where they can get access to information about responding to different instances. There's general training that goes on and there's more specific information. And our staff is trained to go from the local to the state to the national, whatever information they need. And that's an important way that we're structured because we can't presume to train for every single incident but we do have linkages. And the broad point is don't presume to know that you know how to do it. I don't even know. I've delegated to somebody who, I've got a director who knows how to do it and I provided the resources and the structure to work in. It's not a one size fits all. Get smart about each state about how it's done so you get that information as soon as it's available.

And I would urge you try not to play the what if game entirely as if that's going to be providing the answers. There are lots of what if's that we could keep playing and still not cover them all. And that's why, if I could suggest an answer to the question I posed earlier that I needed an answer to, why not do failure to testing unless there's a good reason not to. One of the reasons to do it is that you have an unique set of circumstances that was not

covered by the what if planning, then you'd know, well, that's a situation that was covered through some extreme testing that was never thought to be realistic but it was done and we know that something like that set of circumstances, for example, fire and heating followed immediately by immersion in cold water.

I mean, we have a lot of places where we have a lot of railroad tracks together where there could be other materials that burned next to it and it goes off into either the river or the Lake of the Ozarks. It's pretty cold water. Immediately following is you've got a hot brittle material going into the river. I'm not saying that is a specific scenario but some sort of combination of testing and testing to failure could help answer the question.

If somebody calls into my office or gets me up in the middle of the night, just when they tend to have these little things, not that we don't love it but, you know, they do tend to go at odd hours. They say, what do we do? Who do I call? I may get to the right information. There is a stockpile of information to anticipate these things that may be on the edges of what if. And with regard to whether things are realistic or not, I urge you to drive across I-70 and see all of the unyielding surfaces on the limestone bluffs about every mile or so where we've had a

number of incidents already where trucks going routinely at 75 miles an hour have skidded right into a bluff and snapped in half, routinely. So, if you haven't been on I-70, I thought all interstates were the same. I-70's is an unique interstate with lots of limestone bluffs right on the edge of the road with not the same size shoulders that you would see like on the Beltway or Route 270 going out to German Town or something. It's not the same kind of road. It's not designed the same way.

And, you know, although I mentioned earlier, we had a lot of experience doing the foreign spent fuel shipments. Those really were different and one has to address the fact that foreign spent fuel shipments were fewer in frequency, smaller in size. So, there's some differences there in terms of, you know, increasing probability of these different what if's.

But, finally, it sounds like the meeting we have here today is really not going to address the large laden public crustacea. We have mostly staff who is technical staff. They're not public policy analysts. We're not dealing with that today. And I recognize that's a limitation. We're not going to get into that whole public trust and confidence because that's a whole other set of expertise. I mean, just as an engineer I know I am not

qualified. You know, I've dealt with it. There are people who do it. But technical staff, you know, has limitations. We can't necessarily get into that whole public participation area.

Nonetheless, the technical testing should be informed by knowledge of this context, this larger public involvement context we're working in about how you feed in and, you know, the inputs and the outputs. So, even if we're not going to address it square on, although the NRC said that they already have confidence in the technical issues, that we need to increase public confidence. There's still an input to it.

MR. POSLUSNY: Okay, let me thank you all for your patience and we are running a little bit late. But let's go for like a 15 minute break. And we'll start right on time from 15 minutes and then we'll continue with the agenda.

(Off the record.)

MR. POSLUSNY: In order to try to keep on schedule, we're going to combine Dr. Murphy's discussions on over-arching issues as well as the general testing issues into one discussion. And clearly we've started to go into the, into other main discussions in the past hour. And that's okay.

A lengthy list of issues that people brought up, many of them we really had on the agenda. But there are a few that I'm going to bring to as we go through and try to address here to answer some of those questions and concerns. Some of them are news, others we've heard, I believe.

So, let me have Mr. Murphy start. Thanks.

MR. MURPHY: I'm going to try to address, I'll say two of the points over there, the ones I just linked. The last one and separate fuel tests and fuel behavior.

We have separated, and I think it's come up a couple of times here today. There is a need to have information on how fuel behaves during these impacts. I talked about having the surrogate assembly and the Holtec and the GA4 Cask. Those assemblies will be instrumented so that we can, as the impact or impacts occur, get specific information as to what forces and strains and stresses are being applied to the fuel, to be applied to the fuel.

As a separate part of the Package Performance Study, we are working at this time on a, I'll call it a series of experiments. We don't know exactly what shape they're going to take at the moment. So, we'll understand that when these forces and stresses, strains are applied to the fuel itself, the fuel bundles, the fuel elements, the fuel rods and the pins, you'll know, begin to know what is

happening to them, whether we can, if you want to say, break them open. And in the case of the whole tank, the caesium escape into the multipurpose canister or what? Just at this time there is very little to almost no data on how the fuel itself behaves in these kinds of scenarios.

Okay. That I'll say just as a point of clarification. And then my job an hour ago and 15 minutes ago was to key up the two discussions on the over-arching issues and on the general testing issues. The first I think I'll say with the over-arching issues, I think we've gotten a pretty good start on these without prompting from me. The question about confidence enhancement, I think we've done a lot of discussion on that, particularly, well, today actually and in the previous meetings.

The question of actually a definition of what confidence enhancement means, a lot of the folks at the other meetings said, okay, fine. You're staring at the wrong word, maybe, at the moment. Maybe you should be looking at public trust and public understanding of what we're doing rather than enhancement of confidence at the moment. We've talk about validating the current codes and models, the model codes. I think we've acted continuously in that discussion. We haven't added on this slide the question about testing to failure. I think that goes under

just before the scale of the stressment tests.

We've touched on and probably need to touch a little bit more on provide data to refine risk estimates. I believe Chet's got that someplace over on his right hand board. And I've got right and left straight now. But on the right side, and it's part of what we're going to do with the information after it's been generated, after we've done the physical testing and, you know, take a look at it but what are we going to do with it afterwards? We've had some comments on that today. And also one of the things that's sticking right in the middle right now is the discussion we had of having to turn this into useful information to the first responders. I think the question of combining the fuel test with a cask test is something that's going to go right to the heart of the question that Ned brought up a few moments ago.

Let me, this realism thing because we're kicking that around here today. Again, I think a little bit more discussion on what do we mean by realism. I think there's a question of the probabalistic analysis kinds of things and using that to guide us in selecting the testing. Do appreciate Eileen's comments. Yeah, it's something that, as we put our metrics together, this was a work in progress, as the song says, that we're here to get public comment. So,

as I've said on some of the other occasions, this is a hard test, it's going to be an expensive test. We're not going to be able to probably get to do it every day. So, at this stage we need to get it right and we need to be able to talk about it in the right framework.

Okay, Chris, if you'd switch to the next one.

Testing issues; these are the general concerns. And the question about whether or not to do full scale testing or partial scale, and there's an awful lot there. There's no question in my mind that we can do partial scale testing and satisfy our requirements for validating the codes. The little lead in that Chet gave, I come from the Research Office and we have just simply recently completed -- experiments and continuing experiments. They're all down at scale. We can -- them. There is a -- issue associated -- choice issue or public understanding issue associated with the full scale. There are very definitely engineering concerns about doing scale modeling. These are things that we are interested in and would like to get comments on.

We've proposed to do a rail and a truck cask, one of each at this stage. Is that the right number? I've got to think Bob Halstead thinks so. Okay, I'll take a shake of the head to mean, yeah, you've got that one right. Types and numbers of field assemblies. This is another

question because at some stage we found out, including war, fuel assemblies in the package to see whether or not the placement in the package makes a difference to the stresses and strains that the assemblies and the rods and pins see. So, we would definitely like to see some comment on that.

And I'll say with that, finish my teaming up or teeing up the discussion and turn it back to Chet.

MR. POSLUSNY: Okay, before we go on in detail discussions, was the issue on the thermal loading inside the cask, could we talk about it here or in the fire --

MR. LEVIN: Let's save it for fire.

MR. POSLUSNY: Save it for fire, cool. All right. Lose of inert gas, that would be one of the catastrophic affects of a very severe accident, I would imagine.

MR. MURPHY: Yeah, I think the late afternoon, the impact, that might be a good place to touch on that one.

MR. POSLUSNY: Good. And the comment on the table as to EIS updates, I think it's probably too early to see what we're going to do with the results of PPS.

MR. MURPHY: Right. I would say that would make for a good conversation in the wrap up session at the end to what we're going to do with the lessons learned.

MR. POSLUSNY: Okay, good. All right, let's go

to the first subject of the over-arching issues. A number of folks brought up the issue of public confidence. Clearly there's been a certain amount of effort on the part of NRC from what we've heard today to take a stab at it. It's an earnest attempt. We've heard some suggestions on wrapping this program into a larger public outreach program, which, you know, maybe Bill would want to talk about things that go on generally. But, you know, we would plug that in, I would assume. Those are comments that we should take into hand.

But are there other suggestions on how this program could be either translated better either visually, electronically or whatever throughout whatever median that we haven't really talked about?

Sure, John.

MR. ERIKSON: Two things. First of all, public confidence really starts, as was mentioned earlier, at the lowest level, when you mention the local fire chief, whoever the local leader is that the people really have their trust and confidence in. I mean, just like the joke, the feds, the same thing. The word from the state, we're here to help you. I mean, it's the local person that you get the highest confidence with. So, as we work to get, you know, federal and then state and then local officials and leaders of first responders, that's the target audience for the information.

And secondly, it would be helpful, this is a very technical area and I don't know how many other policy people are at this table. But it's important to get kind of the communication, the policy perspective on what you're trying to, the information that you're trying to communicate with the public so that it's even more readable. I mean, this is a great technical document. I can understand it because I have a technical background but I'm also a policy person. And there's some things in there that are very difficult for a lay person to understand.

And how do you say we think everything's fine but yet we have to do all this new testing? Well, why? So, maybe some more involvement with policy folks or others that have to try and translate the technical to be understood would be helpful.

MR. POSLUSNY: Good, thank you. Fred?

MR. DILGER: Thanks, Chet. I want to go back and question the premise. I don't think, I've said this before, I don't think the objective of the testing should be public confidence. I think the NRC's mission is to protect the public's safety and I think that the NRC understands that the reasons for embarking on this program now are pretty substantial. We're on the verge of a massive new transportation program that's 61 times larger in terms of

shipment miles than we've done before in the past 40 years in the United States. So, we're looking at a much changed program.

We have new cask designs, new computer models and enhanced computer models. And so what we're looking at is different. And so in that, given this changed situation I think that the best way to get to public safety is to do the kinds of full scale testing that you're commenting on or that you're asking us to comment on.

Another item is about the expense. According to the DOE estimates, it's going to cost about $200 million dollars a year to move waste to Yucca Mountain. The most expensive possible program, total, would be about 50 to $70 million dollars testing program. The Yucca Mountain Program total is going to weigh in around 56 to $60 billion dollars. When you look at those kinds of figures, this is really not an expensive program that we're talking about. And so in terms of assisting NRC and ensuring the public safety I think that that really has to be the justification for this.

Will public confidence fall? I think it will. I think that if you do a really good testing program with the kinds of oversight and the kinds of independent review that the State of Nevada and Clark County have proposed, that I think you'll get the public confidence and the trust

that you need to move, or certainly what the NRC wants.

MR. POSLUSNY: Thank you. George?

MR. CROCKER: Thank you, Chet. I'd sort of like to echo, I think, what Fred just said. I mean, do we all know what our confidence man is? You know? What's the objective here? I mean, to have that item at the top of this list indicates to me that there's thinking within the industry and its regulators that the public is stupid, the public doesn't understand what's going on, we're the technical experts. We know. And if only we could convince these foolish people, then they wouldn't be concerned anymore.

Now, I think the public's smarter than that. I think that the Nuclear Regulatory Commission and the nuclear industry has a confidence problem because the public has some stuff figured out, not because it's stupid. And I think the fact that this item is at the top of this list ought to give great pause to how we proceed with a testing program. And if a the testing program, I think Fred's right, if the testing program is really designed to get us to the point of demonstrating viability of a technology, you won't have the confidence problem. And if it's not, you will anyway.

MR. POSLUSNY: Okay, thanks for your comment.

Let's see. Okay, Eileen.

MS. SUPKO: John just suggested that documents be written in standard English, not necessarily engineering language, technical language. In addition to doing that with the Package Performance documents, you might also consider explaining the current regulatory standards in common language and explaining what that means. There was some discussion earlier that current regulations cover something on the order of 99 percent of all of the possible accidents that might happen. And I think the Nodel Study that was done in ten or so years ago, it made an attempt to look at actual accidents that had happened and put them in the context of our current regulatory structure.

And it was a useful exercise except that it was a technical document. Sandia National Lab has a fabulous web site that takes railroad transportation accidents and tries to translate them into English. They've got pictures and it really is a useful tool. The little video clips that you have on the web site that show a spent fuel package dropping onto an unyielding surface for that package and then a concrete surface, which to you or I is unyielding, is interesting. And then the same video clip is done with a mini van. And to the mini van concrete is unyielding. And I think it's a useful exercise of trying to demonstrate

something that everybody says, oh, okay, I understand the significance of unyielding to different types of objects.

Another thing that can be explained that tends not to be explained is that there are different, in the current way we do business there are a number of different types of tests that are done. We talked about the scale model tests, component tests. But there are also some other important things that I don't think are discussed enough. The material testing that is done for materials that are used for the structural components of the spent fuel package and the fact that those materials have to be to ASME code and the significance of that and the conservatism in the material properties are all important factors in the conservatism of how these packages are built and the robustness of the package.

And trying to put all of that together to maybe tell a story. Whether or not it's a story that is significant, I don't know. Personally I think that it might add something and maybe getting some feedback from others around the table on that would be helpful. But there are a lot of things that we do currently that we don't explain in English. We talk about them in engineering terms and I don't think the public is stupid. But sometimes we don't speak it clearly. We've got terminology that engineers use

sometimes that you say to yourself, why did I just say that? Let me translate it into something.

There was a comment from the Nevada meeting regarding impact limiters, to talk about, and I don't remember what the suggested term was --

MR. DILGER: Shock absorbers.

MS. SUPKO: Shock absorbers. But, you know, that kind of feedback is very important. And in helping in how it is that we explain and how it is that people understand what it is through the engineering and the technical documents. Across the board the industry doesn't do as good a job as they should. The Nuclear Regulatory Commission doesn't do as good a job as they should in using terminology is much more common and that people will understand without a very detailed explanation.

MR. POSLUSNY: Thanks. We'll go to Ned, Bob and then Bill.

MR. WRIGHT: George, I'd hate to tell you but in some cases the public is stupid.

MR. CROCKER: I knew that, I knew that.

MR. WRIGHT: And part of that is, and I'll just use a couple of examples. Going back to our Y2K preparation, the biggest doomsday people, I mean, and I'm wondering why they didn't commit suicide, were our

engineers. Rockwell Industries, we have a lot of other high tech industries in my community. My biggest problems with the damn engineers who, in their mind, could understand that the flow path that could actually systematically create the destruction that everybody was worried about. But the common person couldn't figure that out. So I had a lot of my engineers that I couldn't get to understand that they were okay.

The other thing we're getting, anytime you mention nuclear, the first thing they think about is Hiroshima. All I heard was on September the 11th was when that 757 crashed into the Dwayne R. Energy Center there would be flash from the fuel followed by a mushroom cloud. Now, no matter what I did to tell them, I said, physically it can't happen. I didn't get through to them.

And then we talk about Trinobal. I've got a lot of stuff in there about having to do things in here in the United States because of Trinobal. We don't have the same things Trinobal did, whether it's alerting the public or the enrichment of the fuel and stuff like that. So right now the public gets most of their information from either the old movies, the sci-fi flicks, or things that we don't have.

And that's part of the problem that I'm finding

is that I'm trying to re-educate the public. And there, you know, while you try to put the facts out to them, they're all saying, but at Trinobal this happened. I said, the damn Russians screwed it up. Or, you know, they said, well, looked what happened at the films after Hiroshima. I said, do you understand the difference between three percent enrichment and 98 percent enrichment? In my previous life in the military I was a nuclear target analysis. I used to draw little circles around places. And then what happens if they do it to us?

So, you know, I mean, that's where my background is from. And it used to be that we had to tell our commander, we can only provide you ten percent destruction. I said, if I told that to our army leaders that said, gee, I can only give you ten percent, he'd fire me because it was massive destruction.

So, you know, there's a lot of things that people are so confused over. When you mention the word nuclear, you know, they start going all over the place. And I can't tell them about how my other chemicals that are coming through my community is ten times worse, immediate problems. But they don't worry about that. But they mention nuclear and right after September the 11th, whatever was on Good Morning America, I answered that question

whether it was nuclear, biological or chemical because that's what got the public stirred up.

And I appreciate the information I get from NEI because I've used a lot of that information. But in some cases the nuclear industry does a pretty poor job of defending itself. And I don't mean from the engineering or the technical. We've got enough of that stuff out there. It's telling John Q. Public what they need to know.

And a lot of it is they are just so enamored with that the weapon's grade stuff but they can't separate what is weapon's grade and the effects of weapon's grade events to none weapon's grade. And, you know, we even showed the examples of we have probably a greater security problem with their medical stuff in our hospital that you can get to for the dirty bombs and whatever.

And I get these people worried about how the ninjas are going get in to steal the fuel rods out of a power plant. I said, let them. We'll get to them in about a week because that's how long it'll take them to get into it. But these are some of the problems. The public's perception which when the word nuclear's put in there, they automatically flash back to some other time. And that's going to be a hard one to do and, again, there's a lot of good materials out there. And really, it's going to be our

smart people, our engineers, our technical people are going to be hardest one to sell versus just the, you know, the average John Q. on the street.

MR. POSLUSNY: That's a big challenge, thank you.

Bob, you were next.

MR. HALSTEAD: Yeah, Chet, I want you to write two things on the board. Test all cask design; I'll explain why it's there, test all cask design. I want to see it go up there.

MR. POSLUSNY: Okay.

MR. HALSTEAD: Then demonstrate adequacy of regulations. And that's in shorthand, of course, because I don't want to make you write a paragraph.

First of all, I could not disagree more about the public and I think it's really bad to denigrate the way the public reacts to these things. But I agree with Eileen, among other people, that this agency has no mission to pursue public confidence. This agency has a mission to pursue protection of the public health and safety and the environment. And if you do that, in a demonstrable way, public confidence will follow. But there is no way that you can set out public confidence as an objective and get there. It won't happen.

But you can do two things that I think are reasons why the approach that Nevada's suggested is both better for public safety and the result in public confidence. First of all, we're asking that all the cask be tested physically to demonstrate compliance with the hypothetical accident conditions of 10CR471. And that's not a worse case accident. My friend, John Vincent, will tell you, it's one hell of a real world accident. You know, 55 mile per hour impact with cement followed by the 30 minute fire. We've got the 40 inch drop on the spike and there followed by emersion.

If you demonstrate that all the casks designs meet that standard, you've gone a long way towards public confidence. Conversely, no matter how rigorously you test them, if you only test two casks and the cask going somebody's community isn't one of those two, you're out of the room. You might as well cancel the meeting. You will have no public confidence.

Secondly, demonstrating the adequacy of the regulations. I don't know if Dr. Chen is here but at some point we're going to -- is Dr. Chen still here?

MR. POSLUSNY: He left.

MR. HALSTEAD: Oh, okay. Well, he was the person, he is the person who's worked on the Griscon code

and had some very important insights to offer. The long of the short of it is this. If we agree after the discussion of the Baltimore fire, that it's reasonable to assume that a cask could be caught in a three hour engulfing fire for 1,000 degree C, followed by, say, four hours, 800 degrees C. And you can't get up and say that you tested your cask to that level and then prepared the results on that cask to the regulatory standard. You're not going to be able to argue that you demonstrated that the regulations reasonably encapsulates somewhere like 99 percent. We could argue what fraction, Eileen, of that remaining one percent has to be shown.

And like if you're in a meeting up at Keywana or Manitoba talking about barge shipments out of Keywana or Point Beach and you get up and talk about how rigorous the International Atomic Energy Agency's standard for submersion is undamaged cask at 200 meters. And you get a fisherman who says, yeah, but what about those canyons where it's 280 meters deep. Then you're out of that room and you don't have to worry about public confidence. You won't have any.

So, you've got to figure out how to demonstrate public safety. And then hopefully love will follow. But if love doesn't follow that can't bother you, man. That's not the agency's mission. If you've demonstrated safety you've

done what you have to do. And I will say this about the public, it's fickle. And my greatest concern is that all the body of work that people of the State of Nevada have done might actually be adopted. All the extra regulatory things we've asked for I might see them in statute and regulation. And public still isn't going to be convinced. That will hurt me in my heart but my head will feel just fine going home from that meeting with people probably throwing stuff at me because they'll say we've been sold out. He agreed to something.

But we can't worry about public confidence. We've got to worry about public safety and if the confidence follows, fine. And I know that's hurtful to the people who want to do public relations campaigns and want to be loved. But you shouldn't expect that to happen.

MR. POSLUSNY: Thank you. Bill?

MR. BRACH: Just a few comments. Interestingly enough the first comment I want to make Bob Halstead also is making. The NRC's mission is protection, public health and safety, common defense and security and protection of the environment. We do not have the mission statement increasing or educating the public.

But I also want to mention that we recognize that interactions and communication and understanding on the

part of the public, very broadly I say all of our stake holders, on what we do, why we do it and how we use the information from what we do is extremely important. I want to step back. The meeting today, at the very outset we had mentioned we had developed a draft test plan for testing spent fuel transportation packages. The purpose of today's meeting is to interact with stake holders and members of the audience on what we have laid out as a draft test. I mentioned before no decisions have been made yet.

We're looking to stake holders, to the public for input and comment and we will be considering and using that input and comments. And I'll use, if you will, where we are currently in the Package Performance Study. This is a third series of public meetings, a series of outreach meetings, public meetings we've had in the Package Performance Study.

The formulation of the draft test protocols built on, if you will, the Issues Report that was issued back in June. The Issues Report was built on the public input and comment, stake holders comments we had in our very first series of activities. We're not sitting with an assumption that we have the answers or know all the information. We don't. The information we've heard today, the information we've heard at the previous meetings in Las

Vegas and Prupt, Nevada and also in Rockville. I attest to that. There's significant information that we are listening to and considering as part of this process.

So we genuinely do want to hear from the public and stake holders. We're not sitting with all the information or answers. On the one hand we feel that we have technical competence in what we're doing. We have confidence in our regulatory programs and activities. But we also recognize that there is more on our part, all of our parts to learn and understand. And looking for building, if you will, of the public trust and the public understanding, and I very much agree with Bob Halstead's comment and also was offered at the meeting in Las Vegas by at least one county representative and a number of other people that we, NRC, need to keep our focus on our mission, if you will, and that the public's understanding, the public's, if you will, confidence, the public's trust will come from our doing our job.

And that's what we're trying to. But we also recognize in doing our job we need to be, one, accessible and then open to and communicating with, and listening to all of our stake holders to help us learn as well as others understand perhaps what we're doing and why we're doing it and how we're trying to move forward.

MR. POSLUSNY: Somebody mentioned transparency earlier this morning and I'm hearing that's an example of what's going on here.

Let's see, Mr. Strong and then Mr. Resnikoff.

MR. STRONG: Well, I'm just going to reiterate comments first at Bob and then Bill made. In terms of the public confidence and trust is not a goal for this Package Performance Study. It will be one tremendous benefit if it is done properly and done right. And the job of, then, translating the results of this Package Performance Study into something that is understandable to the public will be the job of those of us who deal with that, serve that particular arena.

I mentioned earlier that one issue that I wanted to address was the issue of horizontal versus drop test. And I'd still like to discuss that but from the standpoint of public perception, I believe that horizontal impact tests are much more dramatic. Pictures are worth a thousand words. And those videos, even still shots, are very dramatic.

But if from the technical aspect of verifying the computer codes and this sort of thing, if drop tests are more technically adequate for getting you that, that part of the job done, to verify the codes then I'm willing to seed

the issue of the horizontal test because the issue of assuring safety, assuring the ability of further testing; getting back to one of Bob's comments about the issue of conducting full scale casks tests on all casks, all prototypes versus a limited few. I'm not sure I support the idea of tests on all casks. If indeed this study can show that the computer codes are accurate, are verifiable, then I think the public can understand that those testing protocols and the computer codes, computer simulations can assure safety of casks even if full scale tests are not done.

MR. POSLUSNY: Thank you.

MR. RESNIKOFF: I wanted to get one of the issues you raise, which is the type and number of casks that should be used.

MR. POSLUSNY: Can we see if there's anything else on confidence and then I'll shut that one off.

MR. RUNYON: I think I would, not to beat a dead horse here, but I would reiterate some of the things Bob said. I almost see two parallel paths here. I don't think we can confuse public perception or public confidence with risk assessment, which is, I think, the objective here. And, you know, in the test design, one form may function much better than the other in terms of, you know, one of the alternatives was including the conveyance as part of the

test.

Well, you know, personally I think if you see the conveyance, you evaluate the couplers, you evaluate a lot of other aspects. But is that really the data? And is that going to be the accurate data that you need to validate your computer model? You know, I'm not an engineer either but I would guess it's probably not. I would guess the drop test with just the impact limiter would be a more valuable test in validating the computer model than, you know, a rail car with the couplers, with the cask, with the, you know, the jet slag.

I still think even though there's a need for the more technical engineering type of tests, I still think these other types of tests would go a long way towards public confidence. And, you know, do I think that it will automatically follow? I don't think it will automatically follow. I think it takes some work to build public confidence. And you have to convince us first, for those of us who have to work with the public and have to answer questions, have to deal with these issues at the state and local level.

MR. POSLUSNY: Thanks. Any issues on communication?

MR. VINCENT: Yes. One of the things we try to

do at the NEI is to improve public confidence in what we do and why we do it and how we accomplish safety. And we understand from our continual discussions with people on a daily basis that how you communicate that is the key to doing that. We do not characterize the public in any way prior to making answers to people's questions. We try to answer the questions as they are drawn to us. I do it routinely three or four times a day. And I get calls from people who are retired. I get calls from fifth graders or ten years old who are trying to do a class report. And I clearly cannot talk about diffusion equations and answer his questions. So, we make a distinction.

We try to do the best we can in trying to provide the information in an understandable format, recognizing at the outset we get requests for information at different levels throughout the organization on a daily basis. We do not, I repeat that, we do not try to make any kinds of characterizations about what the public does or does not think or whether they all have PhD's. That is not the thing you need to do. You need to answer their question in the way they've asked it.

And that's the primary concern of getting information to the public and so that they understand and they can make use of it for themselves and then develop

their own confidence or reliability or trust or understanding in what you're saying. And then they'll come back to you to get more and more information. Once you succeed in doing that, then you've helped the situation.

MR. POSLUSNY: Thank you. I suggest we talk about casks, the number of casks.

MR. RESNIKOFF: Right, I thought that was one of our subjects this morning. First of all, I just want to say one word about conveyance. The conveyance is important so far as the weight is concerned and whether bridge capacities can handle that weight. And that affects the probability of accidents. So, I just wanted to throw that out incidentally.

This is my understanding. You have these various casks. You have some steel, lead steel. You have some that are monolithic steel. You have some that are steel depleted geranium steel. You have some that serve as over packs for canisters that fit inside and you have some that don't have over packs. You want to do a thermal test and benchmark some computer codes. But then you need to have some, you need to understand how you can apply that same computer code to these other different casks. And you have to some how bound the error in going from one cask to the next and what is an acceptable error as you go from one

cask to the next. This is why the State of Nevada is asking that all casks be tested at least thermally. I think that's an important issue unless the NRC is going to be able to take these computer codes and bound the error in going from one cask to the next.

MR. POSLUSNY: So, this is a suggestion. There's a modeling issue in the models that are used today if you try to apply two different cask design. Okay.

Any other comments on the types and numbers of casks?

MR. RUNYON: I have a question about the number of tests or the number of times the test would be repeated to create some statistical validity. I mean, you know, when you make measurements you don't typically take one measurement, you can't graph one measurement. You can't put error bars on one measurement. How would you propose how many times could you drop a cask or how many casks would you have to use to develop, I guess, a probability or an accuracy on your measurements?

MR. MURPHY: Give me 20 seconds here to pull out my key up slide for the impact tests. At this bottom line, at this -- we're proposing to do one rail and one truck cask by way of impact. And we're talking about one rail and one truck cask for fire. Obviously, if you have any question,

we're open to comment. But we also got to think about what we're doing.

The rail cask has an MPC in it. The truck cask does not. And the other thing we're looking, I'll say, at the orientation, I'll call it orientation, when we're dropping CG over corner, center of gravity over the corner on the lid. The other one we're doing a back breaker drop. We're looking at carrying out the diversity of the challenge to the code by working with the material that we have available at the moment or planning on the moment.

I'm a physical scientist. I'm a sizemologist. If we could test more casks, that would be fine. That would be a good thing. We could do a better job in bounding the uncertainties and the perimeters, the results of the perimeters that we apply. If we did small scale testing, potentially we could no more and we could answer the questions associated with the potential diversity in the actual physical characteristics of the cask.

We don't think, because of the quality of control programs that are in place, the quality of control that is done at the manufacturer, the vendor, the purchaser and so forth, that we have confidence, trust and understanding that these guys have done their job correctly. We have folks like Amy keeping an eye on them, inspectors

looking to make certain that they have done things according to the rules. And within the nominal physical characteristics of the metals, the materials that are used, we think that we can do a very good job of -- these are going to behave.

We'll tell you that we are going to be putting our necks on the line, that before the tests are done we will have the analysis, the predictions made of what's going to happen to these casks. We will predict the trend in the fire, as Ken showed you an hour or so ago on the board. We are going to be predicting the deformation, the plastic deformation, if we go that route, what is going to occur in those casks.

We are going to put that out in the public and make that available to you. And in addition to that we will put uncertainty bounds on it. We'll tell you whether or not we're going to be able to get our plastic deformation prediction right to plus or minus five percent, ten percent. And we will be, I'll say, staking out our territory with what we think we can do with these. Like I said, we're doing two different casks, two different orientations, two different, oh, MBC or not MBC.

And there is some level of diversity. And I think within the engineering community, anyway, if we have

done a good to excellent job with those predictions, you know, we will be in very good territory. If we don't, it's a oops.

MR. SORENSON: I'll just add on real quick to what Andy said. One of the things that's talk about in the protocols also is to do deponent testing, for example. This is an opportunity for us to learn about material behavior outside of the cask system in the drop test. And this is not unlike what a cask applicant would do as well, using a combination of scaled testing and component testing with analysis to evaluate the response of the cask under regulatory condition. And so that's part of the PPS as well. So that we use that combination of component testing and analysis to be able to do the pre-test analysis before the actual test.

MR. POSLUSNY: Yes, Bob.

MR. HALSTEAD: How would this problem occur with all these different casks designs? One of the smart things via we did back between 1988 and 1991 is they had a design competition. And the original plan was to pick the best, the second best truck cask design; the best and second best rail cask design and some procurement decision. You know, in the graveyard of DOE ideas, you can look back and see three or four times when they really had it right. But then

I don't know exactly what happened with the policy change. They gave up on that idea.

And so first of all, Nevada started thinking about this testing issue in time when we thought we'd have a design competition that probably would involve scale model testing to pit the cask designs for the project. And secondly, we've advocated the principle of uniformity in design. I haven't heard any of you nuclear guys talk about how impressed you are about the standardization of French reactor designs. But that's where all this came from in the '80's. We said it's stupid to have five or six or seven or eight designs out there. It's stupid economically and it's stupid when we have to train ER responders to recognize one from another and everything in between is stupid. But that's the course we've taken.

So, now, right now in the pipeline the NRC has certified four different rail cask designs. The Holtec, the Transnuclear, the Napp Dual Purpose Cask and the New Holmes Pack. Thank goodness the GA Truck Cask design, which is not that different in its boiling water and pressurized water reactor fuel configuration. So we probably, I don't see anybody here at the table arguing that if you test the GA 40, you've got to test the GA 9. So, that's progress there.

The real problem is these casks are

significantly different from one another. Now, I'm not real familiar with the Transnuclear 68. But I know that the Holtec design, which is a steel design, is very different from the Napp Dual Purpose cask, which has more of a traditional steel lead on it. And it's very different from the New Holmes steel lead steel -- approach.

And there are differences in the neutron shields, at least three major different approaches. At least three different approaches in materials use for the impact limiters and some different approaches in the lid closure mechanisms. I don't believe, Andy, that if you and I have a debate in front of the public in Nevada about whether you can do one test on one of those casks design and confidently predict that that model equally predicts the acts and performance of three or four of those casks design, I bet that crowd's going to walk out not having confidence.

Now, confidence should not be the issue so let's take that off the table. Your big problem is that the technical people who live, eat, sleep and breath this stuff like us, also have that concern that you can't model those differences in cask design to our satisfaction. So, we're going to argue that you've got to test each one of those cask designs to show compliance with the regulations.

I wanted Dr. Chen to be here because the big

concern is with the impact test you've got one dang data point. That's not much to work with. And we'll talk about it some more with the extra regulatory test. One of the advantages of testing these four different rail casks to the regulatory standard is you've got four chances to see how well your model predicted the impact that's the equivalent of the 30 foot drop and the 40 inch drop on the spike.

Without belaboring the point, I have a real burden if you end up only arguing that you're going to do one truck cask and one rail cask. You have an enormous burden of proof to show that testing one rail cask gives you the basis of confidence that your models adequately predict those other rail casks. And frankly, that's where you're going to fall down in the court of public opinion.

You can't get to public opinion necessarily with this testing program. But you can sure cause problems with public confidence if you've got a lot of different designs out there. And frankly, there may be two or three more. I mean, right now the NRC has identified these four rail cask designs and the one truck cask design as most likely to be used either for Yucca Mountain or PFS. But probably there's a couple of people, maybe some people in this room from the industry thinking about another design or two. But that is real issue. And that's why our argument is you ought to do

the regulatory test on all of them.

And we don't think it adds that much cost. The only reason not to do this is cost. And if the cost of your program looks like 20 to $30 million dollars to us to do two casks and we think for 40 to $70 million dollars you can do five to eight casks, regulatory and extra regulatory. Thank you.

MR. POSLUSNY: Thanks, Bob. Any other comments on the need to do multiple design test. Fred?

MR. DILGER: This is not directly a multiple design tests, although we do advocate that. We think that's important. One of the things that is related to this, however, and came up in the Washington meeting was that there's a marginal cost of doing additional tests. So that you don't necessary want to just drop it once and go home.

One of the people who has done a lot of scale model testing mentioned that their first test run was a successful failure. It was successful failure because they got every wrong on the first test. But it told them all they needed to know to make the second test completely successful. And given the way the capital improvements are going to be made to have to construct a facility capable of doing these tests, a lot of those costs, a lot of the costs for an additional test are already gone, are already been

paid anyway. So, you might as well, so, I don't see that the marginal cost of additional tests would be all that great.

And the model for this, I think, was the Whip Program. And we heard Jim Chennel in Las Vegas talk about how he'd seen the Tru Pack 2 bounced and dropped and punctured multiple times. And that was a good testing program and I would commend it to you as a model to think about when you draft your own protocols is to look at that and see, see how they did it. See what they learned. See what the marginal cost of additional tests look like to give you some idea of what your budgetary requirements will be.

MR. POSLUSNY: Thank you. So, we've heard comments on the suggestion to do multiple tests, to address the differences in the design and whether or not the models can be applied to different designs.

Any other comments? I'd like to give everybody a chance to get all these issues, if so needed. Any other comments on the number and types of tests? Sir, David. MR. BENNETT: The experience in industry has been the multiple testing of different styles or types of cask. My understanding, and I am an engineer, my understanding is NRC sets a regulation, a benchmark that has to be met. And builders of the cask, builders of the transportation

trailers, et cetera, have certain criteria that are ASTM or higher. It seems history has dictated, and we have been in the industry many years, the type and look of a cask has changed greatly. But that benchmark criteria requirement has not changed unless it's been elevated.

Now, I guess being from southwest Missouri I can relate to a, more of a country type assessment. From an engineering standpoint the automobile industry has a benchmark standard for safety. But everything that comes out of the industry isn't the same looking. But it protects the public the same way because of that benchmark. And I've been involved with the NRC regulations. I'm on several ASTM committees for specifications of highway transport of heavy objects, which is spent fuel cask.

The regulations, if they're set at the right level and the public understands they're at the right level, I'm protected. I'm not sure the public has so much concern about whether it's black, white, four feet long, 12 feet long, two feet around. If I know that material is going to be contained by this regulation and this standard, you lose some of your effectiveness of intelligent and advanced design work from the industry manufacturers if you limit them to a particular item that may or may not be the cadillac jaguar of the industry.

So, I think NRC's job is well done by setting the standard to protect the public. And if the public can read I'm protective of this benchmark. It looks like this but it looks like this but they all met that same benchmark criteria for safety, I'm not sure that's all bad.

MR. POSLUSNY: Thank you, Bob.

MR. HALSTEAD: I think that's the point. We're arguing. We want to test the casks see if they meet that standard. I do not think a lead wall cask performs the same way in the six hour 800 degree C fire as a cask that doesn't have lead in the walls. I want to experimentally find that out. For the most part I haven't heard a lot of criticism of the standards here, although a lot of us, some of us particularly in Nevada have been concerned that the 30 minute fire at 1,407 degrees Fahrenheit may not adequately reflect the level of defining a severe accident given the types of materials that are out on the road.

But, you know, for the most part even the State of Nevada has accepted the NRC's standards and said what we want to do is have you demonstrate the different casks of different designs of different materials meet those standards. And then what we want to do with some combination, some combination of computer simulations, full scaled tests, component tests and scale model tests is

figure out if the cask failure thresholds are enveloped by the regulations or on the other hand be able to say in order for an accident to exceed these regulations and fail the cask, it's got to have such a low probability that we're not going to be able, we're not going to worry about it even though some of us will worry about it.

But I think it is a good point. What you're talking about here is taking six different cask designs and testing them to demonstrate that they comply with these regulations and at the same time acquire very, very useful measured physical data that we're going to feed back into the codes. And then, frankly, also use that as a basis in our extra regulatory tests.

MR. POSLUSNY: So, yours is sort of a hybrid suggestion. And you're going to give that to us in writing as well?

MR. HALSTEAD: Well, I'm just saying, we don't want to confuse the standards with --

MR. POSLUSNY: This test.

MR. HALSTEAD: -- a test, benchmark or a target maybe is a better way to say some target condition that we want to test the cask to. But so far you haven't heard anybody come in and say, I know that fire standard is wrong. I know that impact standard is wrong. I know that puncture

standard is wrong. I sure haven't heard that although we've raised questions about whether the fire standard should be re-examined.

MR. POSLUSNY: Yeah, and we'll bring that up later, I'm sure.

Okay. Any other comments on cask numbers and types? With that, I will cross that one off.

Just going from the top of the list, anything on the codes and standards in the validity of us or the validity of the NRC suggesting that those be revalidated? Yes, Fred.

MR. DILGER: I just have a question there. You know, you've proposed these two extra regulatory tests. Is there, do you expect to learn something new that is not already understood by your computer code or you can't already model by your computer codes by proposing these two specific tests?

MR. MURPHY: I think it's a question of we are challenging the capabilities of these tests, of those codes with the test. Yeah, I expect to learn something new from them. At the very least that the codes are valid or invalid in these applications.

MR. HALSTEAD: Could you explain what codes are used by designers who come in to meet the requirements of

the 200 meters submersion test for IA? My understanding is it isn't really a submerging pressure test. It's more of a -- under pressure test. Can you briefly, just for the record, say it?

MR. SORENSON: I could say it for the structural part of it because you do have to look at the buckling and those sorts of things. It is a boundary condition, hydra static sort of pressure that you put around the code. And you use standard structural codes to do that type of analysis.

MR. HALSTEAD: Well, my understanding was the for the emersion survivability for the intrusion of water into the package, the particular, and that's done for the sequential, for the fourth part of the sequential test, the tendency of Bar 71, that that's, but that's a criticality. I don't know, John or somebody who's taken a package through certification. I'd like to put that on the board as a question that somehow needs to be addressed in this proceeding. You know, I don't believe I'll live to see large scale barge shipments for a lot of obvious reasons. But since the department has put it on the table, it's something that has to be addressed. And so that whole issue of how a package designer demonstrates compliance with the two emersion standards is something that needs to be

addressed in your report, if for no other reason than to justify why you decided not to consider it in testing.

MR. VINCENT: Bob, are you asking whether we think it's a moderator exclusion test? Is that what you're saying?

MR. HALSTEAD: Well, I just want them to give an explanation for the record of why they decided that either the one hour, one meter emersion at the end of the sequential test or the two, why that shouldn't be addressed in this testing program. If it's because they agree with me that we won't see those barge tests and they don't find the required shipments, then we can -- but I think they need to give some rationale for why they fenced that off as a topic that they're not addressing because when we went through the 10CFR71 revision last year, a really big issue was the formal adoption of the IAEA 200 meter submersion test. So, if it was important last July, why isn't it important toady?

MR. POSLUSNY: Yeah, we should address that now.

MR. SORENSON: Yeah, Bill touched on it, I think, a little bit earlier in terms of the public meetings that we had two and-a-half years ago. And a lot of the issues really did focus in the comment period on the severe, the severe thermal test. In terms of containment of the material in these sorts of environments, that was deemed as

being really the important sorts of tests to look at. In terms of the emergent from a containment standpoint, we didn't see that as a severe environment as the high speed impact test and thermal test.

That's why we didn't necessarily fence it off but looking again at the resources and those sorts of things, we saw those two tests as being the most important in terms of being able to really understand --

MR. HALSTEAD: Well, I read the environmental assessment that you prepared. And it was totally inadequate because it assumed that the maximum depth you would ever lose a cask at would be someplace on the continental shelf where it would be, say, 50 meters. And the argument was if it was in deeper water, if you couldn't recover it, who cares. You didn't think it would be a big problem.

I don't necessarily agree with that. But if you lose a cask in Lake Michigan or some other body in fresh water, you're not going to have the option of letting it sit down there at the bottom of the cask. That's going to be a horrific situation, people shutting off municipal and industrial water intact systems. And so as long as there is a real threat that the Department of Energy thinks, and frankly, some of those reactor sites on Lake Michigan, very difficult to access with heavy haul trucks. I happen to

know the bridge ways into the Port of Keywanies. There's some places I don't think you could service except by -- truck. But as long as they have that out there, I think you have to revisit it.

And I can tell you that the way that it was deposited it in the environmental assessment in support of the rule making last year, only looked at a few types of movements. It did not look at movements on the inland waterways. So, at some point you're going to have to deal with it in some detail, I think.

MR. POSLUSNY: I think we had that comment that needs to be addressed in our final deliberation.

MR. WERNER: Chet, can I make --

MR. POSLUSNY: Yes.

MR. WERNER: I just wanted to offer a suggestion for a process here. We heard earlier the need to have things written in plain English, if possible. I would suggest also that there are audiences, too, who would value and appreciate in more detailed codes. I think we just heard that, frankly, from Bob and other people. But that seems like something that ought to be available, the detail. I mean, it seems like we have sort of a one size fits all. You know, here's the document, whether you're an English speaker or a mathematic speakers. Here's what you got.

And, you know, maybe it's appropriate to survey your audience and think, okay, there's some people, most people are just going to be able to cope with a one page summary of what's going on overall. And there are other people who are going to want to download the codes and play with them and validate and kind of that transparency.

It goes back to what I think we've been saying in different words that it may not be a goal of this whole process necessarily for a public relation -- it leads to public acceptance. But perhaps rather simply a transparency of the overall system that leads to understanding so that to the extent you've got a technically valid test, there's understanding and acceptance of that. But one has to lead to another. And we don't seem to, again, be looking at the systems approach to enable that to occur.

Again, all the money we're, as a country, investing in this is well spent and if we don't make sure that it really leads to meeting some kind of an objective, you know, begin with --

MR. POSLUSNY: Yeah, I'm hearing multiple versions, depending on the user, experience type, plain language all the way up to the most technical, perhaps.

MR. WERNER: Yeah, I know some of the codes may be proprietary and its an issue of at least know where they

are and get access and things like that.

MR. POSLUSNY: Good comment. Sir.

MR. RESNIKOFF: I wanted to issue the issue of codes. Maybe I read the draft test protocol too rapidly but I noticed that, and you can correct me, I notice that in fire tests there were several codes that the NRC was considering. And I think that's a good idea because the actual physical test is what costs the money. Actual setting up these codes is much less expensive. And if you can test a few codes at the same time and one more accurately predicts what the actual results will be, why, you know, that sounds like you get a lot more for your money.

But for impact I noticed that you only seem to be using one code, the code developed by Sandia and I think you should use several different codes for that.

MR. POSLUSNY: Any comments on that?

MR. MURPHY: Just a quick comment on that. We are taking into consideration or planning, if we can get it going, what we call a round robin code exercise. We're considering putting the materials out into the public domain, if you want, and then inviting different engineering firms, different countries, different organizations to run their calculations and check and see how they compare with

the actual experimental results. A little like a lottery. The winner gets to do the calculations for everybody. I don't think so. We're too diverse and the question of what the winner is or what is a good prediction is obviously something to be considered.

And I'll say it goes actually the same thing that Bob was talking about a few minutes ago and that is the diversity in the number of the casks and the diversity in the calculational tools to look at how the cask performs whether it's a fire or an impact code.

MR. POSLUSNY: Okay. Any more comments on codes? I'd like to wrap up for lunch around 1:00 o'clock if we could.

Test to failure has been mentioned at least three or four times. Any comments on that concept or questions on it? Yes, Fred.

MR. WRIGHT: We've been advocating test to failure for some time and I just want to offer kind of a compromise for the purposes of this proposal. And that might be a cask that is tested like this full scale is failed in the sense that it will never be used to ship waste. So, it seems to me that it might be useful to perform the drop test but then test the, do the final test, the fire test to failure. As I understand it a rough

estimate is that it costs about $10,000 an hour to continue a fire test or to perform a fire test, somewhere in that ball park.

And testing, running that out for say an additional six hours, seven hours, whatever it takes until we have a failure in the cask, whether it's an open pathway to the environment or some other definition, probably wouldn't be that expensive and would give us useful information to validate the model and could be translated into useful information for first responders. I mentioned that in the Las Vegas meeting.

But I think that might be a way to proceed usefully on test to failure.

MR. POSLUSNY: Good comment. Anybody else? Bob.

MR. HALSTEAD: Yeah, there's not a definite answer on this and I'd like to talk about it more after lunch. But one of the things that we're looking at is for the test to fail is the combination of the impact of the cast and the impact of the spent fuel. I have to credit Charlie Pendington, who's working for Nuclear Assurance Corporation, he was at the Rockville meeting, who raised a good point of saying, well, instead of defining failure as a gap of so many centimeters in the lid or the failure of the

seal or a certain degree of strain on the bolts, that you pick some measure that's related to a consequence.

For example, what would have to happen to rail cask to get a one percent release of the inventory radioactive cesium in there. In that case you're looking at some measurable condition that causes the fuel to fail coupled with some measurable condition that causes the lid -- so, for example, one of the things you guys might be thinking about for after lunch is we've worked under the assumption that if the fuel gets heated up to 750 degrees C, we can assume that it all fails. There's burst rupture, the ceramic is largely reduced to a fine powder and certainly, while we may not look at the rest, but certainly we assume that all cesium 137 that's in the gap between what was the pellet and the cladding. And there's a big debate over that with the range of, you know, we said 0.3 percent or 9.9 percent.

But to try and make this whole thing manageable, we need to try and find some target conditions that we can measure the test. And one of the things we're looking at is what causes the fuel pellet, what kind of exterior fire engulfing the cask causes the fuel pellet to reach 750 degrees C. If it reaches that level you can assume that the seal failed, you know, two, three hundred degrees C earlier.

The harder thing is with the impact, to say, you know, when Marvin comes back we're getting, you know, you hear values as low as 50 to 60 G's, or you hear loadings as high as 70, 80 or 100 G's that are necessary to cause the same degree of fuel failure that that elevated temperature would cause. So, it would help the discussion if you guys could be thinking from your standpoint the modeling work to be done as we try to help you with input on how to define these failures thresholds. You could be thinking in your own mind particularly what impacts and fires cause seals to fail and what impacts and fires cause the fuel to fail.

MR. POSLUSNY: Thank you. Anything else on test to fail? Yes.

MS. SUPKO: I guess my biggest concern in talking about test to failure, and there's been a little bit of discussion about this already today, is how do we define what is failure and keeping in mind with regulatory standards for accident conditions are regarding 10A2 release, et cetera, that that is allowed, potentially allowed under an accident condition so that, you know, any release isn't necessarily failure from a regulatory standpoint and trying to put that into perspective.

The other thing is the test that was proposed, the thermal test that was proposed was fully engulfing

optically dense fire. I find it difficult to believe that you're going to have a fully engulfed optically dense fire in a real world situation. And I understand that from a scientific point, that's the type of test you want to run. You take a lot of the uncertainty out of the analysis that you're doing in terms of, you know, whether heat sinks and how do you model that and all of that.

But, again, I go back to what I said earlier. Translating what you're doing into real world situations so that we all understand how it is that the test that you're doing, if indeed the objective is causing some sort of failure, however it is one might define failure, translating that so that there's an understanding of this is a physical situation that can occur or we're outside the bounds of it. And we're doing that on purpose so that we have confidence that our models can handle everything in between what is realistic and probable and what's out here on the bounds and we're not just extrapolating, that we have a real data point and that's the reason we did this test. And it's really important that you put that into context if you're going to go to what I would call way beyond design basis.

MR. POSLUSNY: Thank you. It seems like the challenge to define what failure is is going to be, would not make everybody happy but it has to be well justified, is

what I'm hearing, you know, a lot of assumptions to be made.

Fred.

MR. DILGER: I've provided this example before. For those of you that heard it, I apologize, but I just want to explain where I'm coming from in terms of why we think a thermal test to failure makes sense. And it relates more to first response than it does to the design basis.

And that is, just to give you an example, on US 95 in Las Vegas, the wheel came off a break truck and caused a collision that had a semi truck hauling two trailers filled with gasoline to crash and ignite and burn into flames. The heat was so intense it ruined an overpass and it burned for about four and-a-half hours, I think it was and closed the freeway, of course.

But the first responders let it burn out of control and let it burn itself out because the damage that would come from their using their foam and their other gear to put out the fire would have exceeded the cost of replacing the bridge and keeping the highway closed and that sort of thing.

So, in that kind of an unlikely but realistic scenario, it would be of assistance, I think, to first responders for them to know when the cask might fail or where there might be a problem like this so they can adapt

their tactics to a particular situation. Had there been a cask inside that fire they might, they might have been willing to incur that damage caused by the foam running off into the drains and that sort of thing rather than run the risk that the cask seals might fail somewhere down the line.

So, it seems to me to be a reasonable thing to do.

MR. POSLUSNY: That's a good time between a couple of issues brought up earlier this morning and what the test could possibly do.

Anything else on test to fail? Okay.

We've already talked a little bit about rules only a few minutes ago. Any thoughts on that and a test design aside from what we've already said. And I'm sure we're going to bring it up later this afternoon as well.

MR. HALSTEAD: Yeah, I just wanted to remind the folks at Sandia, we submitted a list of 20 plus real world accidents including some that involve military explosives, which is a special concern to us in Nevada and maybe some states where you have a concentration of literary weapons, depots and storage for test practice bombings and so forth. I know those are rare but certainly many of you know that's an issue in Utah that may indeed have killed the private fuel storage facility. Certainly an issue that of test

sites.

So, we've put in a list down of what we consider to be credible, well, we've put in a list of historical accidents that we believe suggest credible accidents that might exceed the regulatory -- conditions. And I just want to say for the record we hope at some point that we understood one of the tasks was to rework the entries and reassign probabilities. And I'm hoping that as part of that you will get back to us on those accidents but if not you'll force me to write another 200 page report, you know, discussing to those accidents. And I'll lose my eyesight if I do that.

MR. MURPHY: We'll try to accommodate you.

MR. HALSTEAD: Because the whole issue of defining risk here, and I don't mean the -- people who aren't here, but, you know, there's like a two, three year process here. Some parts of it, I think, are going to be admirable job in following through on comments that we made a couple of years ago. And there are other areas, frankly, we're still waiting for a response from you and one is in this issue of if you look at real world historical accidents, how does that compare with the forces that you're looking at in, particularly in the test protocols.

Although, I will say, if you look at the G

forces and the impacts, for example, you know, you get into 100, 150 T impacts, you know, those are mighty severe accidents. So, it's possible that you might envelope them. I just want to see that you're looking at an answer for us.

MR. MURPHY: Let me cut in on Ken's behalf. One of the specific tasks in the Package Performance Study, not in the experimental pieces that we're talking about here today, there is a task specifying an evaluation and a study of severe historic accidents, not just fuel accidents but general rail and truck accidents. That study is going on as part of the update of the entries and scenarios that you just talked about.

MR. HALSTEAD: And I'm going to add on, Andy, can I ask you to make sure you issue it in draft so we get a chance to give you the benefit of our comments before that study is finalized. That would be very important to us.

MR. MURPHY: We will take your comment into consideration.

MR. POSLUSNY: Okay, anything else on realism? Jim.

MR. WERNER: I just had a question as I read through your protocol. It appeared that various tests were occurring independent of each other, that there wasn't sort of sequencing and mixing it up of say you'll puncture

followed by fire, fire followed by emersion. I guess it falls under the category of real world, and maybe I didn't understand it, you know. My real world experience, things don't happen in isolation. Of course you have fulling emerging fires. That's obvious. -- today, next to the rail tracks, they call it JP4 and JP8 -- ammonia and gasoline and you have it spill out every once in a while and you have a major fire. I mean, that's an easy one. You obviously had full emerging fires. That's, you know, an easy real world.

The harder one is how you mix up a combination and maybe there's codes that can help you deal with that. I just don't understand it clearly. And, again, the real world example I bring is, you know, having to work in the World Trade Center, when I worked there we had fire drills where you had to go down like five floors and that was considered real world because nobody imagined the whole building would fill with smoke. And after I left work there my buddies had the experience of the '93 explosion where you had smoke throughout the building and people had to walk down, most of the people in my office, it would have been for me, I worked on the 72nd floor of the World Trade Center, walking down 72 floors is pretty tough.

So that was real world. You can't have just assume fires are contained within ten floors is what our

port authority colleagues did. And then the port authorities said, well, we have to actually practice it. You know, how many people could really walk down 72 floors, well, 110 ultimately, but I was being parochial. I was worried about my office, who's on the 72nd floor. But nobody then imagined that you'd have fire and smoke in combination with structural damage that occurred, obviously, September 11th where you cut off three of the floor's stairwells.

And had we imagined that combination more people would have been saved because they would have understood that there were three or four independent stairwells and if you got around to the other one, a lot more people could have gotten through. But, again, we didn't anticipate that combination of circumstances. But because we at least had some practice of combination of fire and smoke throughout by the H-fax system, you know, a lot of people got saved that might not have otherwise been saved because we had the experience of practicing getting everybody out.

But how do you deal with the combination of insults in the protocols.

MR. MURPHY: At this time, understand, we are only doing, no, we are two insults to the package. We're doing them sequentially. We'll do a, at this stage the plan

is to do a rail impact and then a rail cask fire. So, it will be the same cask. If it is damaged in the impact, that will be the cask that will still be used and the analysis will take into consideration the damage.

MR. WERNER: Okay.

MR. MURPHY: And if we, you know, the very definite suggestion has been made here of doing the full sequence of impact, puncture, fire and --

MR. WERNER: Emersion.

MR. MURPHY: -- emersion. And the very likely case would be that if that is an excepted, if the NRC decides to go that way, if you want, is very, very likely that it will be done sequentially. So, yes, a valid point.

MR. WERNER: I would just offer you to look at the experience of the Department of Energy's analysis of the Feather River Canyons scenario. There again, it's a matter of looking at your routes and what each state and route do, and we went through that analysis. What are the things we might have to anticipate? And to actually allow us to throw things out, well, it's not just something that could occur along the way. But then Feather River Canyon, we were -- and we had to look at that condition.

MR. MURPHY: Right, I mean, we had comments at the Nevada meetings of doing, on the question of realism, of

doing an impact, what sort of impact of the truck cask coming off and then either a fuel load from the truck itself or from a tanker becoming involved as well. So that, yes, we are very definitely looking at the sequence issue. And if we do anything with the additional, want to do something potentially with the additional comments about the puncture and the emersion as well but they're likely to be sequential as appropriate.

MR. POSLUSNY: And that's consistent with the regulatory structure.

MR. MURPHY: That's correct.

MR. POSLUSNY: Okay. The comment about the fully engulfing fire, I think Chris will talk about that later so let's leave that as an action item.

MR. DILGER: I think what we've heard is it strengthens the argument for a full scale regulatory testing. I mean, everyone agrees that the regulatory tests are extremely tough and we don't get lose in the maze of arguing, well, how likely is one accident or another accident. And I think that that's why this is one reason why we can, if we do regulatory tests, we can get a demonstratively tough cask out of it.

MR. POSLUSNY: Thank you. Scott?

MR. DOIG: Kind of a question. I'm sorry I

don't have the insight. I'm just wondering, when you talk about the realism, now are any of these casks that are stored, my understanding is that, first, at Prairie Island we have casks that have been sitting there for a number of years and have that thermal load that's put on the metal there. Now, is that going to be simulated in terms of the cask that is tested or does that have any significant impact on how it performs? Does that make sense? That question?

MR. MURPHY: Let me answer the question by telling you what we're planning to do. At this stage we're not planning to have initially the thermal load from the stored fuel in the fire test. Okay. At this stage, that's where we are. We anticipate that by carrying out the thermal code foundation analysis that the addition of the thermal load from inside of the cask from the fuel will be an item that we will be able to handle by analysis.

MR. BENNETT: I think he's asking maybe another question, though, too.

MR. MURPHY: One second. Where was I? Yeah, the question has come up at previous sessions of these public meetings. And it's a question or comment that we will be taking into consideration, whether or not the thermal test should involve a fuel thermal load in addition.

MR. BENNETT: I think he was, maybe I'm putting

words in your mouth but I thought he was also asking whether a canister, as it sits for ten years or so, suffers some metal fatigue. And are you then going to put that into a transportation over pack and take that into account?

MR. BRACH: Let me try to address that. As a separate matter, one, we're talking spent fuel storage type activities. And as a separate matter we've had ongoing research looking at the potential for any long term real materials degradation from spent fuel storage for an extended period of time. And to date we have not found that there has been any degradation in the materials.

We've done some reviews. We have fuel that has been stored at the Idaho National Engineering Lab as part of a research activity looking at the affect on fuel, affect on materials in a long term dry cask storage environment. And that information has revealed or identified to us that there's been no detrimental or no degradation on the materials or the spent fuel in the long term extended storage.

One other comment I will just add, Prairie Island, I believe the fuel cask that they're storing on site I believe are storage only casks and configurations so that if they were somewhere downstream to elect to transfer that spent fuel to another facility or to another facility, that

fuel would have to be unloaded out of its current storage cask and transferred into a transfer or transport configuration.

MR. DOIG: That's correct. Although I think that after the 17 casks, it's going to be a dual purpose cask.

MR. BRACH: Okay.

MR. POSLUSNY: Okay, good. I'm going to suggest and see, any cards up yet? Okay, I'm going to suggest that we save risk estimates. I'm going to suggest we leave full scale versus partial scale. We've touched on a number of time. I think we can revisit it during the technical discussions this afternoon as well as the fuel assemblies. You're going to get into that, more discussions on the surrogates? Will that --

MR. MURPHY: The topic is still on the board but I'll say I'm not going to key it up again.

MR. POSLUSNY: All right. I'm going to leave it. And think about those remaining during lunch. I think we need a break. I would provide, I would like to provide right after lunch, an opportunity for those in the audience. So think about the same issues, please. I know you're all hungry. So we'll give you a few minutes up front when we return. Let's take, let's come back about, let's see, 2:15,

please, on time. Thank you very much.

I expected some new ideas and we indeed got some. And before we wrap-up this afternoon, I'd like to, before we get back to the agenda, I promised the audience who is not all back but let me give it a shot. If anybody would like to make any comments or questions, provide any questions on what was discussed this morning, please raise your hand and I'll be glad to give you the mike. And yes? And please state your name and organization so the transcriber can --

MR. CAMPS: Hello. Okay. My name is Kevin Camps. I'm with Nuclear Information and Resource Service based on Washington, DC. And I actually was on the panel at the Rockville, Maryland equivalent for today. And I just had a couple of things I wanted to share from the morning session.

The first thing was having to deal with something Mr. Wright, I think, talked about films, and maybe somebody else brought it up as well, but the films taken during the Sandia tests in New Mexico in the last 70's and how many times those have been shown to members of the public who are concerned, to elected officials, members of the media. And someone mentioned that they had shown it countless times, and it really brings up a concern that I

have about this current discussion where in the Package Performance Study draft, and I brought this up in Rockville so some have heard it already, there is discussion of filming the physical tests that will be done.

And I'm very concerned about how those films are going to be used because the Nuclear Energy Institute put out a video before the Yucca Mountain vote that was widely distributed to decision makers and I've heard interviewed some of the scientists who conducted the tests at Sandia saying that those films were really a misuse of their studies, that those studies were intended to benchmark computer models. But when you show dramatic fiery tests to the public and say, see, the casks are safe, there's a question of misuse of these films.

And so, I asked the question in Rockville to the NRC how would these films be used, and I didn't hear that for lobbying tools on behalf of industry, it was a precluded activity with the film. So, that's a concern I wanted to raise. And another one has to do with the realism discussion. An accident that happened in Michigan just before the Yucca votes again a year ago was a propane train that derailed near Lansing, Michigan, in a small town. And the entire town was evacuated and the situation was very touch and go because there was so much propane on board the

train and a lightning storm rolled in. And so, there was a potential for an ignition of a vast amount of propane.

And it's another one of the situations. I know that NEI very recently came out with a new transportation policy that advocates dedicated trains. That's been a long time in coming, but our concern is that the Department of Energy which would be in charge of this massive Yucca Mountain campaign does not have that position. And so, there still is very likely a potential under current regulations that high level nuclear waste could be mixed in with a train such as the one that derailed in Lansing, Michigan with this high temperature burning material, highly explosive material. And that's a dose of realism.

In that situation, the emergency responders didn't know whether to go in or not. But in the case where high level nuclear waste is on board and the explosion could liberate that radiation into the environment, we're not talking of having, and our organization is very concerned about the safety of emergency responders. But the emergency responders could be faced with the choice of letting a fire burn with high level nuclear waste in the middle of it not knowing what the fallout consequences for a vast area could be if they don't risk their lives to put it out.

And another dose of realism is we're going to

talk about the Baltimore train tunnel, or you are later this afternoon, the fire in 2001. But the realism of that situation was that the emergency responders, some people feel unnecessarily because there were no people in the tunnel, rushed into a situation that endangered themselves. Perhaps unnecessarily. But at the same time there were hazardous materials on that train. Perhaps a part of their thinking was they wanted to stop the release of those hazardous materials on to the environment because of the fire.

And again, the Baltimore train tunnel is a possible route for high level nuclear waste, so I just wanted to bring up those thoughts.

MR. POSLUSNY: Thank you, Kevin. Any other comments? Yes? Again, please state your name.

MS. GIU: My name is Lisa Giu. I'm here representing public citizen. We're a national, non-profit, public interest organization based on Washington, D.C. And I just had a few comments that I wanted to add at this point.

First of all, I really appreciated Amy's response to the question about how dangerous is high level nuclear waste. And I think it's really important for the NRC as well as the industry to be honest in answering that

question that what we're dealing with here is an extremely dangerous, in fact, deadly material. To try to conceal that, which has certainly been the practice to some extent, is not only dishonest; it also runs counter to safety goals because it leads to a sense of complacency. And it's vitally important that everybody involved in the transport of high level nuclear waste including the public as bystanders even is aware that this is a material that has to be dealt with with the utmost safety because it is very dangerous.

I also wanted, of course, to say a few words about risk. Risk information is a useful tool, but unfortunately, it sometimes appears that the NRC applies this tool more as, or applies this more as a blinder than a tool. And we've heard a lot about the safety record of past nuclear waste shipment. You know, not only are there problems extrapolating based on such a limited history with any confidence projecting on to what's going to be certainly an unprecedented shipping campaign if either the Yucca Mountain or the private fuel storage proposals move forward, but also I think there's some very interesting insights coming out of NASA's investigation into the Columbia disaster where you have some analyst suggesting that NASA erred in mistaking a history of successful shipments with,

or missions in their case, with a reduction in risk. And in fact, risk has not been reduced unless something meaningful has been done to improve safety. That's something that we would all do well to translate into the nuclear waste transportation scenario.

But in any case, it's certainly no comfort to an impacted community to know that the accident they experienced had a very low occurrence of happening. And I think that's the other side of realism that we have to take into account. That coupled with the fact that some of the most disastrous experiences that the public knows to be real were in fact very unlikely. And that seems to be increasingly the case.

So, and then, I guess the other thing is, of course, we all saw last week the decision of the Licensing Board on the private fuel storage application which ruled, in fact, strongly against the NRC staff analysis of probability in that specific instance. I think that does actually cast a shadow of doubt as to the adequacy of NRC staff probability analysis across the board. So, all of this argues in favor of conservative estimates and an eye to understanding the consequences as well as not only focusing on the question of probabilities.

So, the final point I just wanted to make is

that we are very interested to know that whether and how hopefully the NRC intends to move forward with the information from a package performance study to influence and inform other important licensing decisions both with regard to the adequacy of licensing regulations for nuclear waste transportation casks and in the evaluation of the large scale transportation campaigns that would accompany the Yucca Mountain and private fuel storage proposals that are currently on the table. Thank you.

MR. POSLUSNY: Thank you, Lisa. Any other comments from the audience? I promise to give you another shot at the end of the day, thank you.

Before we get started, I just wanted to let you know that we have another participant on the panel, Corey Conn. If you'd tell us a little bit about yourself.

MR. CONN: Thank you very much. My name is Corey Conn. I've come up from downtown. This is a difficult time at the medical schools across the country and for staffing reasons I was unable to extricate myself until afternoon today. I am here representing the Board of Nuclear Industry Information Service which is based in Evanston, Illinois and I'm acting in lieu of our director David A. Kraft. And I will have some remarks of my own at times today of course. But also, I have an understanding

that we are preparing a tape of some additional comments made by public yesterday evening who also could not be here during work hours. Thank you very much.

MR. POSLUSNY: Okay. We look forward to getting those. Bill, you had a comment?

MR. BRACH: I just wanted to make one comment. Kevin raised a point I think is very important. The comment was with regard to the use, if you will, of the tapes that we're planning to make of the Package Performance Study test. Just to put that in context, if you recall earlier this morning, we had mentioned that in the Package Performance Study, it's NRC's first effort in a major research activity to on our part try to involve the public in its very aspect in all aspects of the, if you will, the planning, the scoping, the conduct of the activities. Today's meeting is an example. We're trying to move forward and develop the test plans for the Package Performance Study to have stakeholders and public views and input incorporated.

We made passing reference to it this morning but it might be worth just spending another minute on this. Part of our plans for involving stakeholders and public in the study as it progresses is to have, in the actual conduct of the test, is to have stakeholder and public observation

of the test. And I think Andy mentioned earlier that our plans as well is that the prediction on our part, the model of the analysis that would be conducted prior to a test would have all that information available to all the public and all the stakeholders. And then, after the conduct of the test, after it has been, as I mentioned, be observed by the public and stakeholders, the results of the test, the comparison of the results to the prediction, the conclusions we reach, all that information would be available and shared with all the public and stakeholders.

We are planning that we would have as well a film or a tape made of the actual conduct of the test. This will be a film or tape of the same test that was observed by all the public and the stakeholders. And I think the point that Kevin was raising is appropriate that it's important on all our parts as we're analyzing and presenting and representing information, whether it be showing of a video, representing results of a study or a test, that we are doing our best to factually represent and correctly represent whether it be in the showing of a video or presenting test results in data and comparisons to have that available to us all.

And so, I think, I appreciate your raising that because we hadn't really discussed the filming of the study.

But that's an element in our effort on it in an outreach activity to have all what we're doing being as transparent, if you will, to all the stakeholders and all of you out here at the table as far as what we're doing, conclusions were reached and how we reached those conclusions.

MR. POSLUSNY: Thank you. Bob?

MR. HALSTEAD: Chet, I'd like to ask you to write this up on the board as a specific issue to have public participation and peer review in determining how you're going to do risk communication as a public. Now, we talked about earlier doing this for the ER stuff, this is a particularly sensitive issue for us. Some of you know we've commissioned a couple of reports on the Sandia test films and people have various opinions of how this footage are used. We find it very effective in the data as a fundraising exercise to tape those DOE tapes of the Sandia films, to show them and then critique them. So, that would be my argument, that's the way you don't want to go.

On the other hand, there's a very, very effective tape made, I believe by the state of Idaho, regarding the true waste shipments from the Idaho engineering lab down to DeWitt facility in New Mexico, and I believe it's called Safe Way Out. And it's very interesting there because I know one of the concerns people have is the

dramatic impact of the rocket sled versus the drop test. And a lot of western people would testify that what doesn't look very exciting when you've seen the raw footage, in fact the multiple drops and fire test of the Trupact 2 container was subjected to not only have good technical validity and of course they're documenting in the safety analysis report, but you really see how tests a lot of critical, skeptical people endorse then presented on video have an impact.

And I think that that's one of the things you should be thinking about how to do in your work plan towards the end here is basically to get a group. Anybody who wants to come will all bring different versions of videos and films we have. And a surprising lot has been written on the use and misuse of these communication tools. So, we would definitely like to be part of that and obviously people who, you know, have taken different approaches have got to be part of that, too, so that whatever comes out of the NRC, if it's an official NRC video, has the same benefit of public participation as well as technical peer review to make sure there aren't any inaccuracies in that.

MR. POSLUSNY: Okay. Good, we'll take that as a recommendation. Okay. We're going to get back to the agenda. And at this point, we're going to do the --

MR. HALSTEAD: Sorry to bother you. Would you

please write video or something that says products up there so we capture the point?

MR. POSLUSNY: Got it.

MR. HALSTEAD: Thank you.

MR. POSLUSNY: Got it. Sorry about that. My brain stopped for a minute. Okay, now it's time to talk about the fire aspect of the proposed test. Two folks will be discussing the issues. The first person is Amy Snyder. She's recently enjoying a spent fuel project office. She's been with the NRC since 2000. She's currently the project manager in our office with PPS. Previous work with the NRC included being a project manager for the Less Value Project, and also the lead health physicist on the Panemic Reactor decommissioning effort.

Prior to the NRC, she was a health physicist on several decommissioning projects. She was also an officer in --. She's got a Master's in physics from the University of Cincinnati, a Master's in management from Leslie College, and a Bachelor's in geologic sciences from State University of New York. Amy?

MS. SNYDER: Good afternoon. NRC appreciates your participation in this workshop and I'm glad to have the opportunity to talk to you this afternoon about fire testing issues.

An important part of the process for design testing involves the interpretation of the relationship between potential radiological hazards and real world severe accidents. In the past, NRC has studied real world accidents and we will continue to do that as far as our problems are concerned. In July 2001, the Baltimore tunnel fire occurred and the Commission asked us to look at that and see what it would have meant if a spent fuel cask was in that tunnel. We did that and what we're about to talk about is some very important discussion on what we learned from the Baltimore tunnel fire and how it compares to the Package Performance Study.

As an example, we studied the Baltimore tunnel fire, but I want to make it clear that we didn't base, the design basis is not based on the Baltimore tunnel fire. It's just an example of part of our process that we go through; we need to look at real world incidents that happen. The state of Nevada also evaluated the Baltimore tunnel fire and came to different conclusions. And what we have planned, we're in the process of getting together with the state of Nevada to discuss our findings and to talk about the assumptions that we made in the evaluation so that there will be a better understanding of our conclusions, why we came to the conclusions that we did.

What I'd like to do this afternoon is first talk to you about the test protocols, the fire test protocols portion, and then review what the staff has proposed in the fire test protocol. And then, Chris will talk about the evaluation of the Baltimore tunnel fire.

You saw from Mr. Sorenson's presentation this morning that we're going to be performing fire testing. Well, what is the process that we've proposed? What we'd like to do is calorimeter testing to obtain necessary background data on the fire such as temperature and heat flux so that we will have a better, so we can benchmark the fire codes that we'll be using to, so that we can more accurately model the fire environment. Then, what we'll do is we'll actually do modeling and determine the response of the casks to the fire environment. We'll make those predictions. Then, we'll do the tests and compare the results.

In my first bullet, the staff has proposed full-scale testing for the severe fire test. What I think is unique about this is that this will be a real cask, a certified NRC cask so we can get some valuable data. Then, the staff has proposed to do a fully, that the fire be fully engulfing, optically dense hydrocarbon fuel source fire, jet fuel. As Dr. Murphy explained to you earlier this morning,

a fully engulfing fire is that the fire completely surrounds the cask. Optically dense means that you can't see in to see any part of the cask or the cask can't see out so that the fire, all the heat goes into the cask. And the hydrocarbon is the source of the fuel; we're proposing jet fuel.

Next slide please. There are many ways in which fire testing can be conducted and we'd like to know what you think about how it should be conducted and specifically these two questions: what should the duration of the cask fire test be and what should the cask position relative to the fire be?

In the test protocols, preliminary modeling was conducted from zero to 60 minutes. And we did not specify a specific duration for the actual field testing, but we recommend more than 30 minutes, more than the regulatory test. We would like to know your opinion and what you think on that.

You saw from Mr. Sorenson's presentation this morning that the cask, he showed the cask on the ground one meter above the ground, the regulatory position, and then, above the vapor dome. What position should the cask be in when we do the testing?

Next slide please. Your comments, concerns and

ideas, and suggestions are welcome. And I want to make it clear that we're here to listen. We're here to consider your comments. And with that, what I'd like, if you have any questions? And then we can go on to Chris' presentation.

MR. POSLUSNY: Yes, John?

MR. VINCENT: Amy, you should clarify that the choice of the hydrocarbon fuel also specifies the temperature. At least that in the NRC meeting in Rockville --

MS. SNYDER: Correct. That's right. The question was what temperature, the NRC should be specifying what temperature conditions we are going to be proposing to do these tests. We've specified hydrocarbon fuel, and hydrocarbon fuel burns at, was it 1475 degrees Fahrenheit? So, we were remiss in explaining that, but that's what we, that's the temperature that the tests, we're proposing that tests be conducted at.

MR. POSLUSNY: Let me just say that we obviously did get some comments on the fire conditions, and indeed we talked about a suggestion that the fire test go to failure for a number of reasons and a number of, obtaining information for different purposes. Are there any other comments besides the ones that we heard this morning on what

the fire test should be or not be?

MR. WERNER: Yes, I just have a question about that fuel selection. I wasn't at these various other meetings so I missed that whole discussion. Maybe it was answered earlier, but why were you suggesting using jet fuel rather than diesel fuel or gasoline? And what's the difference in temperature? We have relatively little JP4 or JPH compared to diesel or other gasoline.

MR. SORENSON: Well, we've selected JP4 because most type of carbon fuels burn without the same temperature.

MR. WERNER: So, there is no difference in the temperature between regular gasoline and --

MR. SORENSON: I'm not saying no difference, but they're all around a thousand degrees C is what they burn at, the hydrocarbon fuels.

MR. WERNER: Okay. Isn't gas cheaper? As a taxpayer --

MR. MURPHY: We're buying it in bulk.

MR. WERNER: Thanks. So, there is no difference in the temperature though. That's the important thing, it's what you test for. I'm just trying to be practical here because the common thing is to use gasoline. I'm just wondering why you get fancy. Is there a reason why that fancy?

MR. SORENSON: Well, the burn rate is, I think, less for JP4 than for gasoline, so you can control the flame a little bit better.

MS. SNYDER: We did some preliminary calculations to get a feel. For a one-hour fully engulfing fire with jet fuel would be about one tank or 9,000 gallon tank or truck to sustain the fire for one hour. That would give you a frame of reference.

MR. WERNER: I'm just with Eileen. Let's use realistic tests --

MR. ELLIMAN: This is Dave Elliman from Sandia. The other reason that we've used jet fuel as opposed to gasoline is just for test facility safety. Jet fuel has a much higher vapor pressure than gasoline. It doesn't evaporate as quickly so you have much less chance of having an explosion at the test facility when you go and throw the match in.

MR. POSLUSNY: Mr. Resnikoff, you had a question? A comment?

MR. RESNIKOFF: Well, I'm unsure where to jump in here. The test conditions that I would take depend on the results that Chris Bajwa is going to talk about, the Baltimore tunnel fire. So, should we just jump in now and talk about what fire conditions we think are appropriate or

should we wait until after Chris' presentation?

MS. SNYDER: I'm sorry. What I should have made clear is there will be time for the workshop to talk in detail about your ideas and comments on the fire testing. So, the plan is to talk about the evaluation of the, or NRC's evaluation of the tunnel fire and then open it up to everyone to talk in detail.

MR. POSLUSNY: Okay. Let's go with any general questions first and then we'll do the detail. Yes, Bob?

MR. HALSTEAD: Yes, I'd prefer to be involved in a discussion of fire testing after the Baltimore presentation. But I want to plant one idea in people's minds, and that is, to what extent did you consider using a furnace or some other approach to doing the thermal environment test as opposed to the --. Most of us who followed this the last 20 years are familiar with the open fuel fire technique, but I don't remember seeing a discussion of that in the '93 Sandia testing report that we got, there was an evaluation of the pros and cons and identification of the facilities that actually had furnaces large enough to do 40 and 100-ton packages.

And would it be better to defer that, Ken, until we do the Baltimore presentation?

MR. MURPHY: Just a quick answer is that a lot

of the conditions that we're talking about either it's for the fire or the impact were simulating things that are going on in the certification test. And I'll say we're going a step or two beyond what's done at certification. And that was sort of the reason that we picked the open fire route than doing a furnace. And also, given the question of where are we going to find a furnace with access that would be large enough to hold a full-size cask.

MR. POSLUSNY: Okay. Any other general questions on the fire? If not, we'll go to the discussion of the Baltimore tunnel fire. And now I would like to introduce Chris. I need my notes to do that.

Chris Bajwa also works for the Spent Fuel Project Office. He's a fuel engineer assigned to our staff. He's been with the NRC for about ten years. He's worked in various regulatory activities related to fire protection. He's responsible for conducting full and contained reviews on spent fuel and transportation casks. And he holds a Bachelor's in mechanical engineering from Stevenson -- He is a registered professional engineer. So, Chris?

MR. BAJWA: Chet is going to serve double duty and do the slides, so I'll give him a second to get in place.

Obviously we heard a lot about the Baltimore

tunnel fire today. It's been mentioned several times in the morning session and already a couple of times this afternoon. Some of you may not be familiar with what that was, so I will cover some of that during the presentation. We were asked after that event in July of 2001 to look at the tunnel fire event itself, to sort through what happened during that event and to look at how that event would impact a spent fuel transportation cask had that particular cask or had a particular cask been in that fire in the Howard Street tunnel in Baltimore.

Next slide. So, what I'll do today is I'll talk about the actual event, give you some of the details. I'll talk about our coordination with the National Transportation Safety Board. They're the main investigatory body that was looking into this particular event. I'll talk about a fire model that was put together by the National Institute of Standards and Technology, formerly the Bureau of Standards. And I will also talk about a transportation cask analytic model that the staff put together in conjunction with Pacific Northwest National Labs. And finally, I'll share some of the conclusions that we reached during this analysis.

Just to tell you a little bit about the event, the Baltimore tunnel fire was actually a derailment followed

by a fire that occurred on July 18th, 2001. A CSX freight train was traveling through the Howard Street tunnel in downtown Baltimore. Howard Street tunnel is actually adjacent to Camden Yards where the oil is placed and if any of you are baseball fans, you might know where that is.

Just a few pictures from the event itself. In the corner here, this is a western portal of the tunnel, and this is a tri-propylene tanker car. What had happened is several of the cars, as the train is going through the tunnel, several of the cars derailed, and this tri-propylene tanker car had a hole punched in it during the derailment and a fire ensued. They don't know exactly how the fire started but they knew approximately when it started. And right here is the hole that was punched in the tanker car. It was actually punched by a brake mechanism that came apart during the derailment. And that hole is about 1.5 inches in diameter just to give you a feel for the size.

Up here is a picture from the actual fire. Emergency responders here. And this, I believe, was taken at the eastern portal sometime during the fire. And this is the eastern portal about a year after the fire, so it's been cleaned up, just to give you an idea of how big it is. This is a single rail tunnel which means that only one train can pass through at any given time. I should also say that the

precise duration of the fire is really not known and I don't think we'll ever know exactly how long it lasted.

We do know through information provided to us by emergency responders via the NTSB that the approximate duration of the worst part of the fire was about three hours. And we also know that 12 hours after the fire started, firefighters were able to enter the tunnel and actually approach the tri-propylene tanker car which was the source of the fire. So, it was cool enough for them to approach that car to make a visual on it and see that it was not burning 12 hours after the fire. So, we have a range of how long the maximum fire duration could have been. But again, we believe that the most severe portion of that fire was probably about three hours.

To get an idea of what this event entailed, in other words, what the details in this event were, we coordinated with the National Transportation Safety Board. They were investigating this event and in fact are still wrapping up the final report on how they think this particular derailment happened and the consequences of it. The derailment was the primary concern of the NTSB simply because the derailment happened first, and that's what they wanted to find out the reason for. They wanted to find out the reason for the derailment. And the fire was a result of

that derailment.

The NTSB provided us information data and technical expertise on rail events because we decided we really were interested in the fire. So, we wanted to characterize and understand what the fire was like in the Howard Street tunnel. One of the other things they provided was access to the railcars that were actually in the tunnel during the fire, and that was through CSX. So, we were able to look at and inspect the railcars that came out of that tunnel.

Because we had a lot of conflicting reports of what the fire was like, we wanted to take a look and see if we could model this particular fire given that we knew what fueled it, we knew approximately how much of the fuel there was. And we went to the National Institute of Standards and Technology to model the Howard Street tunnel fire. They used a fire code that they'd been using for many years, they'd been developing it for many years called the fire dynamics simulator. It's a computational flow of dynamics code, and basically what that means is it's code that not only will allow the combustion that's happening in a fire but the flow of air going into the fire and smoke leaving the fire. So, it's kind of an all-encompassing code.

It's been used extensively for nuclear power

plant fires and also for building fires. They've actually worked with several fire departments to determine what happened in building fires, for townhomes, single family homes, that kind of thing. NIST put together a full three-dimensional model of the tunnel geometry, the Howard Street tunnel. So, they measured, they modeled the entire 1.7 mile length and they also modeled all the railcars in their derail configuration.

One thing I should mention about the FDS code, to get a better feel for how the FDS code would handle such a tunnel fire event, they used data that was published by the Federal Highway Administration and from the Memorial Tunnel Test Program. An abandoned test facility in West Virginia was actually a road tunnel. They set several fires and took data as to what the temperatures were along the length of this tunnel and published that data. And what NIST did is they took that, a couple of different fires from that pool of data, modeled them in FDS and looked at the results versus the data that they got. So, they modeled those tests and the results that NIST got from their fire model actually correlated quite well to the test data. So, we were comfortable with the tunnel fire model that NIST had done, or I guess I should say we were comfortable with the way FDS was going to handle a tunnel fire model with the

geometry and the flow characteristics of a fire in a tunnel.

To tell you a little bit more about the Howard Street tunnel fire model, they did use tri-propylene as the fuel, as we know that that tanker was the source of fuel for this fire. There was no ventilation in the model and the reason for that was the manual ventilation system in Howard Street tunnel, there is one, it was not activated during the time of the fire. So, we did not model that. The actual simulation reached a steady state or constant temperature conditions in about 30 minutes. And what I mean by that is the hot gases -- tunnel, the surfaces of the railcars and the surfaces of the tunnel wall reached pretty much a maximum steady state condition in about 30 minutes into the simulation.

This is a delineation of the -- tunnel fire model. And it may be hard for some of you in the back to see and I'd be happy to show it to you later if you'd like to get a closer look. Basically, we have the tunnel geometry. This is the top of the tunnel. The bottom. There is a slight upward grade from here to here of about 0.8 percent. And you'll notice that as the fire progresses, it is actually moving towards the upwind side of the tunnel.

As far as the temperatures, this model predicted that within the flaming regions of the fire was about 1800

degrees Fahrenheit. Where it actually impacted the top of the ceiling, we're looking at about 1500 degrees Fahrenheit for this top of the ceiling surface. For the hot gas layer above the cars here, for a distance of about four railcars, the temperature was about 900 degrees Fahrenheit. That's an average along four railcar-lengths from the fire. And finally, the average of the tunnel surface, about four railcar lengths from the fire was about 750 degrees F. So, that's what this tunnel fire model predicted.

Now, to kind of tie all that together, this is a graph of that data. And what you have here, and it may not be clear on your handout so I want to go through it briefly, degrees Fahrenheit on this scale and then distance in meters on the scale down here. Zero is where the fire is located in the NIST model. And as you can see, as you move from the ceiling which is the line of the top here, down to the top of the railcars, down to the side of the tunnel, the tunnel walls, and down to the floor of the tunnel, you see a decrease in temperature. So, the fire obviously shot up through these railcars and started heating up the ceiling almost immediately. And that's where you saw your highest temperatures. And you'll also notice that the upward slope is in this direction and that the maximum temperatures are slightly offset from the fire about between zero and five

meters upwind of where the fire was located in the simulation.

Next slide. We certainly do not want to ignore another important piece of information. And that was the physical evidence that was present in the tunnel. There were railcars, there was brick, there was the rails themselves. There was sand. There were all sorts of materials that were in that fire and we thought that that would give us an even better picture of what happened there.

So, we went for it. We went to the Center for Nuclear Waste Regulatory Analysis which operates at a southwest research in San Antonio, Texas. And we contracted with a fire and material experts to look at the actual materials that came out of that tunnel to get a better feel of what kind of temperatures they saw and what kind of duration they were at those temperatures. So, we decided that we would ask them to do a metallurgical analysis on those materials that were taken out of the tunnel.

They took samples from the railcars, samples from the tri-propylene car itself and then from cars that were surrounding the tri-propylene car. They had brick samples. They looked at paint charring patterns on the cars that were in the tunnel. And we're analyzing those to

determine temperatures that the paint saw, stratification of temperatures in the tunnel meaning the cool temperatures towards the bottom and then the increase in temperature as you went to the top of the tunnel. The results that the CNWRA reported were consistent within these temperature results. So, in other words, what the center, we call the center the Center for Nuclear Waste Regulatory Analysis, saw in the actual materials that came out of the tunnel corroborated with what NIST was predicting for temperatures in the tunnel.

So, now we felt we had captured what was happening in Howard Street tunnel fairly well. I mean, obviously the point has been made before and I completely agree with it that we're not going to know ever exactly what happened in that tunnel. No one is going to know all that. So, what we are doing is we're going on the best information we have to try to capture what we feel is a realistic simulation of what happened in the tunnel.

The next step in this is to look at how that fire would affect a spent fuel transportation cask. This is schematic of the Holtec Hi Star 100 which has already been presented today. This is a multi-purpose cannister cask. This particular one has 24 fuel assemblies. This is the multi-purpose cannister, over pack and the closure plate.

What's not pictured in here but you'll actually see in the next slide are the impact limiters.

So, this is a rendering of the Holtec Hi Star 100. It's actually on a specially designed railcar. It has impact limiters in place. This is a cradle in which it sits and then it is secured into the cradle. And these are positioning blocks on either side. And like I said, this is just a rendering.

This is a picture of a two-dimensional finite element analysis model that we did of the Holtec Hi Star Cask. If you can just go back one? This has 24-fuel assemblies, 24 pressurized water reactor fuel assembly and this is the fuel basket. This is the MPC shell. These are cover steel gamma plates. This is the neutron shield material. And then there's a stainless steel skin on the outside. We also modeled the cradle on which it sits when it's transported.

Next slide. This is a detail of the fuel area. You can see the basket supports here, the shell. These areas in here are helium because the cask is backfilled with helium. This is a homogenized fuel assembly; basically because of modern limitations and limited computing capability, you can use a homogenized fuel assembly which will pretty closely mimic the behavior of an actual fuel

assembly and give you decent temperature data. Also, this particular model had a 20-kilowatt heat load that was in the fuel basket for this particular analysis.

So, what do we do with this model? We took temperature and flow data from the NIST tunnel fire model and we applied it to this model. We did two assessments. We looked at the cask center 20 meters from the fire source. And the reason we picked 20 meters is that is per federal regulations. Department of Transportation regulations currently require that if a radioactive material package or any railcar containing radioactive material is being shipped, it must be separated by at least one railcar length from a hazardous material railcar.

So, in the hypothetical situation of a spent fuel cask being shipped on the same railcar as a tri-propylene tanker or tank car, you would have at least a separation of one railcar which is about 20 meters. So, that was the first assessment we did. The second assessment is kind of a feel of what would happen if we were adjacent to the fire. We took the cask now located five meters from the fire source.

And these are results of the assessment. This graph actually shows different components of the cask starting here at zero time. The fuel is at about 700

degrees Fahrenheit. As you can see, the fire started at zero and there is the fuel, the cannister shell, the cask inner shell, the gamma shield of the cask's outer surface. We have a regulatory limit, short-term temperature limit on spent fuel that the NRC currently enforces during cask reviews of 1,050 degrees Fahrenheit.

And so, we just put this on this graph to show you how long it would take for this particular fire with the cask 20 meters away for it to heat up the fuel to that particular temperature of 1058. It's about 116 hours. And you'll notice here that the fuel doesn't even start heating up until about 15 hours into the fire transient.

Next slide. Notice, if you move the cask closer to the fire source, it's going to hit it faster. That's pretty obvious. Here at the five-meter distance, you'll see the fuel in about ten hours starts to heat up and it exceeds the short-term temperature limit of 1058 at 37 hours into the transient. And then, you can see the temperatures of the other cask components.

One thing to mention about the 1058-degree Fahrenheit short-term temperature limit, it's not as if when the fuel reaches that temperature, it all of a sudden fails. And that's a regulatory limit. In fact, that particular one that was established through experiments where they

exposed spent fuel cladding to that temperature of 1058 for 30 days and 70 days and they saw new degradation and new failure. It's a fairly conservative limit on spent fuel.

Next slide. This is an animation of the five-meter results. And what you're going to see here is the fire starts up and you have, obviously the maximum temperature is going to be up here towards the top. And can you click on it again? I don't know, it looks like it's not running. It died? There it goes, okay. So, you can just leave the mouse there. Yes, that will do it, okay.

Anyway, so, obviously the maximum temperatures are at the top of this cask. The way we divided this particular model is we took the top third and applied the maximum temperatures in the seal region to the top third of the cask. Then we took the middle section and applied the maximum temperatures and flow of course from the tunnel in this tunnel fire model to the middle section. And then we took the bottom third and applied the maximum temperatures and flow from the bottom of the tunnel. And you can see that to your, obviously it's going to heat up first at the top and then you have a wave of heat pretty much moving down through the cask.

The other thing noticed here is the top of the support here is heating up. And the reason that's happening

in this case is we wanted to capture the effect of the flames. This is the five-meter case, it's right adjacent to the fire. The flames coming up over the impact limiter and having a direct view down on to the top of the cradle, and so that's why you're seeing that particular heat up of the cradle.

Next slide. If you can get to it. Why don't you just try page down? There we go. So, just to sum up the results that we obtained from our analysis, first of all, the time to exceed short-term fuel temperature limit of 1058 for the 20-meter case was over a hundred hours, for the five-meter case, it was over 30 hours. The time to cannister failure was also something we were interested in because this particular design has a multi-purpose cannister. If that cannister stays in tact during the fire transient, you're not going to have a release of any of the materials that's in that cannister.

So, we calculated the time to cannister failure based on the heat up of the outside of the cannister and the internal pressure. And we saw that for the 20-meter cask, it would take over 30 years at the sustained peak temperatures of that fire for it to fail the inner cannister. And for the five-meter case, it was about the same, it was over 30 years. So, our conclusion was that for

this particular transient, we would not see a failure of the cannister, the multi-purpose cannister.

Conclusions. One of the things that I think is evident from this particular analysis is the robust nature of this particular cannister design. We concluded that the exposure of this particular design to an environment similar to the Baltimore tunnel fire environment would not result in any release of radioactive material. And when I say that, what I mean is that the radioactive material within the cannister would not have been released. There wouldn't have been a path to the environment for a release of that material.

We believe the health and safety of the public would have been protected had this hypothetical event occurred. There's one thing I want to say also about the neutron shield. The outer surface of this cannister has a neutron shield surrounded by a stainless steel skin. The neutron shield in this particular case would most likely have been damaged during this kind of a fire. Most likely, it would not have been completely gone, but certainly damaged. Compromised, I'll say.

Now, this particular cannister design is certified for accident conditions with non-neutron shield in place. In other words, the vendor who applied for this, to

license this particular cask did an analysis of the dose rates around the cannister, or sorry, around the cask without the neutron shield in place. And it met the federal requirements -- one meter.

Indications for PPS thermal testing. Obviously, that's what we're here to talk about. For this particular analysis, we see that the cask was not fully engulfed. And we believe that for the actual Baltimore tunnel fire event, panic has been involved in that, it would not have been fully engulfed in the fire that occurred. The PPS (Package Performance Study) is seeking to do a fully engulfing fire test. And depending on the duration that is chosen for that test, it is very possible that the actual heat input to the package tested in the Package Performance Study, a fully engulfing fire could be greater than what we calculated here in the Baltimore tunnel fire event. That's it.

MR. POSLUSNY: Let me ask you a quick question, Chris. We've talked about fully engulfing fires several times. Hypothetically, if a tanker was running on the track and there was a spent fuel cask right next to it, would that be considered subject to a fully engulfing fire?

MR. BAJWA: No. No, not at all.

MR. POSLUSNY: And why not?

MR. BAJWA: Yes, the fully engulfing fire is a

phenomenon that you would probably very rarely find in nature. It is something that has been engineered to pass the maximum thermal response or thermal performance of packages. If a spent fuel cask was next to a fire source, obviously that's not going to be a fully engulfing fire. And the fully engulfing fire, like I said, to occur in a transportation event is highly unlikely. But obviously, for the regulations and for the Package Performance Study, we feel that it is a severe test and that it gives you a good indication of how a cask is going to perform in a severe fire event.

MR. POSLUSNY: Thank you. I guess I will open up the table to questions either on the proposed testing under the Package Performance Study or even on the Baltimore fire. So, obviously we have questions.

Mr. Resnikoff?

MR. RESNIKOFF: Well, first of all, I appreciate the fact that the NRC has expended so much resource to investigate this fire. I have a bunch of comments and questions.

First of all, I have some comments and questions about the fire itself I'm somewhat uncertain about. As I understand the fire, and it was a three-hour fire and then at the three-hour point, I think the water main broke in the

ceiling and then they noticed the difference in the color of smoke coming out. And they thought that perhaps the fire might have been extinguished at that point.

But there were other materials that continued to burn in the tunnel but at a lower temperature and not necessarily in the same location. There might have been paper and, you know, other materials that burned. What concerns me is the fact that the brick heated up to a great extent. We often talk about the fact that these casks are so massive and it takes so much time to actually heat them up, but there's a massive amount of brick in the tunnel, too, that heated up. And that brick, after three hours, continued to radiate heat.

So, my first question, I guess, is when NIST modeled the tunnel, did they also take into account the re-radiation by the brick itself? I have some other points but I wanted you to, I'm interested to know your thoughts on that.

The second is when you then put a cask, and there was no cask in the tunnel, I don't know if you said that, but if you then put a cask in the tunnel next to this tri-propylene tanker, it looked to me like you're then doing a two-dimensional analysis or P&L was doing a two-dimensional analysis. You were assuming a fire was right on

the side of the cask or at five meters or 20 meters away. And you were taking that two-dimensional slice of the cask, not a three-dimensional cask.

In other words, what was happening to the impact limiter at that time? And the Holtec impact limiter is an aluminum honeycomb and I assume is going to melt at the temperatures in that fire. What is happening there? What is happening at the seals of the cask when this fire takes place? Those weren't shown in the slide because you were just looking at a two-dimensional. And it would be helpful to us if you could actually release this P&L study so that we all could take a look at it and, you know, and see what modeling was actually done.

I think from the basis of what happened in the tunnel, at least a three-hour fire should be looked at with a continuing heat source in the tunnel itself because I think that's what happened in reality. So, that answers the question, I think, of what kind of test we think or I think is appropriate for modeling, you know, in this PPS study. I don't know if you wanted to answer any of this.

MR. BAJWA: Yes. Just to give you a better feel for the NIST model, the NIST model did take into account the heat up of the tunnel, the surface of the tunnel. When we then applied those temperatures to our model, we did take

into account the radiation of the brick onto the surface of the cask. One thing that we did do in our follow on study is we actually did a seven-hour fire, so where we took the 20-meter case and we ran the fire for seven hours.

And then we did a cool down period after that. And we didn't see any, we didn't even see the cask exceed the short-term temperature limits in that particular case. So, that's a case where you have seven hours worth of radiation at the fire temperature on the cask. And that was kind of an enveloping study that we did.

I wanted to speak also to the 2-D versus 3-D. As far as the analysis that P&L did, we had proposed a follow on meeting to talk about the NIST report and our analysis. At that time, representatives from P&L will be available, so they can discuss with you how we did that model. They have not published or submitted to us any formal, I don't think they've submitted to us any formal documentation on the model. But at some point, we will have a more descriptive representation of what we did and that will be available publicly.

MR. RESNIKOFF: If you're going to have a meeting in May, you know, to just consider this issue, it might be a good idea to bring them in at the same time. And NIST as well.

MR. BAJWA: That's what I'm saying. Yes, that's what I'm saying we're going to do. That's the plan at this point.

2-D versus 3-D, the reason we took a 2-D cross-section, obviously to save a little overhead on the computational time. A three-dimensional model of the spent fuel transportation cask with impact limiters that would give you enough resolution to really understand what was happening in a fire environment is quite a big model. It would take a long time to run and a long time to develop. The 2-D model gives us a couple of advantages. Obviously, there are not as many elements in that model, so it won't take as long to run.

Plus, we are able to take the peaking factor for the fuel. In other words, the cross-section that you saw is the hottest possible cross-section in that cask based on the peaking factor of the fuel decay heat. So, that was the hottest possible cross-section. And I wish I had kind of a visual, but when we say it was 20 meters from the center of the cask, if this was the cask here, this is the center, say this is the center of the cask, the fire was located 20 meters to this side of the cask. So, it wasn't as if it was, you know, it was this distance away, okay.

So, this is the center of the cask, the hottest

possible cross-section, fire source here, impact limiter here. And the impact limiter is actually going to have an insulating effect, and obviously that's not taken into account in our two-dimensional model. So, the two-dimensional in that sense is actually more conservative than a three-dimensional model would be.

MR. POSLUSNY: Let's do Corey. Your first question.

MR. CONN: I want, Chris, to just ask you if in the successive versions of the analysis, algorithms and the parameters and the expansions of the sets of parameters that you might be able to use as you move beyond two dimensions, for example, would enable you to introduce into the space where currently we see a homogenous region opportunities to introduce constants and variables and parameters derived from the computation of stresses on welds and things of that nature.

MR. BAJWA: Well, theoretically, yes. This model was a thermal model. So, we were focused mainly on the thermal performance of the cask. You could do a structural model that would take into account thermal stresses and that would give you an idea of what those stresses would be. That is something that could be done.

MR. CONN: I raised the question in part because

I am curious if it would bear on the strength of a weld whether or not post-welding heat-treating had occurred or not, and if any, you know, data was known from that. Of course, brittle fracture, temperature ranges and things like that change whether post-weld heat-treating has been done. So, an example of things about which there is some uncertainty at the level of fabrication and if a person could be present at the time models are generated and to have input where a range of uncertainties, at least a few orders of magnitude could be, you know, introduced, I think it would certainly improve the reliability of any forecast in terms of failure thresholds.

MR. POSLUSNY: I would assume that comment not only refers to what was done there but also in PPS?

MR. CONN: Yes. Especially in PPS.

MR. POSLUSNY: Right. Oh, let me go over to Eileen, and then, Bob, you're next.

MS. SUPKO: I have a question, and it goes back to my focus on realism and trying to explain the test proposed for the Package Performance Study. What you're proposing is a fully engulfing, optically dense fire, and Chris, you commented earlier that, you know, theoretically, it's not something that could happen in a real world situation. My question is, is there a unit of measure? In

the impact test, the unit of measure is force or energy absorbed by the package. And so, one can equate the total force in a drop onto an unyielding surface to forces that one might encounter with different impacts to real world surfaces.

So, that's something that you can explain that, you know, this covers this real world situation, you know, whether it's a 120-mile an hour impact into, you know, whatever, concrete. Is there a similar unit of measure, and I don't know if it's heat transfer or some heat transfer parameter that you can use to translate the fully engulfing, optically dense fire into real world fire situations? To be able to explain, because actually that's one of the things that I find difficulty with. How do you explain that the 1475-degree, 30-minute regulatory fire is much more than just a 30-minute fire?

MR. POSLUSNY: Is there some conversion factor or something?

MS. SUPKO: Yes. Is there anything, you know, are you thinking about how to translate what you're proposing into something people can understand and say, okay, I got it?

MR. BAJWA: Yes. I think the term you're looking for is heat flux, and that's the movement of heat

into the package or the heat input into the package from the fire. You can determine that by calculation for different size fires, different fuels, I mean, you know, all different kinds of fires that you might find in actual transportation events. And then, you can decide you can calculate how much heat input would be put into a package, say a spent fuel transportation package.

So, I think that's the link that you're probably talking about and that's something that we could certainly wrap into any of the fire work that we do to help people better understand, taking the 1475-degree regulatory fire and looking at the heat flux there and then comparing it to, say an actual transportation event like Baltimore tunnel fire.

MR. POSLUSNY: Robert? Bob?

MR. HALTEAD: Well, some of you know Chris and I have been going around the country beating each other up the last three weeks and it's been such a popular performance that we're thinking about taking it on late night television.

For purposes of what we need to do here, I want to defer some of the next round of this debate until we have an opportunity to get the NIST and P&L people in a room with us. And hopefully, we'll do that in early May and we'll

have to somehow disseminate the transcript of that meeting so people can look at it before you finalize your comments. I want to summarize some concerns that I think would lead to different conclusions, but mostly, I want to talk about how we want to apply this fire with what we got to do today which is try to figure out how to define a fire temperature and duration that would be useful to us in designing a test.

We think that the fire history is more complicated. We're not convinced that, in particular, that the full re-rate radiation of the heat from the brick has been accounted for. But even so, it looks to us like at a very minimum, there's a basis in the NIST report to say that that fire was running at about 1,000 degrees C for three hours. Now, you can say it could have gone another four hours at 800 degrees C depending on how you account for the re-rate, that's because of the fuel and the tri-propylene tanker.

You add on number of hours for the other combustibles like the boxcar full of paper that are burning and the fact that the firefighters couldn't or for some reason weren't sent in to put it out. You'd also have a sizeable cool-down period where you'd have an elevated temperature but it would be a temperature below the peak temperature of the fire. So, number one, we think this is a

fire that at a minimum is a three hours at 1,000 degrees C and could conceivably have created the equivalent thermal environment of a fire that ran seven to 12 hours at 800 degrees C with that three-hour spike at 1,000 degrees C. Now, that's, temperature-wise, not as high as some fuels might burn in an open-air fire, but it's one hell of a fire. So, it's a pretty good fire for us to look at for these purposes.

The location of the cask in the fire was important. First of all, we don't think you can delineate these temperature zones as precisely as was done in the NIST report, but, you know, that's an argument for the meeting. But we look at the height and width of the tunnel where this occurred and it's quite conceivable to us that in a pile-up accident without any exterior damage to the cask, you could actually have had the equivalent of an engulfing fire. Again, that's another issue to be discussed.

Thirdly, the selection of the cask is really important. Some NRC casks appear to be less vulnerable to this type of a fire than others. We looked at a range in our analysis but we also didn't look at the one we think is most vulnerable, the currently licensed IF300 which is a 70-ton cask that doesn't use an inner seal. And if I were going to guess and then ask you to model it, I'd say that

cask would probably have failed in three to four to five-hour range of the fire. And by fail, I mean would have allowed the fuel inside to reach 740-750 degrees C.

And finally, I would argue that most of the containment credit for this cask that was used in Chris' example is the welded inner container. And it's a real good reason to go back and look at some of the discussions that occurred between state of Nevada, DOE and NRC people who were in those meetings in the mid-90's and we were talking about an MPC design that is the standard design. And frankly, there's probably a pretty good basis, too, by regulation requiring all the rail casks to have that welded inner container because that seems to be where the real barrier to a horrific release of cesium seems to come from.

All that said, for the life of me, I'm unable to explain why the thermal modeling that Miles Bryner who is a trusted mechanical engineer in the University of Nevada, Reno who has worked extensively with Richard Wertz is also at UNR and they have worked with Dr. Kaufski when he was at Sandia and those guys have worked with the Sandia staff on the fires for benchmarking the cafe code with large calorimeters which were basically mockups of casks. And we see some very different performance curves, so for example, when we look at the 125-ton MPC which was the DOE large rail

package, still a little smaller than the cask, than the Holtec or the other cask we're talking about, he assumed that that cask is undamaged. We find failure defined by heating up of the fuel inside being very sensitive to the assumption of the temperature of the fire.

So, if you assume that the temperature burns at the regulatory 800 degrees C, it takes about 22 hours for the fuel to fail. If the fire is hotter at 1,000 degrees C, the time to failure goes down to about 13 hours. And if the fire is at 1300 degrees C which is what, 24 degrees Fahrenheit more or less, then the fuel failure occurs in seven hours. And you see a similar range occurs for the truck cask.

What's interesting is if you assume that there's exterior damage to the cask, and in this case, again, I don't know why these curves are so different from yours, Chris, but both looking at the absence of the neutron shield and the impact limiter, at the higher temperature fires, we get modeled results that's show the truck cask having massive failure of the fuel and seals in less than an hour. So, there are some real gaps between the analysis that you guys have done and the analysis that actually was not done for us but was paid for by DOE over a period of about four years. It's published in peer review journals and

summarized in a report that was prepared for us by Dr. Bryner.

Now, we need to put all of this information, all these documents into the data that's on the Sandia web site. And I guess the bottom line that I want to try to pull us through here is as we try to design a fire test, we've looked at about three different ways to approach this. One, for each of the casks involved, it would be useful if Sandia would assume for a damaged and an undamaged cask, what type of exterior fire has to be applied in order to reach a 750-degree C temperature on the fuel cladding because that's when you expect that horrific burst release of the radioactive cesium.

So, one approach to designing the test is to first model where you think that failure threshold is going to be and then actually run that fire. A second approach to this would be to take a definition of what we think would be the worst fire that could have occurred in the Baltimore tunnel. So, say we define that as three hours at 1,000 degrees C and another four to nine hours of 800 degrees C and then we run that fire. And a third approach which our consultant Dr. Burkie who was formerly of the NTSB and is now back at the NTSB says that he really thinks that we need to run a fire test without any exterior damage to the cask.

And this is primarily as a benchmark in the exercise, not to demonstrate the ability of the cask to survive a fire but take an undamaged cask, install a thermocouple where the fuel would be in the fuel cask and another thermocouple in the seal region and another one on the surface of the cask and see how long you have to run the regulatory fire which is 1475 Fahrenheit to reach 750 degrees C or 1380 degrees Fahrenheit inside the cask and untether it, just run the fire.

Now, here is the big problem with all of this. Running fires for more than a couple of hours gets to be a really tricky exercise in the real world. And that's why I think we're going to have to go, I mean, I hate to say it, another round with this document and then have another meeting at some point to try and hash out the fine details. But right now, looking at what we've learned about all the modeling we've done in the Baltimore fire, we can see three basic ways to design a fire test. One is to model a failure point and run that fire for that cask. One is to draw some conclusions for Chris' analysis and our analysis of the Baltimore fire and replicate that fire and, hey, see if we get a failure condition or not. And the third one is to take an undamaged cask, install the instruments properly and

run the fire until we find out where the failure threshold as defined by a certain interior temperature is.

I mean, I don't know if that's helpful or not. I thought this was going to be easy three weeks ago. We'd spend a couple of weeks bashing this back and forth and we'd be able to give some precise feedback on exactly what kind of fire we thought should be run. And obviously, we should have been a little more humble before we said that by the time we had a meeting in Las Vegas in two weeks, we were confident that we could give you a firm recommendation. Frankly, we'll be hard-pressed to have this worked out by May 30th. But that's kind of where our thinking is going.

Do you want to add by capturing this shot at myself?

MR. POSLUSNY: I don't think it's a surprise. I think the staff right up front indicated that this was the more difficult of the two proposed tests. Do we have some more ideas? Mr. Crose?

MR. CROSE: Just from a layman's term, I have photographs here of all these cars that was in that tunnel fire. All of them came out of there in tact. I mean, they were not melted down. It's going to be hard to convince me that the cask wouldn't be better built and withstand the fire better, including the car that had the chemical in it,

a hydrochloric car, the boxcar in front of that car, they all came out of there with no melt-down. They were able to roll them out of the tunnel.

MR. HALSTEAD: Just remember, the failure we're looking for in this case is not a structural failure but a failure of the seal in the lid coupled with the internal temperature and pressure that forces one bad actor, the cesium 137 --. But, yes, that's right. You would not expect a lot of structural damage or any other kinds of visible, measurable exterior, except there is a question, Dave, about whether you assume that the impact limiters and the way they run the tests with the impact limiters and neutron shield, it turns out at least from the modeling we've done that the result is very sensitive to that. If you take the impact limiter off, boy, that thing gets to the failure threshold surprisingly quick. Whereas if it's got the impact limiter on, it takes a long time.

MR. POSLUSNY: Mr. Wright?

MR. WRIGHT: Again, looking at, just like Dave just said, looking at all these reports and everything, and it just, not being an engineer, how can you put all the same stuff in there and get such a divergent set of standards? And then, the other part is, from the drift that I'm getting is you're never going to get there because no matter what

each of you come up with, you're not going to agree with it. You know, it's to the point where we're going to have to basically put this sucker under in acetylene torch because you're not going to get to some place. That's the drift that I keep seeing with this.

And just like Dave just mentioned, the ones that we're concerned about, the chemical cars we know are not to the same standard. The trucks and the stuff that our first responders go to all the time fail all the time. But we're trying to put some standards on here that are so far out that we can't even agree on how far out is far out. And that's my concern is we're not going to come, at least it appears, we're not going to ever get a resolution to this because we can't get two scientists, we're bad enough to get two lawyers to agree, but two scientists to agree on the standards.

You know, I've read documents from peer reviews and you can't get two peers to agree. So, I'm concerned that right now about getting some type of resolution or conclusion to all that what we're doing is we're in an endless loop. Because every time there is a study, there will be someone and this is that part of that peer review process, there will be someone with a vita that goes several pages long that will conflict with one portion of that and

say the study is invalid. Now, we'll go over and over and so I'm concerned about are we ever going to get a resolution?

MR. POSLUSNY: That seems a valid concern. I really don't know the details of both analyses, nor do I think that each group has seen the other's assumptions, modeling techniques, et cetera, although that meeting would bring us closer to a better understanding. I'll let you speak for that.

MR. BAJWA: Now, I would agree. I mean, I think really here, we're here to discuss Package Performance Study. So, I mean, I think Bob has the right idea in making the transcripts of any meeting that we have to discuss the analysis that we did. And I'm sure Bob will bring his analysis and we'll also discuss that. And those will be made available. So, you can draw your own conclusions.

I agree, it's hard to get engineers to agree on something. But I think that a defensible analysis is one that takes into account everything that you know about what happened, everything that you know about the way materials respond to a fire, and everything you know about fire. And if you put those together, you can probably get a decent analysis about, that will tell you approximately what happened.

MR. WRIGHT: And that's what I think we're all hoping for. And I'm just saying that my hope out of this whole thing is we can get to a point where we can agree that here is the range, and we get the range down, it doesn't have to be down to a silly millimeter, but there's got to be a point, and someone, I don't know who that person is going to be to say okay, we've got enough information, you know, we don't need to study it for ten more years. And I think, because right now, it just seems like that it's study after study and we're not moving any far forward. It's just one engineer is conflicting with the results of another engineer who is conflicting with the results. So, I would hope that as part of this process, we get to somewhere and someone who can make that decision says here is where we're going to stop.

MR. POSLUSNY: Good comment. Yes, Bob?

MR. HALSTEAD: Well, people are probably ready to move on, but let me try to make a couple of summary points about the fire test issue. First of all, one thing we want to remember about the fire test is it's the one type of test that we don't have a good scaling basis for scaling. So, if we want to understand a fire, we've got to run a full-scale fire. I'm as skeptical as they come on impact. There's just a lot of things you can do with a half-scale

replica model when you want to know about how the materials respond to force. It's different with fire.

So, we need to do the fire full scale. Secondly, the plan that's proposed in the PPS which is to continue doing benchmarking studies with large calorimeters is we believe a very good proposal and builds on some of the past work. Now, remember, all that does is it tells you about the heat input to the cask from the fire. It doesn't tell you a lot about what's happening in the internals of the cask. But as far as the heat loading to the cask from the fire, frankly, a lot of that I think is maybe even best done with the large calorimeter test because then you're not at the same time worrying about trying to collect temperature data from a couple of different points like you'd be in the cask test.

So, number one, you've got to build the fire test full scale. Two, you do part of this work through a mockup of a cask, if you will, which is a large calorimeter. Number three, if you ask me how I could fit this extra regulatory fire test into what the state of Nevada has proposed for full-scale testing of the regulatory board, I think in fact, we're not as far apart as the gentleman from Iowa fears.

My own feeling, and I'm not authorized to offer

this as a formal position, but you know, if Chris and I went out in the hall and fought for another hour and had to come up with a number, I would say that running the regulatory fire for a period of six to seven hours in a fully engulfing fire would be a pretty righteous test of how either a damaged or in tact cask would hold up. The nice thing about the fire test as opposed to the impact test is you can continuously report data. So, and again, I'm sorry Dr. Chad isn't here, but you know, it's not like an impact test where, you know, you do all this work and then you've got one data point and, boy, if you didn't set it up right, you might have wasted six million dollars. Okay, it's a little more forgiving with the fire test.

So, as a provisional recommendation, I would say this. We were trying to combine Nevada's testing proposal and what the NRC wants to do as far as actually taking the test, testing the cask that would be used to Yucca Mountain. Something like the regulatory drop test, followed by the regulatory puncture test, followed by a fire at the regulatory temperature. But taking continuous temperature recordings in the interior cask for six or seven hours would probably be pretty convincing to us and pretty convincing to the general public. Now, we've got some time between now and May 30th to think about that.

The one thing that I also throw out to the people who are interested in validating their codes is the strong argument that our consultant Dr. Burkie makes that it's difficult enough to collect data on fires. And if you've got the complication, (a), of damage to the cask and (b) the fact that you had to install your instruments in the cask before you damaged it in the drop test, and then you're expecting that instrumentation to accurately report fire data out, that's a big challenge.

And I'm hoping Andy is going to say or Ken is going to say a little bit about that, the engineering challenge to the people setting up the test of installing instruments that can survive the drop test and then accurately report how the cask responds to the fire. Those cover our concerns. Thank you.

MR. POSLUSNY: Good. Jim?

MR. WERNER: I can offer a process suggestion for you all, although after that little outburst from Bob, that sounded like a suggestion, a proposal actually, you just laid out there. But in order to get to a proposal consensus, I would respectfully suggest not simply calling an arbitrary halt and saying we've had enough argument, here is the way it's going to be. We've had enough of that, it doesn't bring any credibility, it doesn't get you the right

answer.

It's an interesting engineering question. As an engineer, I'd love nothing better than to have weeks to spend debating it but I don't do that anymore. I don't really have time, a lot of our people don't have time. And to get participation, you have to be able to engage, although it would be a very interesting little exercise.

But as a kind of a project or program management point, one thing I've seen successful is you kind of parse it into middle level assumptions where people can discuss the chunks of assumptions that might go in. You know, do you think this is reasonable? Do you think we ought to do these things in terms of duration and temperature and then look at what the results might be and how that would come up with a fire.

So, you don't have, people don't have to spend a lot of time here debating -- by details. They can debate levels at an issue that they can actually enter and participate reasonably. And then, you have some sort of consensus about that, and then you have perhaps consensus about the test. That would be a process suggestion so you can have participation in developing your test protocols.

Secondly, in terms of process, you know, I did read this in advance, the paper that Bajwa, and it's

sprinkled with assumptions and suggestions about what the technical assumptions should be, and then I read the NRC thing. It was hard to really put it together and say, how do the assumptions overlap? How do they, and they're not. There was no easy overlap to make it even compare having read both things. It just seemed like you all need to get together on it.

You know, the same thing going back to sharing codes. Speak English to people who, you know, speak in that language. Speak in detailed codes to all these people we have up here with level debate. But in terms of life participation, and I've worked on developing it for transportation scenarios and nuclear waste management for nuclear and mixed waste is that you can, you know, we actually put it into like a board game and had people from various states.

I don't know if anybody here is in the state level mixed waste thing, but you know, we've had people put together a game board in a way where people, this is a pretty serious discussion where you're treating remote handle true, contact handle true, low level -- high level waste spent fuel and say, all right, if we need this here and then we move that there, you know, what is going to be the result? And you can participate in the project without

being engineers because they're right, some people are not engineers. But just sort of running the clock and then just saying, there is the answer, that's not going to build a lot of public support. You're not going to get it by them in the decision-making.

MR. POSLUSNY: Good observation. Jim, do you have any insight as to how long that process took or I mean it's --

MR. WERNER: We spent a few months developing the rules and the algorithm and it was a day meeting, day and a half meeting --

MR. POSLUSNY: But you had more peers as well here.

MR. WERNER: Oh, God, we had --

MR. POSLUSNY: We don't have that many peers.

MR. WERNER: We had states involved in that overall. Yes, so it's simplified. We have, you know, a couple of dozen. But it translated into decisions that people can actually participate in and --

MR. POSLUSNY: Chunks at of time, little bits rather than the full. Okay, good comment. Okay, any other comments on either the tunnel fire analysis or the proposed fire testing conditions? And clearly, if you don't have time today or don't feel like doing it now, you still have

that written date by May 31st to send something in. And we appreciate your comments on it.

Okay. In that case, we're done with fire. And I would like to take a very short break about maybe ten minutes and come back maybe about five after 4:00. Okay, then, thank you.

(Off the record for a short break.)

MR. POSLUSNY: Okay. If you could get settled? We'd like to move next to schedule -- on the agenda. And remember that we owe the audience some comments on the -- as well.

Last but not least, important session, is going to be a discussion on the impact test. And Dr. Murphy is going to sort of key it up, to talk about some of the issues we'd like to focus on. We want to -- participants. So, with that, Andy?

MR. MURPHY: Okay. Keying up, easiest things first, right? Proposed speed range, the protocols indicate a proposal between 60 and 90 miles an hour. The 60 is really easy to understand. At less than 60 miles an hour with the shock absorbers or impact limiters on there, the impact limiters absorb basically the energy. We are looking for a cask test, so we need to fully engage the impact limiters and that doesn't happen until about 60 miles an

hour.

Now, we get into the more troubling or tricky portion, realism. We had Sandia put together some of the numbers from 6672 which is a risk study that we've talked about a little bit here today. We used a number of the data points in that study that basically are the data, they're not part of the analysis and so forth, of how often you get a 90-mile-an-hour rail accident with an orientation of the cask that simulates the center gravity over corner kind of thing. You're talking about an accident where the cargo comes dislodged, falls, come off of the conveyance. You're talking about having the roadside material being a hard rock surface.

When you put all of those numbers together and do a simple multiplication of all of those fractions, you come up with a number of something like 10-8. Okay, we took a look at that. That tells us that 10-8 times has, how often those occur. We took a look at that and we are also looking at the question of realism, trying to compare that number with some of the other numbers that the Commission uses to make safety decisions or to inform safety decisions. And we looked at it and decided that something on the order of 10-7 or so which is represented by the 75 miles an hour accident is what the staff would propose.

Okay. Now, we get into some of the little details. We're talking about a 75-mile-an-hour accident on to one of these unyielding surfaces. For the Holtec cask, that means basically a block of concrete that's about 30 feet deep and 30 x 40 feet in surface with a 12-inch steel plate on top of it. And what that does for us is forces all of the energy from the 75-mile-an-hour fall to be taken into the cask so that we're spending all that energy to forming the cask and not doing something to the target.

Okay. There are implications for that that our calculations, and some of them were published in 6672, indicates that that is about equivalent to at least 150-mile-an-hour accident into a yielding surface. That does represent a significant challenge to the cask. There's a couple of reasons that we're doing that and one is that for the codes that we are using, you've got elastic and plastic or inelastic deformation.

Basically, elastic deformation is like with the rubber band, you pull it all the way out and basically if let go, then it comes back to the original position. Plastic deformation, you pull that rubber band and it breaks on you, or you hit the brass ball with a ball pein hammer and you hit it hard enough and you get a dent in your brass ball. What we're looking for is to get that plastic

deformation in our cask so that we are able to challenge the computer codes and the computer models that we have out there. Like I said, validation of our codes and analysis is one of the things that we're driving at and we have to take our speeds, get our speeds up to this level in order to get measurable deformation.

Okay. Let me look at the notes. We talked about earlier the question of challenging the codes. At this stage, we are not proposing to do multiple tests of the casks. In order to get our uncertainty analysis into hand, we're talking about looking at a rail cask and a truck cask that obviously are of significant difference in their geometries and materials. We're looking at one cask with an MPC on it or in it, multi-purpose cannister, and one with and one without. We're looking at two different orientations of the test. One, the center gravity over corner, and the other the back breaker.

One of the more exciting aspects of this discussion is the type of impact test that we're looking at. And I got to say at this stage, given a lot of discussion, it's an item that's going to take a lot of discussion when we get back to the NRC's headquarters. And that is whether to do it with a rocket sled or a tower drop. We're talking about a tower that's about 300 feet tall and using some very

simple numbers, I don't remember from high school physics, that represents a drop for this stuff of about three seconds duration.

The rocket sled is obviously a far more interesting -- operation of mounting a 140-ton cask on to a sled and putting a rocket engine behind it that is large enough to get this thing accelerated from zero miles an hour up to 75 miles an hour in probably less than two miles. So, you're talking about a very large rocket engine. One of the reasons that we've thought about the drop rather than the rocket is a safety consideration. If you've got an accident with this rocket and this projectile in front of it boogieing across the Sandia desert at 75 miles an hour, don't get in front of it. Satisfying the safety folks at Sandia would be a non-trivial exercise.

Putting that all aside, looking at it from an engineering point of view, one of the things we're going to be doing is making a prediction of what's going to be happening to the cask when it hits the target. And with a rocket motor and sled operation, there is going to be some uncertainty as to how fast you are actually going to get this thing moving at the impact. There is not that uncertainty with using gravity as your motivating force. Basically, you can know exactly how tall it is, you know

what gravity is at your local location. You can tell how fast it is when it's going to hit the ground. And we, as a part of our validation, want to be able to predict what's going to happen to that cask when it hits the ground or it hits the target.

Orientation of the cask, we have selected, as I've said earlier, the center of gravity over lid and the back breaker to give us some level of diversity in the challenge that we give to the codes. But also, we're looking at them as particularly you can remember the back breaker. There is significant plastic deformation that has occurred to that cask. There is less deformation to the Holtec rail cask, but those tests for both, I'll say for both tests are challenging to the cask as well as to the code.

Okay. I think that's what I've got in my notes. I didn't remember that there are other comments that we were working on. Bottom line at the moment, I don't remember what they are, I don't have that written that. So, I'll turn it back to Chet at this stage.

MR. POSLUSNY: Yes, why don't we go through the issues? And the first hand up is Bob's.

MR. HALSTEAD: Well, I wanted to follow up a question from last time. And Andy, now, you have had more

time at home than I have over the last, the -- home office. We wanted to get some idea if you did the drop test on the tower without an impact limiter, what the speed or the height drop without the impact limiter equivalency would be to your 90 mile-per-hour drop with the impact limiters. And I don't want to belabor this but the reason that we're inclined to have you do the test without the impact limiter is, first of all, we have lots of information on impact limiter performance. We think from the scale model test that's the one area where there's been a lot of scale model testing as part of package certification.

Secondly, if you were going to do the test with the impact limiter for the rail cask, we would be inclined to argue for the 90 mile-per-hour because we think that would be a real world replication of what a pretty near worst case runaway train accident would involve. Yes, I know you've done these equivalencies at say
150 --

MR. MURPHY: I was going to ask you if we could do the questions one at a time so that we don't get, me, I don't get confused.

MR. HALSTEAD: Oh, I'm sorry. Yes, I didn't know this was going to be the only shot I would, I didn't want to --

MR. MURPHY: Oh, you can have a shot.

MR. HALSTEAD: Okay. Well, forget everything else. What about the equivalency of with impact limiters and not impact limiters to get the same G load in one of the casks? Because that's a pretty impressive whack that you put on the cask at 90 miles per hour with the impact limiter.

MR. MURPHY: At the moment, that's an easy one to answer. We don't have that information yet. It will be part of the information package that we develop as we go on from here doing the analysis to understand what's going to be happening. And obviously, the analyses do respond to the comments that we've gotten over the last two and a half weeks.

MR. HALSTEAD: Okay. Well, can I ask Chet just a process question? Do you want like each one of us to give you the different issues or you want to do speed and then come back to the sled and then come back to the --

MR. POSLUSNY: I'd like to do one at a time. Let's do speed, go around real quick.

MR. HALSTEAD: Okay. If you're going to do the rate with impact limiter, we would argue for the higher speed. The back breaker at 75 miles per hour in the truck cask, you know, we've previously said we think that's a

pretty good insult to the cask if you want to see what the sideways impact would be. And we're holding open the issue of whether the sideways impact on the truck cask which gives us the loss of shielding accident is more or equally important than doing an end drop on a truck cask which we think coupled with the fire would be more likely to give you a test of whether there is a loss of containment.

But for right now, let's say 90 miles per hour on the rail test with the impact limiter and 70 miles per hour for the back breaker for the truck cask certainly seem good for us as an extra regulatory test. Now, understand, we still think the most important thing to do is the basic no impact limiter, nine-meter drop on the unyielding surface which is what the regulations say then followed by the other three tests at sequence.

MR. MURPHY: We had proposed to do the drop, the extra regulatory drops, extreme drop with the impact limiters because that would be the condition that the unit would have if there were a real accident. So, that was the rationale for that.

MR. POSLUSNY: That's a reality question again. The reality, yes. Okay. Any other comments on speed? I'd like to wait for the audience until the end if you don't mind. Eileen?

MS. SUPKO: I hate to beat a dead horse but I'm just going to reiterate, I have great concern regarding the speeds proposed on using an unyielding surface and what may or may not be, and I don't believe that they are, realistic conditions that can actually happen in a real world transportation accident. And you know, I agree that one could see traffic accidents, rail, truck, that could happen at those speed ranges, but not into unyielding surfaces. And I have had great concern that the significance of the unyielding surface in the tests that you do are not going to be adequately explained and put into the proper context.

And that's kind of my issue throughout, you know, everything that's been proposed so far. And I would also suggest that you might look back to the comments of the ACNW from June of 2001. I think they made basically the same exact comments that I'm making today. They had three or four points. And it seems as though the, you know, you'd not factored that in. Enough said.

MR. POSLUSNY: Okay. Thank you. Any other comments from the table on the speed?

MR. HALSTEAD: Could I pose a question to Eileen or John in this? Are you comfortable with our proposal that if we had to do one drop test, we would do a regulatory drop test which we believe is a pretty severe accident to set up

an extra regulatory fire test? I mean, you know, what if we said, look, we think that the fire test is more important, the extra regulatory fire test is more important, is there really a possibility of any common ground between what Nevada has put forward and the way that you did? Because I appreciate all your arguments about what these high speed drops mean.

And in addition to the arguments you've made, one of the reasons we're leery about them is the discussion that we had with Dr. Chad earlier. It's a lot of money to get one data point. When you're not sure what that data point means, then, boy, if you make a mistake, you've lost an expensive test article. But have you done any thinking about how you would see coupling the regulatory drop test with an extra regulatory fire test?

MR. VINCENT: To be clear, we haven't really looked at that. It is interesting, I'm not sure exactly how we'll come down on that. I guess as a matter of general consistency with our comments in terms of speed, we see no reason to go above 75 miles an hour for anything. And in fact, you could argue that maybe 60 is fine as well because that's typically what we're going to see. I understand what Bob is saying about the runaway trains and things like that but I'm not sure I'm completely convinced of that.

But, and I'm not sure until I really think about it, Bob, from your perspective, whether or not the fire test is more of a problem or less of a problem. And so, we would have to think about that. But, yes, I mean, clearly if we were, I think, left to our own devices, you know, the regulatory testing would be the first stop point. But, and I understand from the perspective of the PPS as, on the Package Performance Study as currently proposed, that doesn't get you the data that you want in order to benchmark the computers for what are admittedly the extra or super-regulatory types of testing, very specifically, the plastic deformation requirements that you want to see and to verify in terms of code prediction.

But then again, I agree completely with what Eileen is saying. Now you got the problem of trying to explain that in a way that makes perfectly good sense to somebody, like for instance, my brother and sister back in Arkansas, and I guarantee you, I've tried and it doesn't work. They know what I do and they just shake their head and that's the end of it, okay.

That's a really important consideration and I am trying to grapple with that from my own perspective about how can we meet both of the criteria that you specified in the PPS, particularly in the first appendix about on one

hand wanting to get the scientific data and recognizing for the moment that you may have only one shot at this to also satisfy the idea of trying to go in some way towards improving public confidence about what we're doing here. I'm not convinced at this point from what I heard being in Rockville and here that there is a simpatico between the two of those on one test.

And as I said, Bob, there might be some merit in what you suggested but I haven't really thought it through at this point. But as far as speed is concerned, anything above 75 miles an hour I think is we're just getting outside the ballpark. And clearly, I think we would like to try to stay to keep things somewhat reasonable so people can identify it with circumstances they are familiar with.

MR. POSLUSNY: Thank you. Those are good comments and makes for hitting the ball over to that side.

MR. HALSTEAD: Put somebody else on the spot.

MR. POSLUSNY: Okay. That's good. Good.

MR. HALSTEAD: -- one of the things with the dedicated train issue thrown into it, while we've talked about the 90 mile-per-hour runaway train condition, that is the condition in my own mind that I think is reasonable in general freight service on long western stretches. A good case can be made for the 75 mile-per-hour rail impact if you

are assuming that these trains are traveling in dedicated trains and what the Union Pacific calls key trains for hazmat hauls of their western blocks where generally speaking those trains are restricted to 55 miles per hour.

And so, I mean, given that both the state of Nevada and NEI have now endorsed mandatory use of dedicated trains which of course Department of Energy still hasn't agreed to, with that proviso, I mean, I think you can argue with that the 75 mile-per-hour impact for rail represents an awfully severe and hopefully rare accident. Because you've got administrative controls now in addition to just looking at the accident forces.

MR. VINCENT: Well, if you do what PFS is also proposing, and I'll put on my PFS hat for a moment, with regard to the redundancy of the locomotive, then you get a circumstance that is likely never to happen because of the redundancy and breaking systems. So, back to the dedicated train business, yes, I'm not sure that that plays very well in Peoria from that perspective either.

MR. POSLUSNY: Thank you. Okay. Any other speed questions?

MR. WERNER: I very much appreciate John's perspective of what plays. Bob, here I am, I have family who raise chickens, it's hard to explain to them what you

do. I just know if I have to explain, not just to the public, not just to my sister, brother-in-law, and not, you know, just tell them, but somebody's staff has got to do an emergency response and I went to a meeting and somehow sat idly by where people said 75 miles is outside of the realm of possibilities of unyielding surfaces, I could not explain that.

Now, having talked to people and read the material and trusting in the Sandia folks that we all work with and said, well, you know, actually I trust them the way -- would have the equivalent of plus 75 and in fact, you know, the bluffs that we have in our state, a lot of unyielding surfaces, trust me, it just doesn't hack it. You've got to have some kind of data and some kind of support for it. I think the staff proposal is, you know, reasonable and it's not outside the realm of possibility at all. Outside possibility would be something else, but this is just people's commuting everyday.

MR. POSLUSNY: All right. I think at one of the meetings, it was suggested that maybe 75-miler test with a typical bridge abutment or something that a truck could hit would be another alternative. I think that was raised --

MR. WERNER: That's not an unyielding services. I'm just talking about the bluffs where you hit a cliff

straight on at 75 but not straight out, you would have to hit it from the side to be comparable to the test proposed here. You know, head on, you have the absorption of the cab and things like that. It wouldn't be 75, you wouldn't take it 75 times 2. It would be more like we'd have a 45 times 2 or something like 40 times 2.

That is, in my mind, although you might be able to explain it technically, again, we're not just having a technical discussion here. This is a public policy programmatic discussion. Technical discussions are somewhere else. I don't think they are
at --

MR. POSLUSNY: Yes, I think we've heard loud and clear that perhaps the biggest challenge is communicating what has been done later on. Okay. Any other comments on the speed question? Okay. Could we go to the rocket sled versus, oh, well, okay, Ralph, just go ahead.

MR. ALHAMBRA: For those of you who don't know me, my name is Ralph Alhambra from Region 3. I have several questions about the speed. Sorry.

It just hit me, being the outsider on this group, unless you guys under the assumptions ruled out oncoming traffic? Unless it's part of the design of the cask and I'm hearing all this, the train is going 75 miles

an hour, what about a train coming at you at 75 miles an hour? Has that been looked at or thought of or anything? I mean, you guys keep talking about running into something, but if you've got a highway cask, for sure there's oncoming traffic. Unless you guys are part of the protocol of transporting this stuff that's going to be -- oncoming traffic, then how about on the trains? Did anybody ever think of that?

MR. HALSTEAD: Yes. That's part of the Association of American Railroads' protocols in fact, when these trains would be passing another train. We didn't add that in but I assume since NEI has gone as far as endorsing dedicating trains, they'd probably agree to work with the railroads. Yes, when a spent fuel train passes another train, the proposed protocol is to have one of the trains come to a complete stop precisely for that reason.

MR. ALHAMBRA: That's also on the highway, isn't it?

MR. HALSTEAD: Well, no, that's a separate issue. But, right, that's why the point that Jim was raising for highways is certainly worth talking about. But for the trains, the reason that we gave in so easy, if we gave in easy on 75, is because the railroads have already suggested a number of special rules to try and reduce

exactly that kind of, because that's a big concern. I mean, two trains going by one another at 75 to 90 miles an hour has a potential for a very damaging impact.

MR. VINCENT: If I can, two comments, one about highway. The comment is, in fact, one of the reasons why the preferred highway routing system is the federal interstate system, because you do not have the possibility for direct head-on collisions with two bodies moving the same speed in opposite direction.

Number two, I wanted just to correct or update Bob's thinking. The work that Private Fuel Storage has done with the Association of American Railroads involves the changing of the normal operating standards for spent fuel shipments into the standard mode for all hazmat which is OT55D. That's the current version. And that no longer requires, I'm going to repeat that, no longer requires the meets and pass restrictions for spent nuclear fuel trains provided the train has been certified as well as the railcars have been certified by the AAR for the purpose intended.

MR. HALSTEAD: Has that been formally adopted by AAR now?

MR. VINCENT: Yes. I don't know that the performance standard itself has actually officially been

signed off on. I know it's essentially complete. But that's the new way that they will be operating. All the spent fuel shipments have moved into the normal hazmat standard operating procedure.

MR. RUNYON: Was that very recent, John?

MR. VINCENT: Yes, that's within the last year or so. And I know the last time that Bob Fonzac made mention of the procedure, OT55D on the performance standard for their train and railcars for spent fuel shipments, that that should be signed off on here very, very recently.

MR. RUNYON: The last time Bob talked -- with the speed, so that's news.

MR. HALSTEAD: Well, I would be interested in that change. If that's the case, then I'd argue for 90 miles per hour. But if we're assuming that we've got the rules that we thought we've got, I would say 75 would be an acceptable speed. But if that's changing, then I think maybe there's an argument for the 90 mile-per-hour.

MR. VINCENT: And the operating speed under OT55D for all hazmat is 50 miles an hour.

MR. WERNER: John, could I just add one thing in terms of interstate highway transportation? I thought what you did when I worked in the -- building and we sat there on the seventh floor making plans and drawing maps based on

interstate highway transportation because we thought we knew what the standards were for highway transportation or we were sure we did at that time when we were working in Washington -- building. Now that I live and work out in Missouri, interstate highways are not built the same, particularly I-70 does not meet standards of what we now define as interstate highway.

So, when we had our people come over from the Department of Transportation to sit down and learn what the standards were and how interstate highways would be, they weren't thinking of grandfathered intersections like the old I-70 section where you really do have the distinct possibility of a head-on at full speed. It doesn't have the same separation you would see on I-95 or 495 or 270 or I-5 or, you know, any of the more modern interstate highways. They're quite different.

I would just urge them to not look at what the standards are. Don't look at what you got from DOE. Don't look at what the paperwork says from DOT. Look at the real roads out there if you're planning on transporting, and they're not all built the same. And, I mean, it's a blessing and a curse that Missouri had the very first interstate highway section built, you know, thanks to Truman and Eisenhower working something out way back then in the

50's. But it's not the same thing as what you think of as interstate highways that you guys may drive on. You would look like, you know, more like closer to Rockville Pike than it does to 270, okay?

MR. VINCENT: Right. Jim, I agree with you a hundred percent. I did not mean to imply that it precluded the possibility of head-on crash. It does not. It just means that you've in all probability reduced the actual probability for such an event by having selected that as the preferred routing mode for highway shipments of radioactive material.

MR. WERNER: I appreciate that. I was sort of making a confession as a reformed Washington bureaucrat, that I was guilty as one of those people who lays out plans and that passes policies on the Potomac without really knowing what the technical details were in the real world. And I'm better now, thank you.

MR. POSLUSNY: Okay. Can we now turn to rocket sled or drop? Any comments? I mean, I know we had some state folks that mentioned that early on today. Thor, is that you? If I remember right.

MR. STRONG: Yes, I had been generally in favor of the horizontal impact approach rather than drop test, honestly primarily because of the, I guess the drama that

you see in it. And there is also the safety issue that was raised. And I haven't heard yet whether from a technical standpoint for validating computer codes, whether you lose something going to the horizontal impact versus the drop. Although, we did mention the fact that you're not exactly sure of what speed you might have with the rocket sled.

So, I guess, you know, I'm at a point of not being a staunch advocate for it. I guess I'd like to hear a little bit more of the pros and cons from a technical standpoint.

MR. POSLUSNY: Who would like to address that?

MR. MURPHY: Just a quick comment on it. One of the extras that you get with the rocket sled is that you've got the cask on a conveyance of some kind or another. That will act as a shocker, energy absorber. And it will also make, forgive me, make the analyst job a bit or considerably more complicated as they try to understand how much energy is absorbed by the conveyance.

MR. STRONG: Sure. Okay. Going back to the sort of the realism argument, you lose something in terms of the very quantitative analysis. But indeed, then, you do have the realism of other things acting as buffers and impact limiters other than the impact limiters themselves.

MR. MURPHY: And I'll also make the comment so

that you know we are looking at this part of it. Very definitely, it does make for a more convincing public demonstration if you've got the rocket with the conveyance and the impact limiters and the whole of the cask hitting a target, whether it's unyielding or nearly unyielding. No question about that, it very definitely does carry a public message forward with it.

MR. POSLUSNY: Bob?

MR. HALSTEAD: Well, the rocket sled is more dramatic, but as a person who's been critiquing the Sandia crash films for the last 25 years, I honestly think it generates so much controversy over what it is that's actually being portrayed. If I were trying to argue for the other side to convince safety, I would be against it except if it were done in the way it was done in the British test in '82, the Operation Smash Hit. There, they actually did the regulatory drop test. They found a very small closure opening less than the A2 value --

They then anyway redesigned the lid for further confidence, and then they subjected that cask to a hundred-mile-an-hour locomotive smash hit live at lunchtime on British national TV. In that case, the combination of the regulatory test and the real world test which put about half the force on the cask as the drop test was an interesting

combination but it cost them $8.2 million to do that program back in 1982. I mean, that's not necessarily out of the ballpark compared to the cost of reviewing but acknowledging that you may get some public relations benefit from a rocket sled test, but then again maybe not.

We're real comfortable with the drop test and it's not only for this reason but because the biggest cost element in doing the rail test is that one-time cost to either upgrade the facility or build the new facility. And once you've spent, we think, eight to ten million dollars to do that facility, you've then got a facility that you can drop the other -- tests or any other casks that you want to test and you don't have an additional capital cost for that. But I do understand why people think that that, you know, my 17-year-old son loves to see that film. We've played it many times at home and you often see the high-schoolers at the Yucca Mountain information center and the first place they go, because they've all been told by the underground that they've got these amazing videos out there.

But I think in terms of demonstrating compliance with the regulation, and most importantly, precise, measured physical data, I think most of the advantages fall with tower drop.

MR. POSLUSNY: Fred?

MR. DILGER: Yes, I have to agree with Bob. I think the tower drop is the best way to go. I think it gives, it will yield better analytical data for the analysts. I think it's safer for the people that are actually implementing it. It's more reliable. You don't have to worry if all the rockets go off at the same time or if the rocket doesn't go off the right way or if you have a, God forbid if you had a mini-challenger go on. You know, you wouldn't want any of those things. If you have the drop test, you don't have any issues with that.

And the other thing is in terms of its publicity value, I think given the height that we're talking about dropping this from, I think we're going to have a pretty dramatic piece of footage as it is. And whatever benefit we might get from running a train and running into a train or a wall or something would be fairly, would not be at all that significant.

MR. POSLUSNY: Okay. Thor?

MR. STRONG: I need to leave in about five minutes, so I just wanted to make one other comment that doesn't relate directly to the question at hand. When we convened back after lunch, there was some mention made of the Potterville train accident. And that did indeed happen, it happened on Memorial Day right outside Lansing. There

was a train that had two propylene tank cars and two train cars of sulphuric acid. Resulted in a five-day evacuation of the little town of Potterville.

This all happened right sort of in the midst of the senate consideration of Yucca Mountain, and the Lansing State Journal, the Lansing paper, came out with an editorial recommending against senate approval of Yucca Mountain, arguing that if that train was carrying spent fuel casks rather than propane, then the words they used was that the little town of Potterville would be facing a "devastating nuclear nightmare," their words. And I just add that sort of as my parting shot to again reflect the idea that, no, the public is not stupid, the media is not stupid, but often whenever you start talking about anything radioactive or nuclear, things get carried away rather easily.

I had to write a response to that particular editorial and basically say, well, if it had been spent nuclear fuel, maybe the evacuation would have, there may have been an evacuation but it would have lasted maybe three hours rather than five days. So, for what that's worth.

MR. POSLUSNY: Thank you. And if you have to leave, thank you really for coming and for your comments and hope you found the meeting useful.

MR. STRONG: I did, thank you.

MR. POSLUSNY: Don't forget, send in your comments if you haven't. Okay, next comment.

MS. SUPKO: I just, I have a quick question. Are there any unique challenges to doing a drop from the height that you're talking about? What's the highest type drop you've done before and, you know, is this double that, triple that, you know, compared to the challenges associated? We've talked about the challenges associated with the rocket sled but I don't think there's been any discussion of the challenges regarding the drop.

MR. SORENSON: We've certainly done drops that high with different size packages, mostly in the weapons arena. Certainly not this size of a package. One of, I was going to mention to Thor real quickly before you leave, one of the other practical aspects of the horizontal versus the drop towers is the instrumentation cabling. It was mentioned that to accelerate a train up to 75 miles an hour, it would take probably over a mile of track, and that's a lot of instrumentation versus cabling relative to about 300 feet. So, that's another practical reason why you'd want to do the drop tower.

But we don't see any large or show-stopping hurdles in the drop test. I mean, it really as Andy said, you've got 1G acceleration, it drops, where are you going to

let it go? And it drops in that orientation and, you know, we definitely need to be very careful how we do that and look out for contingencies that may occur. But we don't see any show-stopping sorts of issues associated with the drop test.

MR. POSLUSNY: Other comments on drop versus sled? Okay, last issue, on orientation. For, I guess first for the train cask, center of gravity over, what's the right terminology? Over corner, thank you. Long day. Bob?

MR. HALSTEAD: Well, we're comfortable with the way that you've proposed it. The question I would ask you is I assume that you did some runs looking at a sideways drop or a drop equivalent to the ones proposed in the truck cask. And what did you find when you did that?

MR. SORENSON: For the truck cask?

MR. HALSTEAD: No, no. For the rail cask.

MR. SORENSON: Oh, you want me to answer?

MR. MURPHY: Go ahead.

MR. SORENSON: Yes. We'd looked at CG over corner, we looked at the end drop and we looked at the side drop. Those are three different orientations and protocols for the rail cask. Actually, you can get higher G forces in the other orientations, but the actual insult to the cask body to itself was not as severe because in the other cases,

for example, side drop, you're engaging both impact limiters. The end drop, it's really, you're not exercising the closure that much because of the impact when it's coming back up into the closure area.

So, we felt that CG over corner was more the case of actually exercising the analysis and having a relatively severe insult to the cask was the best orientation of those three.

MR. POSLUSNY: Any other comments on that concept? How about the back breaker for the truck cask? No comments? I guess we did have a number of comments during the day.

Okay. I think we've gone through the schedule as I have understood it. I'd like to give, I'm sorry?

MR. WERNER: Yes, I don't know if this is the appropriate last comment. Again, not doing this full time like some of the other people at the table, but I heard earlier we're going to be doing a drop and then a fire test. And I guess I'd like to put a pitch in for at least evaluating the benefits of drop, fire and then quenching. I just think that normally the water test is intended for at-depth pressure integrity. But, you know, if I were to sort of say, you know, you hit something by the town of -- City, you have a fire and then it rolls into the river which is

right next to it.

So, you've got a, you know, a rock cliff face, you know, a whole yard of fuel containing cars and then a river next to it, the answer would be what? And maybe we know that the metal is at such a strength and -- that there would be no brittlement problems and no problem with it cracking. The result being heated up to 800 C followed by quenching in the 33-degree water immediately, but maybe not. You understand it was a different type of test that's rapid change of temperature rather than immersing for purposes of pressure testing.

MR. MURPHY: I guess I missed the question, part of it.

MR. WERNER: Have you evaluated that?

MR. MURPHY: We have not done, we've got an issue with reactor pressure vessels that we call pressurized thermal shot which falls into that same bailiwick. At this stage, we have not considered that specifically for the Package Performance Study.

MR. WERNER: While you're heating it, why not just put an extra tank of water and roll it on in?

MR. MURPHY: Good comment.

MR. POSLUSNY: Yes, good comment.

MR. WERNER: As long as you're spending the

money, let's just gather data. Instead of worrying about pinching those pennies as much as you can, you're getting a max amount of data for the amount of money spent. And also, getting all the answers to questions like, yes, we thought of that, sure, we tried, it's a practical question, sure. Because most of our tracks actually are right next to a rive or a lake just because that's the flat ground for running railroad tracks and a lot of highways through.

MR. POSLUSNY: Sounds like realism again. That's good.

Okay. I'd like to go into the audience for a few minutes because we promised them another, oh, I'm sorry, George? I missed it.

MR. CROCKER: It's sort of another one of these context thing. And we talked a little bit this morning about sabotage and how that is something not necessarily on this agenda but is something that needs to be incorporated into the broader context in which packaging protocol fits. And hopefully, you know, that message is loud and clear but there's another context issue along those regards that I really want the NRC to consider. And that has to do with the fact that, you know, when there is an incident, then there will be after the incident, right?

If we have a situation in which we had this fire

and we've had this insult and degradation to fuel and cladding in a cannister, well, maybe the cannister did hold, maybe the quality control, quality assurance was such that the cesium state inside and that the cladding may have ruptured but the pellets are still inside and they didn't fall in a pattern that caused them to go critical. And so, now we have this cannister or this device that's been terribly insulted with all of this stuff in it.

What are we going to do with it? What's the context after that? How do we manage the material that's in that cask? How long will it have to sit like that? What will happen when overtime the helium in it does get out and the heats being generated perhaps does become a problem? What in terms of packaging and how we package a transportation module can we do to ensure that after an event happens, that we still have some management options?

Do you see what, understand the point that I'm trying to make?

MR. BRACH: George, I believe, let me try to respond. One aspect of anything described in a hypothetical situation, I'll say a severe accident where the package and the containment to the package carried out its intended function, you've just described the containment kept all the material, not necessarily in tact, there may have been some

internal reconfiguration potentially, but the containment held all the materials so there was no release. I would offer a couple of things. One, with the containment maintaining its integrity and no water and leakage, the potential for reconfiguration of the fuel wouldn't be a criticality issue. You -- moderator to introduce criticality considerations.

But the underlying point you're raising is that package, that container, that cannister would need to be moved to a facility and be opened and the contents removed and repackaged into another main -- safe handling and transport. There are these facilities such as a hot cell type facility that could be used to open that in a clearly controlled environment so that any gases or so that that would be contained in an enclosed facility. But I would offer that what you've described, and that's a part of our consideration is that there need to be plans and considerations made to handle the special and specific conditions of that package to take it to, move it to and under what conditions it could be moved to a facility where a special handling would be called in to take care of it and to handle the fuel that's in that container that was in the accident you described.

MR. CROCKER: Do we have a hot cell that's

capable of handling a piece of equipment as big as a rail cask?

MR. BRACH: John Vincent -- in Idaho?

MR. VINCENT: No, they did a lot of loading at Test Area North for the dry storage evaluation that you referred to earlier.

MR. BRACH: That's correct.

MR. VINCENT: It was all done in a hot cell.

MR. BRACH: That is right, yes.

MR. WERNER: -- whether IBM is continuing to invest in those -- structure there given the information -- facility as part of the clean up? -- check into what's the, check the baseline for that, which hot cells are up, what the cost is. I just remember we're spending about ten or 20 million dollars a year maintaining things that weren't doing anything. We're trying to offload that capital cost to, Andy, I don't know if they accepted it when I dropped out. I mean the cost of obligations, there's some cost to the financial issues.

MR. BRACH: Jim, let me offer, I realize we're in a what if and what would we do to address a particular situation. I think what we're describing is that in your outline, there may be other Department of Energy facilities, I think what we would be doing is look and see what

facilities and what arrangements would need to be made to handle this cask or cannister that's been in this severe accident so that it could be moved and properly handled in a facility. I'd hate to be speculating too much on which facility, this plant, that facility here or there, I think what we collectively would be doing is what resources, what activities need to be brought to bear to handle that situation.

MR. CROCKER: I mean, that's really the point. I mean, we've spent all day long talking about this cask that's going to undergo this terrible event and whether or not it's robust enough to survive it. Let's also be mindful that even if it does survive it, we still have this thing to deal with. Thanks.

MR. POSLUSNY: Thanks again, gentlemen. We appreciate your effort. I'd like to spend a couple of moments going out to the public again. Thank you. Please state your name so the recorder can record it.

MS. BAYMAN: Yes, my name is Cindy Bayman. I live in Oak Park, just a little west of Chicago. Now, I am concerned about many things. Why do all this waste have to go through 43 states and contaminate us all en route. But the main thing is I'm very concerned about the barge travel of the waste from Point Beach, various places along the

lakes. This is the only freshwater lake we have in the whole world, largest body of freshwater we have in the whole world. And it just behooves me to think that you're going to travel with these highly contaminated carcinogenic casks over the water. I mean, I just don't think you should do it.

I think there should be a prohibition of taking these casks over the water. I mean, it's bad enough that you have to take them over the land and rail. Just for the sake that we have, water is a big thing now in this century and one accident, the lakes will be finished. And I just think you just shouldn't do it. And I don't know why it's a done deal. I'm asking if it is a done deal.

And you have too many moves. First, you have to move the casks on to the barge, then you have to take it off the barge on to the train or on to the truck. It seems to me you could get it right on to a truck right from the spot. You have less moves of this highly carcinogenic material which has more contamination than a Chernobyl accident.

And the other thing that concerns me is one-third of the casks will go by rail through Chicago, Union Pacific. We are going to have one-third of the casks that go in or out and will pass through Chicago. And I live on

Oak Park, literally 20 yards, all the buildings in all the towns west of Chicago are very close to the railroads. The railroads just bisect all the villages and towns. Oak Park, Elmhurst and on and on. And my building is literally 20 yars, the parking lot is just underneath the railroad, okay.

So, I can just imagine these high level, and this track has freight, everything all together, okay. So, it's the track that you will use, it goes out to Proviso. Not to mention that the tracks will get contaminated, the people -- commercial travel, all kinds of travel. And this really behooves me that this highly contaminated X-ray machine because that's what they are, you can't contain the gamma rays in these casks.

I mean, you forget the fact that the truck drivers are going to be contaminated driving the casks. Everybody along the route are going to be X-rayed. I mean, they are a mobile X-ray machine. You cannot contain the gamma rays. And if it gets stuck and suppose a pregnant woman gets behind one of these trucks, God forsake what's going to happen to her baby. I mean, you are talking about moving very dangerous carcinogenic material and contaminating all of us. And I suggest, I mean, I was against Yucca Mountain in the first place. And I suggest that you try and hold off, and especially over the water

travel.

MR. POSLUSNY: Thank you for your comments. Is there anyone else in the audience who would like, Ross?

MR. LANDSMAN: Yes. You said you would consider the side drop? You didn't, this is Ross Landsman here. I'm sorry. You didn't consider the side drop on the rail cask because the impact limiters would hit first?

MR. SORENSON: We did consider the side drop for the rail cask.

MR. LANDSMAN: Oh, but you said you didn't --

MR. SORENSON: But, yes, we decided that this CG over corner was a better test for the objectives of the Package Performance Study in terms of exercising the closure end of the cask itself.

MR. LANDSMAN: All right. But did you look at the stresses that would be on the side of the cask? I mean, impact limiters might not hit first, so the cask could hit a bridge abutment.

MR. SORENSON: Yes, they're much narrower than the two impact limiters are apart.

MR. LANDSMAN: You might hit the side of the cask. I know what you said. You said the impact limiters are going to hit the flat surface first. Was that considered?

MR. SORENSON: No, we did not look at a secondary impact of like a bridge abutment after the impact from --

MR. LANDSMAN: No, I'm talking about the eventual impact of, you know, the railroad train gets sideways on the track during an accident and it's coming to the abutment sideways.

MR. SORENSON: No, not for the rail cask. We did not look at that. We did look at it for the truck cask and the back breaker.

MR. LANDSMAN: Right. I'm just wondering why we're not, I don't know what the stresses would be, a back breaker on the rail cask, assuming the impact limiters wouldn't hit the abutment, you know, if the cask would.

MR. SORENSON: We did not look at that specific orientation.

MR. LANDSMAN: Just a question. Maybe it should be.

MR. POSLUSNY: Thank you.

MR. CAMPS: Kevin Camps with Nuclear Information and Resource Service. I wish that Thor were still here from Michigan because I was wanting to respond to his comments about the Potterville, Michigan propylene train derailment. I think he missed the point because he said the town was

evacuated for five days because it was a propylene derailment and if it had been a nuclear waste train, it would have only been a three-hour evacuation.

But the point that I was trying to make is that the Department of Energy still will not agree to dedicated trains for transporting high level nuclear waste. So, it's the mix of hazardous materials that's the concern. The propylene being high temperature burning material, also an explosive material, I mean, moving materials on the roads and rails, we're not talking about shutting down the highways. So, the mix of these high temperature burning materials, explosives, that could challenge the integrity of the nuclear waste transportation containers.

So, in terms of the Package Performance Study and the temperature of the fire, look at some of the chemicals on the roads and rails today. I mean, the Baltimore train tunnel fire was a real life accident. There were certain chemicals in that tunnel. But the worst case scenario really isn't real world. Look at the temperature of some of the chemicals that are out there, and if these high level nuclear waste sediments would be mixed in with this possibility, then those are the kind of temperatures that should be looked at.

Another issue I wanted to bring up is the lack

of certain tests that's been talked about today, the lack of the submersion test, the lack of a terrorist scenario attack test on these containers. And it came out, I don't remember who said it today but the acetylene torch on one of these shipping containers. But that's exactly the point, there is no torch test in regulations. The propylene train derailment that could result in a torch-like condition, acetylene on the roads and rails resulting in a torch-like condition.

So, it's unfortunate, and I said this in Washington, D.C., that one of the first statements in the Package Performance Study draft is that there will be no changes to regulations as a result of the PPS. And I think that the NRC should certainly be open to changing regulations if it's shown that that should happen to protect public health and safety.

And I guess the last point I'll make is on that, that the NRC's mission is supposed to be to protect public safety and the Davis Besse fiasco in Ohio has shown that unfortunately, sometimes NRC puts industry profits ahead of public safety. And on this issue, public safety should be first and foremost. And I've heard from state of Nevada officials and Clark County officials that the cost of doing adequate safety testing on these containers should not rule

out, I mean, cost consideration should not rule out adequate testing on these containers. So, if the NRC has to go to Congress and ask for more money to do what's required for safety's sake, then that should happen. And tests should not be limited or cut because of lack of funding. Thank you.

MR. POSLUSNY: Any other comments from folks in the back of the room? Okay. I'd like to make some observations for today.

MR. HALSTEAD: There is one more issue.

MR. POSLUSNY: Okay.

MR. HALSTEAD: On the cost issue, I know the hour is late, but maybe you guys can just clarify this. There were a number of questions about funding and how NRC intends to proceed with this at the Las Vegas meeting, and I was somewhat confused after all of that. Could you just take a couple of minutes and explain to us how you propose, my understanding was that you were proposing to request funding from the Nuclear Waste Fund to support these activities. And if you could just reiterate that and then talk back the schedule, the budget -- I know some of this is laid out in the testing protocol but if you could just give kind of a brief explanation of schedule and how you would request the funding for it? Bill or Andy.

MR. BRACH: On the funding first, this has come up at just about every meeting. The funding for the Package Performance Study starting next fiscal year will be coming from the Nuclear Waste Fund. The exact amount of the funds needed, I believe Andy had offered at one or two of the meetings an estimate I'll say of the cost being over 20 million dollars. I know that Bob of the state of Nevada has indicated cost and it might range up to 70 million.

The variable here, of course, is what it is, what tests we conducted and such and what types of facilities are needed. And that's one of the difficulties we have right now in trying to be exact and projecting what the cost will be. The meeting today, the meetings we've had the past few weeks and the comment period we're in right now is to ask for input and comment to help us formulate what the test will be, what cask, how many casks, what types of facilities, we talked just a minute ago about the sled test and the drop test.

Those are right now all on the table from the standpoint as far as discussion, input, comment. So, it's awfully difficult to lay out a cost schedule that is more than some of the general cost that Andy has mentioned before that would be a prognosis as far as what the overall cost would be. But it's generally in the, we're estimating it

right now in the range of 20 plus million dollars and funding would be envisioned to be coming from the Nuclear Waste Fund. A person asked a question to clarify before, the Nuclear Waste Fund is a fund that's maintained, or it's actually furnished from nuclear utilities from rate payers from those that are using nuclear power. So, that's the funding source that we're seeing for the Package Performance Study.

As far as time frames and schedules, I'd have to look at the protocol. I believe it talks about the year 2004 or 2005 for the conduct of the test. Right now, we're in the middle of 2003. 2004 may be a little optimistic when you look at the time it's going to take to get the drop test protocols moved into being a final test protocol. Moving to procurement of equipment with cask, construction of test facilities, we may be looking a little bit beyond the time frames we were earlier estimating.

MR. HALSTEAD: Thank you, sir. That covers that.

MR. WERNER: Bill, can I offer a quick suggestion? Budgetary. It's interesting to hear your perspective from NRC worrying about 20 million dollars. The -- their budget just went from 6.1 billion dollars a year to 7.4 billion dollars a year. And if there is any way, there

is a DOE contribution to be made there, it might be a worthwhile thing to sit down and set up. I don't want to tread on somebody else's rice bowl here but there's a lot of money there and there is a benefit to gain, I would argue. You could cobble together that argument at least for the purposes of going doing to OMB or somebody that they're benefitting themselves from the test results because they're transporting materials from their facilities. And it's seemingly a higher priority to get this technical data than operating, you know, spending 700 million dollars on a reprocessing -- river or you're babysitting -- or whatever they do with the extra money.

MR. BRACH: Jim, we have had discussions with the Department of Energy on the study and the potential of their being a participant in some of the funding. I would only mention that the discussions we've had have been not with the environmental management but with the -- Nuclear Waste Fund.

MR. WERNER: If you can get a straw in to an artery at -- it might be worthwhile. I'd be happy to chat with you offline and maybe they can do something in kind to, you know, build a tower or buy some computers or provide support for, you know, technical expertise and modeling.

MR. BRACH: You're speaking as a state of

Missouri representative?

MR. WERNER: No. I think we all have an interest in seeing the schedule and funding. I just hate hearing you struggle up there by 20 million dollars. I mean, my goodness, this should not be something we should be discussing.

MR. BRACH: We struggle with 20 million dollars, yes.

I guess while I have the mike, a couple of comments I did want to make. Kevin raised a couple of comments and observations, some of which we may have covered this morning, Kevin, before you were able to get here. With regard to the Package Performance Study, I just want to reiterate what I had mentioned early this morning that while clearly we or NRC feel confident in the adequacy of the existing regulations and our programs and our process, we clearly are looking at the PPS and I'll offer experience, I've worked in other parts of the agency, a responsibility we have is that as studies, events, activities evolve, new information becomes available.

And for example, if in the Package Performance Study new information becomes available that would cause us to question, re-look at our existing process, regulations, we will do that. I'd mentioned that early this morning. I

apologize if you had missed that. As well as the overall function of our agency, I don't want to repeat too much, but the function of the agency, the mission of the agency is the protection of public health and safety, common defense and security and protection of the environment.

And that clearly drives us in all of our activities. And those are the activities or processes that guide and direct us whether it be in our spent fuel transportation activities, our reactor program arenas or other NRC activities. So, these are the agency's guiding mission, activities and functions that guide and direct us all in all of our NRC activities.

MR. POSLUSNY: Corey?

MR. CONN: I just wanted to draw your attention to the fact that because I was not here this morning, I missed out on some of the ground rules and whatnot. But I have remarks that I would have preferred to make this morning had I been here.

MR. POSLUSNY: You could do it now.

MR. CONN: Okay. It might be an opportunity. How close are you to getting to the participant concerns discussion and closing remarks?

MR. POSLUSNY: We're very close.

MS. SUPKO: We're there.

MR. CONN: Perhaps we are there. I don't know how many of you share the feeling that I have that there is an elephant in the room with us because we've given a great deal of attention to the analysis of our ability to forecast the cask performance under these conditions. But I want to point out that some of the assumptions that folks were doing in this modeling and doing the best they can with this information and it is really a tiny subset of the information. You look at the efforts to model meteorology and you really begin to appreciate how complex real things are and how difficult they are to model. But some of the things that they're relying upon are assumptions that are based on the metrics and the original design put forward by the vendors of these casks.

The elephant I want to bring your attention to as you go forward and talk to each other peer to peer about improving our ability to model and forecast this is that there are real, well-known, widely-known industry-wide quality assurance failures at the level of the vendor and the supplier. And that, really our certainty here that we're putting forward about the ability of the model to forecast, you know, what its performance might be under the fires and the crash scenarios, it has to be tempered by the very real concerns, the gross uncertainties about design

control process. I'm speaking about design control process failures that are outlined in a specific case, but I think they cast a long shadow over all of these analyses.

The elephant I'm speaking of has nine parts and these are the nine findings of a two-year old audit, a dry cask storage quality group in NUPIC, Nuclear Users Procurement Issues Committee group audit. This is the audit number, SR-2000-257 which was conducted in part at the request of Commonwealth Edison at a time when there were industry-wide quality problems with defection of equipment coming up onsite and having to be repaired in the field in a poorly controlled or documented process.

Now, NEIS, a group which I'm representing today has been asked to assist in empaneling a number of experts to determine whether NRC has really a complete understanding of design control process as it is stated in 10 CFR 50 Appendix B Criterion 3, and also in other engineering codes, the ANSI Standard N45.2.11 and the ASME NQA-1-1989 and its Supplement 3S in particular. The public has a keen interest in knowing that quality assurance failures are being handled properly. I'd like to know the status of all nine of the audit findings on US Tool & Die because they have supplied parts to the Hi Star 100's which have already been loaded with spent nuclear fuel.

The findings are significant. They are about deficiencies in record-keeping regarding training a personnel, welding methods, materials procurement, the calibration of instruments, the bizarre use of non-conformance reports when doing what is known as welding at risk. How am I to have confidence that there is conservatism in the fabrication if field repairs of defective parts are being made in violation of engineering codes and the Commission's own regulations?

Accordingly, I would ask that the audit that I mentioned which has not been made available to the public be released to me. And that if it's possible to include it at this date, the descriptions of all the causes and the corrective actions taken including the actions that were taken to prevent their recurrence. I'll say we're talking about going forward and I need your help in that. Thank you.

MR. POSLUSNY: Okay. Any other comments from the members of the round table? With that, would you like to close --

MR. HALSTEAD: I just want to throw in a QA/QC cost issue. When one of our contractors gathered information on a cask cost for us, one of the vendors gave him a price for a cask with and without compliance with NRC

QA/QC. And the cost of a cask with full QA/QC trail was a half million dollars on a 2.75 million-dollar truck cask which is an interesting insight to me from the vendor standpoint that was that full compliance was a fairly rigorous trail of documentation. I don't know if that's because this was a one-time purchase and that would be different, say if you were ordering five or ten units.

But nonetheless, it's an interesting thing that we would throw in. We would expect any cask that are procured for use of this testing to have that full trail as a demonstration of how the NRC system works. So, again, we could make that clear to people.

And I'm sorry to interrupt you, Bill, but that occurred to me, the QA/QC issue.

MR. BRACH: No, you didn't interrupt me. Corey, on your point on the NUPIC audit, I'm not familiar with what report you're making reference to. NUPIC is an organization that's made up of utilities where the utilities form joint audit teams and conduct audits of vendors, companies that supply parts to them. The NUPIC report would be a licensee, a utility generated report of a vendor that is inspected. And that's not an NRC report, that's not an activity wherein the NRC is in the middle of. So, I am not in a position to offer or suggest -- as far as -- is not within the NRC.

MR. CONN: Okay. I would certainly settle for a third-generation photocopy of any documents received at NRR on or about November 1 of 2001 sent by the senior lead auditor on behalf of the audit team.

MR. POSLUSNY: Could you repeat that again? What was the date of that?

MR. CONN: November 1, 2001.

MR. BRACH: That was sent to NRR? Let me comment on just Bob's point. We didn't discuss this today although it's been discussed at some of the other workshops. So, Amy had mentioned that we are planning in the Package Performance Study to use a cask that's been fabricated, a currently certified cask that's been fabricated consistent with the design and certification specifications. And that clearly is our plan and vision for the Package Performance Study but there's another point that I do want to mention and stress.

I don't know if the discussion you had with the vendor where they identified a product with or without QA, from an NRC perspective, there is no such thing of a vendor providing a cask or under the Part 71 for transportation or Part 72 for storage that has that as an option. A licensee who puts into use whether in Part 71 for transportation or in storage under Part 72, they have a very basic, it's a

very simple straightforward requirement. That package for transportation or that cask for storage must conform with all conditions of the certificate.

Now, that means design, that means materials and that also means quality assurance program. So, I'm really lost that the vendor would represent that there's a, you know, you can pay for it in one of two or buy it in one of two ways. That bothers me that that's a discussion because under both Part 71 and 72 for storage and transportation, that's not a path forward.

MR. HALSTEAD: First of all, I can't -- distance from this particular conversation because I happen to know the vendor representative and I didn't want to bias it by being involved in it personally. My supposition is that the vendor was saying this is a cask that isn't really going to be used to haul spent fuel. Nevada is going to buy it and test it. But anyway, I just thought it provided some interesting insight in terms of the vendor's viewpoint of putting a dollar price on the seriousness of what the compliance with the requirements was. I don't know if that's something you guys have gone and crossed it out as either reasonable or unreasonable.

But I was surprised when the contractor reported to me two prices. So, for whatever it's worth, I offer it

for the record. I would assume that anything we do here, you know, you would insist on full QA/QC --

MR. BRACH: Well, that's true and it's not an option. And some, there aren't many that licensee representatives here today, but some I'll tell you that we have frequently, if you will, have preached at them on not only what the requirements are on Part 71 and Part 72, but the very fundamental responsibility the licensee has, that is, shipping material or storing material. And if using storage, for example, the licensee's fuel that's going into that cask and that cask is going to be on the licensee's property at the licensee's --, the licensee is responsible for the safe storage of that fuel. And the same goes for transportation, that that responsibility is not only stated in the regulations but it's an inherent responsibility they have for the safe conduct of their activities, whether it be storage or transportation.

And that means all aspects of quality assurance as applicable for storage and transportation. So, there's not two paths there.

MR. HALSTEAD: Well, the only reason I need to add one comment is here, again, some of you remember last year during the 10 CFR 71 rulemaking, we had this discussion of a point which, by the way, still hasn't been answered so

I need to write another letter to the NRC, and that is, when Chairman Masur answered Senator Durban's inquiry about the extent to which NRC regulations would apply to the DOE, he sent a letter expressing a very minimalist statement of regulation that said we will only apply the package certification requirements of 10 CFR 71. And he specifically excluded all other aspects.

So, there is outstanding a question that we need to have answered as to whether, and again, I suppose it would depend on how the arrangements were made because if a company decided to have a contractor relationship where they purchased the casks and then provided services to DOE, I would assume that they would be regulated as an NRC licensee. But there is a gray area in the way that all of those miscellaneous but important parts of 72 and 73 apply to the Department's program. And again, we'll provide the letter to the, I'm going to send a bunch of documents and I'll send you guys the correspondence file. Bur unfortunately, there is some confusion about exactly how the NRC would apply these regulations to DOE.

MR. BRACH: Let me get that. The letter you're making reference to, I'm familiar with. And maybe it might help to put the letter and the issues into context. The comment from Chairman Masur to Congress was pointing out

what NRC's legislative responsibilities are in the shipment of spent fuel. The issue that's on the table there would be is it the NRC licensee or is it the Department of Energy that would be shipping the fuel. If it's an NCR licensee, those activities would be all under NRC license.

There has been much discussion with regard to when and where the Department of Energy takes title to and possession of the spent fuel. If DOE takes title to and possession of the spent fuel at the nuclear power plant, the legislation clearly requires that the package that's used to transport that fuel to the National Depository be in an NRC certified package. It's that last point is what was Chairman Masur was addressing in the letter that you made reference to.

MR. HALSTEAD: Well, Bill, again, I don't want to belabor this but we had our lawyers review this and we're not satisfied that we can assume that NRC QA/QC applies to DOE shipments of commercial spent fuel under all circumstances. What we would like is a statement from the NRC that says that we can assume that all of the regulatory requirements, pre-notification safeguards apply. And are you saying that we don't need this clarification or that you can't give that clarification?

MR. BRACH: No. The letter you're making

reference to was providing that clarification, that if the Department of Energy which is not an NRC licensee for transporting material is taking title to and possession of the fuel at the power reactor. The -- legislation requires that the package be an NRC certified package. Department of Energy, using their same authorities as they use today for transport of other materials with regard to notifications, with regard to physical protection, with regard to all other aspects, has that responsibility within DOE.

MR. HALSTEAD: So, in other words, NRC would only regulate the package certification and in fact QA/QC would not apply? I'm not following you. I guess, and this is why I don't want to do this here. I wrote this letter, this is a problem of getting letters out of the NRC sometimes. We ask for a clarification of this point because frankly I believe Senator Durban would have conditioned his vote on Yucca Mountain if he had understood that he was voting to send one out of every three casks through Chicagoland thinking that they would be regulated the same way that an Exelon shipment would be regulated. That is the standard. I take that as a compliment. The way that the NRC regulates the utilities is the yardstick of performance that we expect for regulation of shipments to Yucca. And obviously, PFS is different because that's completely

private.

But it seems to me that we'll have to get some more resolution of that because if what you're saying is correct, I leave this meeting being uneasy as I was last July in Rockville saying, you know, if what I see in this letter is correct, it means that there is a gap in the application of the NRC regulations except for the very narrow package certification provisions. It also has to do with the way transportation impacts would be addressed in an EIS that's presented to the Commission as part of the licensing package.

So, but thank you. I guess I understand what you're saying.

MR. POSLUSNY: Okay. Sure, John?

MR. VINCENT: Two points. What you were just discussing, Bob. Ignore for the moment whether DOE is or is not responsible. As the certificate of compliance holder is still going to be obligated to the NRC regulations to the extent DOE buys material from the private sector which is their avowed intent, so the certificate of compliance and the NRC's responsibilities back and forth between the two would still apply whether or not you presume it's directly applicable at the outset to DOE.

Now, number two. The industry is not going to

sanction the conduct of these tests using nuclear waste fund moneys if the casks are not QA/QC'ed properly. We will not support that. The money will not be forthcoming from then nuclear waste funds to support that.

MR. POSLUSNY: Thank you for that comment. Just some general observation. As I predicted, we would hear several ideas today. There were a lot of ideas on communication on what the PPS is or isn't, when it's done. We know it's being done as well. Some new ideas on fire testing, what it might, on what it should be. Some other discussion on test to failure concept, still very difficult. Let's see, a discussion of final shock adding that at the end of the test. That's something we hadn't heard. Metrics for the test, are they the right ones? Should they be changed?

Trying to test somehow to -- so that those would respond to an accident, could understand what the risks are. That's a very interesting concept. Another thing, communicate the results to all audience at different levels of complexity.

Again, this was a very challenging meeting, but I thank everyone for their participation. And I hope they got what they expected to get out of the meeting. And please let us know formally or informally. Bill, would you

like to add anything?

MR. BRACH: It's getting late and I know that people have already had to leave. But if I go back to the slide that I had up this morning and I was trying to describe what I would see as a success for this meeting, clearly from my perspective, I think we've accomplished that. I was looking for a good, open dialogue, frank discussions and realizing that there may be expressions on our views that are offered, maybe 180 degrees from each other. But that was all from the standpoint of everyone having won the opportunity but also giving their input with regard to considerations that NRC in our Package Performance Study test protocol development need to hear from you. And that's what we were here for today and I appreciate everybody's patience and time. It's been a long day but I think a very productive day and the dialogue I think has been very helpful.

And I thank everybody at the round table, literally and figuratively, excuse me, the round table, as well as those in the audience that have persevered and stayed for the entire time. I thank you very much.

(Whereupon the meeting was concluded at 5:40 p.m.)