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PUBLIC MEETING

5

OF THE

6

NUCLEAR REGULATORY COMMISSION

7

8

Taken on the date of:

9

Wednesday, November 17, 1999

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Taken at the

12

Bethesda Hyatt

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Old Georgetown Road

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Bethesda, Maryland

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Starting time: 8:37 o'clock, a.m.

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Sandia National Laboratories

18

Sandia Corporation

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Reported by: Donna Hall, court reporter

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

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3 MR. CAMERON: Good morning, everybody.
4 My name is Chip Cameron, public liaison within
5 the Office of General Counsel's office at the
6 Nuclear Regulatory Commission, and it's my
7 pleasure to serve as your facilitator for today's
8 meeting.

9 I'd like to briefly cover what the
10 objectives of this workshop are, what my role as
11 the facilitator will be and also some very simple
12 ground rules to guide our discussion today.

13 As far as the objectives of the
14 workshop, as you all know the NRC is planning to
15 do an update of the spent fuel transportation
16 package performance study, commonly called the
17 modal study that was done in 1987, and the NRC
18 wants to insure that the new study addresses all
19 the important issues related to package
20 performance. So with that in mind NRC has
21 invited the public and knowledgeable
22 representatives of the broad spectrum of

1 interests that are affected by transportation
2 issues to share their recommendations, their
3 concerns on the scope and methodology of this new
4 study.

5 The NRC hopes that this early input will
6 help to insure that the design and implementation
7 of the study will provide the best information
8 for furthering the NRC's public health and safety
9 responsibilities.

10 My personal objectives as facilitator
11 today is try to assist you in three ways. One is
12 to keep the discussion organized, understandable
13 and on schedule. Secondly, to make sure that
14 everybody has an opportunity to talk to express
15 their concerns, their comments. And third, to
16 keep track of any action items or recommendations
17 that might come out of this discussion. I'll be
18 using these flip charts to do that and for other
19 purposes.

20 In terms of the ground rules for the
21 discussion, each of you has what's called a name
22 tent in front of you and if you wish to speak

1 during any of our discussion sessions, please
2 turn that name tent on end like that and that
3 will allow me to keep track of who wants to speak
4 without you having to keep your hand up or waving
5 your arms or whatever. It will also help us to
6 keep a clean transcript for the meeting.

7 Donna, our stenographer, is over here
8 and she will be transcribing the meeting for us
9 and those transcripts will be available to the
10 participants and the public at this meeting and I
11 believe it will also be posted on the NRC
12 website.

13 I may not take all of the tents in the
14 order that they were raised so that we can try to
15 follow discussion threads on related points
16 rather than jumping from one unrelated point to
17 the other. And from my experience I found that,
18 there may be comments that don't fit neatly into
19 the agenda item that we're discussing and so for
20 those items, we're going to keep track of those
21 and what people normally call a parking lot, what
22 I call a paddock, and we will come back to those

1 before we end to discuss any of those issues that
2 were raised that might not fit into a particular
3 agenda item.

4 Our focus is the issues related to the
5 update of the package performance study. I know
6 that there are a lot of broader issues on
7 transportation generally, and although the NRC is
8 receptive to hearing comments on those, there may
9 be issues that will need to be more fully
10 addressed in other forums or through other
11 means. But I would note that there is a video
12 being made by the NRC on spent fuel
13 transportation and there will be some filming of
14 our discussions just as a backdrop for other
15 parts of that video.

16 We have Big Shot Productions here doing
17 that for us today and they may, they would want
18 to do some interviews not in here but during the
19 breaks out there. They may be asking some of you
20 if you would like to do a five minute interview.
21 So I just wanted to warn you about that in
22 advance.

1 What I would like to do before getting
2 to just a brief agenda overview, is to go around
3 the table and have each of you introduce
4 yourselves to us and I should say the focus of
5 the discussion is here at the table, but comments
6 from the audience are also very important to the
7 NRC and so after each discussion item we will be
8 going out to those of you in the audience for any
9 comments or questions that you might have.

10 We have a stand-up mike there but I will
11 also bring this talking stick out to anybody who
12 wishes to talk. And in terms of the transcript,
13 those of you in the audience who speak please
14 give your name and affiliation if appropriate for
15 the transcript. For those of you up here at the
16 table, at least in the beginning stages, please
17 give your name so that the stenographer knows who
18 is speaking.

19 I think that Donna is going to get used
20 to where you are and when she sees the card go up
21 and you talk she'll -- at some stage we may be
22 able to dispense of the names, but we'll give her

1 a chance to get that down. So let's go for
2 introductions and let's start at the middle of
3 the table right here with Susan.

4 MS. SHANKMAN: Good morning. My name is
5 Susan Shankman. I'm the deputy of licensing and
6 inspection in the Spent Fuel Project Office which
7 is part of the nuclear material safety and
8 safeguards office in NRC.

9 MR. KAMPS: Good morning. My name is
10 Kevin Kamps. I'm the nuclear waste specialist at
11 Nuclear Information and Resource Service here in
12 Washington.

13 MR. VANAGS: Hi, my name is Uldis
14 Vanags. I'm nuclear safety advisor in the State
15 of Maine. I'm also representing the Northeast
16 High Level Waste Transportation Task Force here
17 today.

18 MR. PRITCHARD: Good morning. I'm Ed
19 Pritchard. I am the staff director of the
20 Hazardous Materials Division of the Federal
21 Railroad Administration of the U.S. Department of
22 Transportation.

1 MR. FRONCZAK: I'm Bob Fronczak. I'm
2 assistant vice president, Environment Haz Hat
3 with the Association of American Railroads.

4 MR. RESNIKOFF: I'm Marvin Resnikoff,
5 Radioactive Waste Management Associates based in
6 New York City. We generally work for state and
7 local governments on transportation such as the
8 State of Nevada and Utah.

9 MR. EDLOW: Good morning. My name is
10 Jack Edlow with Edlow International Company,
11 company for 42 years in the traffic management of
12 nuclear materials.

13 MR. HALSTEAD: Bob Halstead,
14 transportation advisor, State of Nevada, Agency
15 for Nuclear Projects.

16 MR. SHELOR: Good morning. I'm Dwight
17 Shelor, the director of the Office of
18 Transportation Waste Acceptance and Integration,
19 Office of Civilian Radioactive Waste Management
20 in the Department of Energy.

21 MS. MUSTIN: Good morning. My name is
22 Tracy Mustin. I'm the acting director of the

1 Office of Transportation within the Office of
2 Environmental Management Department of Energy.

3 MR. WANGLER: Good morning. I'm Michael
4 Wangler. I'm the director of the Package
5 Approval and Safety Program within the Office of
6 Environmental Management Department of Energy.

7 MR. BOYLE: Good morning. I'm Rick
8 Boyle with the U.S. Department of
9 Transportation. I head up the radioactive
10 materials transport branch in the Office of
11 Hazardous Materials Safety.

12 MR. HOLDEN: Robert Holden, National
13 Congress of American Indians.

14 MS. WESTRA: Good morning. I'm Heather
15 Westra, coordinator for the Prairie Island
16 Community in Minnesota. Our interest in this
17 workshop stems from the location of the nuclear
18 power plant immediately adjacent to the tribe's
19 reservation and rail lines going right through
20 the reservation.

21 MS. SUPKO: Good morning. I'm Eileen
22 Supko, Energy Resources International. We're

1 based in Washington, DC. We're a energy
2 consulting company.

3 MR. KILLAR: Good morning. I'm Felix
4 Killar with the Nuclear Energy Institute. I'm
5 also chairing the Nuclear Industries Task Force
6 on Transportation. We're looking on things such
7 as the Modal Study, the implementation of ST1 and
8 other international and national regulations.

9 MS. SHOLLENBERGER: Amy Shollenberger
10 with Public Citizen.

11 MR. RAWL: Good morning. I'm Rick
12 Rawl. I'm with the Transportation Technologies
13 Group at Oak Ridge National Laboratory.

14 MS. ENG: Good morning. My name is
15 Patricia Eng and I'm chief of the Transportation
16 and Storage Safety and Inspection Section. It is
17 my staff that will be overseeing the study we're
18 going to be discussing later today.

19 MR. HOLT: I'm Mark Holt with the
20 Congressional Research Service at the Library of
21 Congress. I'm head of the Energy and Mineral
22 Section.

1 MR. CAMERON: Okay. Thank you all very
2 much. We might as well include these last two
3 here. Charles, I didn't mean to slight you. Go
4 ahead.

5 MR. MASSEY: Good morning. I'm Charles
6 Massey. I'm the manager of the Transportation
7 Safety programs at Sandia National Laboratories.
8 We are the technical contractor who will be
9 preparing the package performance study that
10 we're here to talk about today.

11 MR. EASTON: And lastly I'm Earl Easton
12 with the U.S. Regulatory Commission. I head a
13 group of technical reviewers that does safety
14 reviews for transportation and storage, packages,
15 in the office of the Spent Fuel Project Office.

16 MR. CAMERON: Okay. Thank you. We are
17 working on getting the microphones going here and
18 I think the way the agenda works at the beginning
19 here we'll have time to do that.

20 I just wanted to go over the agenda very
21 briefly for all of you and I hope everybody got a
22 copy of the agenda that was out on the front

1 table. What we're going to do is begin with four
2 brief presentations by the NRC to provide you
3 with a common set of information as backdrop for
4 the discussions today.

5 At the end of those four presentations,
6 we're going to go out to the participants around
7 the table and also to the audience for clarifying
8 questions. I realize that the presentations
9 could kickoff a lot of the discussion that we're
10 going to have today.

11 What I would like to do is save that
12 discussion for the discussion agenda items. But
13 to make sure that you do understand the
14 information that was presented, we will have some
15 clarifying questions after the completion of
16 those four presentations and we hope not to go
17 too long on all of those four.

18 After we do the clarifying questions,
19 we're going to take a break and then we'll come
20 back and start in on the first of our discussion
21 items and these are accident likelihoods as you
22 can see at the 10:30 spot on your agenda.

1 I will have a brief tee up, so to speak,
2 by Charles Massey from Sandia Labs so that you
3 will get an idea of what that particular
4 discussion topic is all about. We'll have
5 discussion around the table. We'll go out to the
6 audience for questions or comments and after that
7 first discussion area we're going to go to lunch
8 and we're going to come back at 12:45, and we're
9 going to continue with our discussion issues.

10 The first one after lunch is container
11 performance during collisions and then we're
12 going to go to container performance during
13 fires. We'll take a break, come back and talk
14 about spent nuclear fuel assembly behavior and
15 accidents, then testing and computer simulation
16 methodology issues. Then we're going to come
17 back and address any issues that we haven't
18 talked about so far, perhaps issues that have
19 been up in the paddock, but also very importantly
20 a process issue. In other words, how do people
21 think that the NRC should keep the public
22 involved during this study? I think we will get

1 some good ideas on that. Then we're going to
2 wrap up and adjourn by 6 o'clock.

3 Is there any questions on the agenda at
4 this point before we get into the presentations?

5 As I said we can build agenda items in
6 at any time. We'll keep track of them and put
7 them in the proper place. What I would like to
8 do now is -- Susan, could you test your mike?
9 We're going to keep working on the mikes.

10 Our first presentation is Dr. Susan
11 Shankman of the NRC. Susan is deputy director
12 for licensing inspection of the Spent Fuel
13 Project Office at the NRC and Dr. Shankman has
14 been with the Spent Fuel Project Office since
15 1996. Her office is responsible for review and
16 approval of designs for spent fuel storage
17 systems and transportation package systems for
18 the NRC.

19 Her group is also responsible for
20 inspection in the development of regulations and
21 guidance for spent fuel storage and
22 transportation.

1 Prior to joining the NRC, Dr. Shankman
2 was an analyst at the U.S. Public Health Service
3 and special assistant to the Maryland State
4 Superintendent of Schools. She received her
5 bachelor of arts degree from Beaver College in
6 Glenn Side, Pennsylvania. Her master of science
7 degree from Queens College City University of New
8 York and her doctorate from the University of
9 Southern California. I would like to turn it
10 over to Dr. Shankman.

11 DR. SHANKMAN: Good morning. I want to
12 begin by welcoming you all. I'm happy to see you
13 here and I appreciate that you are here. We have
14 distinguished panelists at the table, but we also
15 have a group of very interested people around the
16 room and I hope we all get a chance to
17 participate today.

18 As Mr. Cameron said, I am the deputy
19 director of the Spent Fuel Project Office at the
20 NRC.

21 The Spent Fuel Project Office has
22 convened or assembled this meeting this morning

1 with a very specific purpose of hearing your
2 concerns about the transportation of spent fuel.
3 We are sponsoring a study that Sandia is helping
4 us with and that study is to look at package
5 performance. That's the container as well as
6 contents of spent fuel packages that will be
7 transported throughout the United States.

8 I want to emphasize that there are no
9 middlemen here. I am the deputy director. I
10 sign the papers that go out that approve
11 designs. We have with us today the members of
12 our technical team who will also be working on
13 this study.

14 The NRC and those people I will
15 introduce later are the people who will make the
16 decisions about what is studied and how it is
17 studied.

18 For me this is not an abstract concept.
19 I live in Garrett Park. It was started as a
20 railroad town. The main line that goes from
21 Washington West, goes 300 feet from my house and
22 I too am concerned about what's on those trains.

1 My job this morning is to give you a
2 little background, so I will start by talking
3 about what the NRC is and what we do, who we
4 are.

5 The NRC is an independent federal
6 agency. Our mission, our job is to protect
7 public health and safety. Like other regulatory
8 agencies we set standards and we enforce them.
9 The mission of the Spent Fuel Project Office is
10 to set those standards and enforce them in the
11 design and fabrication of packages for spent fuel
12 transportation.

13 We don't actually move the fuel, we
14 regulate those that do. We approve the designs
15 of the package systems. The other aspects of
16 fuel transport are regulated by other agencies.

17 NRC is a very experienced agency since
18 1974 when the AE, Atomic Energy agency, was split
19 into a regulatory side and a developmental side.
20 We have been regulating atomic agency at licensed
21 activities. We regulate nuclear power plants.
22 We regulate medical uses of materials. We

1 regulate waste and disposal issues and we
2 regulate the transport of radioactive materials.

3 The staff at the NRC has more than, if
4 you can subtract 1974 from 1999, it's many years
5 of experience in regulating these activities. We
6 have been reviewing cask designs and their
7 construction and fuel characteristics and
8 observing nuclear power plant fuel operations for
9 all these years.

10 We use that experience every day. And
11 we try to make sure that what we are doing
12 results in safe transport of spent fuel.

13 Our mission, as I said, is public health
14 and safety. We make rules. We approve what
15 licensees plan to do. We do that by issuing
16 licenses and certificates. We review these
17 things using standardized guidance with standard
18 review plans.

19 We provide guidance to licensees and
20 certificate holders on how to meet the
21 requirements of the rules. We inspect
22 performance and then we enforce compliance with

1 those rules.

2 NRC has several guiding principles in
3 how we conduct our operations. The first one is
4 independence. That does not mean that we are
5 isolated. Part of today's goal is to hear your
6 concerns but we do keep an unbiased and objective
7 approach to our work.

8 Efficiency is one of our guiding
9 principles. We believe at NRC that the taxpayer,
10 the rate payer and licensees are entitled to the
11 most efficient and effective management and
12 administration of our activities.

13 Clarity. Our regulations are meant to
14 be coherent, logical and practical and we often
15 need your help in making sure that that is
16 accomplished.

17 Reliability. Another of our guiding
18 principles. Regulations should be based on the
19 best available knowledge and the reason we
20 continue to do studies is our knowledge evolves
21 and we look at the information we get from our
22 studies and look at our regulations and our

1 guidance to see if they are still effective and
2 efficient.

3 Openness. Anyone who has dealt with the
4 NRC for a while will know that we have evolved
5 into, at this point in time, deeply believing
6 that regulations are the public's business and
7 that public involvement is vital to having
8 regulations that meet our mission.

9 So transportation, safety of spent fuel
10 is what brings us here today. To give you a
11 perspective I think most of you know that there
12 are seven classes of hazardous material and
13 radioactive material is just one of those seven
14 classes that spent fuel is a small percentage of
15 the shipments that are made of hazardous
16 material.

17 The study we are beginning today, I
18 should say, will be on very technical experience
19 and while Sandia National Lab is the contractor
20 that we have selected to do the work, we will be
21 carrying out the study with NRC staff and I want
22 to introduce them today because they will make

1 the decisions with oversight by myself and my
2 staff.

3 They will make the decisions on how we
4 conduct the study and what is studied. So let me
5 start with Mr. Rob Lewis. Mr. Lewis is a
6 predicality expert, shielding expert, those
7 areas, but he's also the project manager for
8 this. By the way, everyone I will introduce has
9 a name tag and I hope that at the breaks we will
10 take a opportunity to talk to them personally as
11 well as in the forum.

12 Ms. Sara Kopel is our expert on
13 containment. Dr. Henry Lee, structural expert.
14 Mr. Ron Parkhill who will be working on thermal
15 issues and Mr. Jeff Ponset is our materials
16 expert. This is the team that will oversee this
17 project from beginning to end.

18 The last few years NRC has been
19 integrating risks into our decision making. What
20 that means in the area of transportation is that
21 we make sure that on an ongoing basis that we
22 understand the risks that we regulate. If we

1 learn something new, new data, we use that and we
2 make sure that what we're doing every day
3 continues to maintain safety. That's what this
4 study is about. It's an effort to gain more
5 knowledge than we have. We believe we have a
6 continuous mission to keep learning more.

7 Earl Easton sitting to my right. Mr.
8 Easton is going to discuss the previous studies
9 that we have done so that we can put this study
10 in the context of where we are.

11 NRC's goal is to conduct impartial and
12 rigorous safety evaluations when we issue a
13 certificate or a license. Another way to say
14 that is we try to be effective and efficient and
15 realistic how we use our guidance and our
16 regulations.

17 We make decisions in an open way. We
18 try to include the public in the review of our
19 rules that's mandatory, but we also have all of
20 our meetings noticed and this meeting is also
21 part of our effort to involve the public in our
22 decisions.

1 We support our decisions with
2 experience, facts, statistics as you know show
3 spent fuel transport is safe and we want to
4 maintain that safety.

5 Public involvement. And I think I said
6 this many times now this morning, but I just want
7 to reiterate it, is an important part of our
8 efforts. You can help us and you can help us
9 throughout this study and there are many ways you
10 can continue to be involved besides today by
11 telling us what you think, what you are concerned
12 about and especially by being candid. The more
13 we know about what the concerns are, the better
14 we can use our resources to be sure that
15 regulatory requirements are met and that those
16 requirements minimize risks.

17 There are forms on the table outside
18 that you can send back to us. Some people don't
19 like to say what they want to say in a public
20 forum. You can either put them on the forms or
21 leave them with us today or you can send them
22 in. They are already preaddressed but not

1 prestamped.

2 After we have incorporated the feedback
3 from this meeting into a comprehensive report, we
4 will end phase one of this study in which we will
5 recommend, with Sandia's help, will have a
6 recommendation of how to proceed with the study.
7 At that point we intend to involve the public
8 again. We intend to have more meetings.
9 Everything that we are doing will be on our
10 website. How to get in touch with us through the
11 website is also on a information sheet.

12 Really what I wanted to say this morning
13 is as the deputy director of the division, I can
14 tell you personally that all the ideas that we
15 have will be considered. They will be evaluated
16 and they will be explored. There is nothing that
17 anybody says today that will not be on the
18 transcript and therefore we have the ideas and I
19 urge you if you don't say what you want to say
20 today to write to us. You can also contact us
21 through the web.

22 Let me end by saying this study in

1 particular cannot be done without your help. We
2 need you to be candid. We need you to express
3 what is your concern. We need you to tell us.
4 You can either write to us, call us or tell us in
5 person today. So thank you very much for being
6 here. I'll pass the mike back to Chip.

7 MR. CAMERON: Thank you, Dr. Shankman.
8 We're going to continue with providing background
9 information to you and go to our second presenter
10 Ms. Patricia Eng from the Nuclear Regulatory
11 Commission staff.

12 Ms. Eng is currently chief of the
13 transportation and storage safety and inspection
14 section of the Spent Fuel Project Office and her
15 part of that organization is responsible for
16 developing the regulations for transport and
17 storage, radioactive materials and she also
18 oversees the inspection of facilities and
19 organizations that are involved in a design
20 fabrication, maintenance and operation of
21 packaging and storage systems.

22 Before Pat came to the Spent Fuel

1 Project Office she was, has been in a variety of
2 positions at the NRC, including being the
3 technical assistant to former Commissioner Gail
4 Duplank (phonetic) and Pat has also served as a
5 resident inspector at one of the NRC's licensed
6 power plants. She's a registered, professional
7 mechanical engineer with a bachelors of science
8 degree in nuclear engineering from the University
9 of Illinois and Pat is going to give us an
10 overview of the regulatory framework. Pat?

11 MS. ENG: Thank you, Mr. Cameron. Good
12 morning and welcome. My name is Patricia Eng and
13 I am the chief of the Transportation and Storage,
14 Safety and Inspection Section. I am responsible
15 for the oversight, the study that Dr. Shankman
16 referred to earlier and this meeting is very
17 important to us.

18 We want to establish a dialogue, an open
19 and candid dialogue with you so we can identify
20 the issues that we need to focus on when we
21 conduct this study. In order to help focus our
22 discussions throughout the day, I would like to

1 describe how the different federal agencies that
2 are here today work together to oversee the safe
3 transport of radioactive material.

4 There are three major players. They are
5 U.S. Department of Energy, the U.S. Department of
6 Transportation and the Nuclear Regulatory
7 Commission. I would like to discuss a little bit
8 about the Department of Energy and we have three
9 very qualified representatives from the
10 department here with us today and they introduced
11 themselves earlier.

12 The department was given the assignment
13 of identifying, characterizing and ultimately
14 operating a long-term geologic repository for the
15 disposal of our nation's high-level radioactive
16 waste which includes spent fuel. This was done
17 through the Nuclear Waste Policy Act of 1982 and
18 subsequent amendments and I won't go through the
19 legislative lesson, but that's where DOE was
20 given this assignment.

21 At the moment the department is actively
22 evaluating the suitability of the Yucca Mountain

1 sight as the potential place for the repository
2 and as part of the licensing process the
3 department prepared a draft environmental impact
4 statement that was published this past August by
5 the office of Civilian Radioactive Waste
6 Management.

7 One of the issues that's addressed in
8 this draft environmental impact statement is the
9 impact of transporting high level waste across
10 the country from 77 different locations. The
11 nuclear regulatory commission is currently
12 reviewing this draft environment impact statement
13 and we hope to complete our review later this
14 year. In the meantime the department is holding
15 a series of public meetings at various locations
16 to get public input on their environmental impact
17 statement.

18 The department is required to ship the
19 high-level waste in nuclear regulatory commission
20 certified transportation packages and they have
21 stated that they will comply with applicable NRC
22 and Department of Transportation regulations.

1 So today we're joined by Ms. Tracy
2 Mustin, Mr. Dwight Shelor and Mr. Michael Wangler
3 from the department. Thank you so much for
4 coming.

5 Next let's look at the Department of
6 Transportation. The Department of Transportation
7 is the regulatory authority overseeing transport
8 of all kinds in the United States. As part of
9 their job, they establish the requirements for
10 the transport of all hazardous materials, and as
11 Dr. Shankman mentioned earlier, radioactive
12 material is a subclass of hazardous material.

13 The research and special programs
14 administration of the Department of
15 Transportation has issued regulations regarding
16 the labelling and marking of transport packages,
17 placarding of vehicles and defining what needs to
18 go into the shipping papers that accompany such
19 shipments. They also established training
20 requirements for both shippers and carriers and
21 in the case of the Federal Highway
22 Administration, they have established guidelines

1 for selecting transport routes on our nation's
2 highways.

3 Without going into a lot of detail, on
4 the table outside there is a copy of those
5 regulations regarding route selection. With us
6 today are Mr. Rick Boyle who is chief of the
7 Radioactive Materials Branch of the Research and
8 Special Programs Administration and Mr. Ed
9 Pritchard who is the staff director for hazardous
10 materials for Federal Railroad Administration.
11 Thanks for coming.

12 Now let's get down to my agency, the
13 Nuclear Regulatory Commission. With regards to
14 transportation, the NRC provides technical
15 assistance to the Department of Transportation
16 and we provide assistance to them in three ways.
17 First, we've established regulations related to
18 the transport of missile material and large
19 quantities of radioactive material.

20 As Dr. Shankman alluded to a few moments
21 ago, we also conduct inspections of
22 transportation activities and enforce the

1 regulations by imposing sanctions when
2 necessary.

3 Second, we play a role in insuring the
4 physical security of shipments along the
5 transportation route. This includes insuring
6 that there are continuous communications
7 capability with the shipment at all times when
8 it's in transport, that the law enforcement
9 agencies along the route are knowledgeable of the
10 shipment and can respond if needed and that
11 predesignated safe havens are identified. So
12 what if a driver needs to stop for any particular
13 reason such as a flat tire or any particular
14 reason? A suitable location is already known
15 where he or she can pull the vehicle off the road
16 and response can be dispatched.

17 Today we'll focus on the NRC's third
18 major responsibility and that is the
19 certification of spent fuel transport package
20 designs. In order to certify a design for use,
21 we do a thorough technical review of the proposed
22 design and you've met the technical review team

1 and we require that each design be tested prior
2 to its first use.

3 Today's discussions will revolve around
4 the scope and the content of these technical
5 reviews. First, why are we doing this study and
6 why now?

7 Briefly let me describe our regulatory
8 process. The Spent Fuel Project Office is
9 responsible for writing and enforcing regulations
10 for the safe transport and interim storage of
11 spent fuel. Our regulations are based on sound
12 engineering judgment, experience in the past
13 technical data we can get our hands on.

14 In a few moments Mr. Earl Easton will
15 discuss the transportation safety studies that we
16 have done in the past and hopefully you will
17 understand how we based our regulations.

18 Since that time the computers that we
19 used to do the analyses have shrunk in size and
20 yet increased our calculational capability in
21 amazing ways that we never foresaw. We have much
22 more detailed and powerful analytical tools at

1 our disposal now than we did then and we're also
2 starting to see that the industries proposing new
3 transportation cask designs that are very
4 different than the ones that we looked at back in
5 the '70s and '80s. So it makes sense to us that
6 it is time for us to take another look at
7 transportation and look at the regulations that
8 we put in place, particularly before the
9 repository opens its doors.

10 In order to make sure that we are
11 providing for the safe transport of spent fuel,
12 we need to evaluate how all these differences and
13 calculational capability and new designs will
14 perform. Therefore it's very, very important
15 that we hear from our stakeholders, which of
16 course includes the public, so we can focus on
17 the issues that are important to safety so that
18 we can insure the transport of radioactive
19 materials continues to be safe. Thank you.

20 MR. CAMERON: Thank you very much, Pat.
21 Our third presentation is going to be by Mr. Earl
22 Easton. Mr. Easton is the section chief of the

1 Technical Review Section of the Spent Nuclear
2 Fuel Project Office. That section is responsible
3 for review of shipping and storage packages and
4 he's going to give us an overview on past studies
5 that have been done and some background on spent
6 fuel packaging and transport.

7 Generally, Earl has been with the
8 agency, the Nuclear Regulatory Commission, since
9 1982 and he has a chemical engineering degree
10 from the University of Maryland. Earl?

11 MR. EASTON: Thank you, Chip. For those
12 of you who do not yet know me, I am as stated
13 Earl Easton, section leader in the Spent Fuel
14 Project Office. I have been involved in the area
15 of transportation safety for about 15 years.
16 Actually if I calculate the date from when Mr.
17 Cameron said 1982, it's closer to 17 years.

18 My first assignment at the commission
19 was as a safety reviewer for spent fuel shipping
20 packages. Later as a section leader I was either
21 directly or indirectly involved in many of the
22 transportation risk studies completed by the

1 Nuclear Regulatory Commission.

2 Currently, I head a group of expert
3 technical reviewers who are responsible for the
4 safety review of both storage and transportation
5 casks for spent nuclear fuel. Many of those
6 reviewers are in the audience. Some have been
7 introduced to you and I would also encourage you
8 to take advantage of their expertise during this
9 meeting.

10 As I look around this morning, I am
11 particularly pleased to see the number of experts
12 in the area of transportation sitting at the
13 table and in the audience. Many of you I have
14 had the pleasure of working with in the past, but
15 there are some new faces and I look forward to
16 working with you in the future.

17 I am also pleased to see the number of
18 people that have turned out in the audience
19 representing the public and other interest
20 groups. My experience has shown that your
21 participation in this process is vital. It is
22 through you, through your comments and the

1 expression of your concerns, that help us do a
2 better job in assuring that transportation is
3 safe.

4 This morning I have been asked to say a
5 few words about a subject very important to all
6 of us. That is the safety of spent fuel
7 shipments. It is an important subject. Spent
8 fuel is a hazardous material. It will be
9 transported through your communities perhaps or
10 near your communities and as much as we do not
11 like to admit the possibility, accidents do
12 happen.

13 During my 15 years in this area I have
14 witnessed many changes. Today's casks are being
15 designed to hold larger quantities of fuel.
16 We're taking advantage of new technologies and
17 new material. The capability of analytical tools
18 for analyzing the safety cask have taken leaps.
19 And indeed the federal government's policy on
20 where ultimately spent fuel will be transported
21 and shipped is involved.

22 The latter change, of course, I think

1 has a significant impact on the numbers and
2 destination of future shipments. But throughout
3 my time at the commission, there is one thing
4 that has not changed and I am proud to say that
5 it is the NRC's commitment to protecting public
6 health and safety.

7 How do we know spent fuel shipments are
8 safe? And how do we assure that spent fuel
9 shipments will remain safe in the future?

10 We know that spent fuel is being shipped
11 safely today because first, spent fuel casks are
12 designed to meet fairly rigorous performance
13 standards. These standards consider the
14 possibility of accidents and rather severe
15 accidents.

16 Second, the safety record of spent fuel
17 shipments has been excellent. Third, the NRC has
18 conducted a series of safety and risk studies on
19 shipping casks designed to its performance
20 standards. All of these studies have indicated
21 that the risk of spent fuel shipments is low even
22 when considering severe accidents.

1 The largest factor in ensuring the
2 safety of spent fuel shipments is, of course, the
3 robust nature of spent fuel shipping cask
4 design. All spent fuel cask are designed to meet
5 a set of very rigorous performance standards.
6 And if I can direct your attention to the slide,
7 this is a list, depiction of those rigorous
8 standards. These include a pretty severe impact
9 test, followed by a puncture test, fire test and
10 an immersion test.

11 At the conclusion of these tests
12 packages have to retain the radioactive material
13 with virtually no release.

14 These standards were developed in
15 cooperation with other countries at the IEA.
16 They're world accepted and they have been in
17 place for about 30 years with these basic
18 requirements unchanged.

19 If I can go to the next slide. Second,
20 just let me briefly go over what is the history
21 of spent fuel shipments. From the time period
22 1979 to 1997, there have been approximately 1300

1 commercial spent fuel shipments in the U.S.
2 These shipments have taken place largely between
3 nuclear power plants or between nuclear power
4 plants and spent fuel storage locations such as
5 West Valley.

6 The exact location and destination of
7 these shipments along with the routes that are
8 published annually by the NRC and are made
9 publicly available. Every year the NRC puts out
10 a tabulation of spent fuel shipments. It gives
11 where shipments originate, where they go to and
12 what routes they take. This is all a matter of
13 public record and publicly available if you
14 request.

15 Approximately 90 percent of the
16 shipments or 1150 shipments were shipped by
17 truck. The remaining 10 percent went by rail.
18 So we have some experience with both rail
19 shipment and truck shipment. The total distance
20 traveled for all these shipments approximately
21 900,000 miles.

22 However, in terms of the quantity of

1 spent fuel shipped, 75 percent went by rail
2 because of the much larger capacity of rail
3 cask. During that period a total of eight
4 accidents were reported, and in fact to clarify,
5 one of the accidents is outside of the 1979 to
6 1997 range. It actually occurred prior to 1979.
7 In four of these accidents, the casks were empty
8 and the remaining accidents, casks had spent fuel
9 in them.

10 Of the four accidents involving spent
11 fuel, three were by truck, one was by rail. But
12 in all of these accidents there was no release of
13 radioactive material. Now I think it's an
14 important point to bring up at this point what is
15 an accident?

16 You can tabulate accident rates and
17 accidents in many ways depending on how you
18 define an accident. The definition that we use
19 in counting these accidents is based on the
20 reporting requirements under NRC regulations or
21 DOT regulations. Why do we use that particular
22 measure of accident? Well, number one people are

1 required to report it. So we're fairly certain
2 that we'll get the data. And second it is a
3 concrete definition. When people exceed those
4 limits they need to record it. And those limits
5 are basically loss of life, exceeding a certain
6 amount of property damage or suspected damage or
7 leakage.

8 Sometimes these, this data collected
9 this way overestimates accidents because there
10 are accidents that cause property damage over the
11 amount that is reportable, but really not severe
12 enough to challenge the cask or truck or route.

13 I would also like to note that in, and I
14 hope I don't put many people on the spot, but in
15 the report prepared by Mr. Holt, he also reported
16 the experience of the British in which they
17 reported over 8,000 rail shipments without any
18 release of nuclear.

19 The final point I would like to make in
20 this area is this is an area that the commission
21 monitors very closely. We count shipments and
22 notified of all shipments. We know where they're

1 coming from. We know where they're going. We
2 know when there is an accident and we are looking
3 to see if any difficulties develop. So we
4 monitor this area very closely. We intend to
5 keep this safety record intact.

6 Next, I would like to begin to discuss
7 safety studies that the NRC has conducted. The
8 NRC has conducted a number of safety studies,
9 some that came into existence in 1974. I will
10 briefly mention two that were done and two that
11 are in the works. But to put it in perspective,
12 what are the things that we look at when we do
13 these studies? How are we attempting to measure
14 this?

15 First, we look at the likelihood of
16 accidents. How likely is an accident and how
17 severe is it likely to be?

18 Second, we look at the consequences.
19 What are the consequences that can result in any
20 given type of accidents? You take those two
21 facts and taken together that gives us an
22 estimate of risk. So the studies I'm about to

1 discuss are really based on determining risks
2 using these factors.

3 To put this meeting in perspective let
4 me try to illustrate where we are. My aim is a
5 little off.

6 MR. CAMERON: We may need to go to the
7 nontechnological process here and point it out on
8 the view graph itself if you could.

9 MR. EASTON: If you can move down
10 between 1987 and the year 2000. The study done,
11 and keep your red dot there because that's where
12 we are. The study done in 1977 basically was the
13 first study done by the commission as an overall
14 look at transportation. We followed that up with
15 a specific look at how shipping containers or
16 spent fuel performed in accidents. Those have
17 been published and publicly available for many
18 years and we have gotten comments from many of
19 the experts in the audience already on those and
20 those have been actively under consideration for
21 sometime.

22 In early 2000 we are going to release

1 another study that is an attempt to update risk
2 estimates of spent fuel shipments. One of the
3 purposes was to see whether the original study
4 done in 1977 is still valid. The conclusions
5 drawn in that study are still valid. Over and
6 beyond that we try to get a realistic estimate of
7 what the real risk of shipping spent fuel might
8 be.

9 This study will come out again in
10 February or March of the year 2000. We encourage
11 you to get copies of that study. We will accept
12 comments on that study, the methodologies used,
13 the conclusions drawn, et cetera.

14 MR. HALSTEAD: Is this a draft that's
15 going to come out in February or March that you
16 are asking for comment on?

17 MR. CAMERON: Could we -- I know Bob.
18 What I would like to do is let's answer this
19 quickly if we can and then let's come back at
20 the, after Rob Lewis' presentation and go to all
21 of these questions and I thank you all for your
22 patience. We're giving you a lot of background

1 information of which there is not only a lot of
2 questions, but I'm sure a lot of difference of
3 opinion on some of the things that might have
4 been said.

5 Could you just answer Bob's question
6 quickly for us?

7 MR. EASTON: Yes, Mr. Halstead. Let me
8 answer your question but bear with me. I'm going
9 to do it within the next couple of sentences.

10 The purpose of this meeting today is
11 basically to get your concerns on our relook at
12 shipping container response to severe accidents.

13 Your concerns will again be discussed in
14 public workshops next month. At the same time we
15 anticipate considering comments on the update,
16 the 2000 study, we will consider comments also in
17 workshops during the next summer, but this is a
18 final contractor report submitted to the NRC.
19 But read it. I encourage you to read it. We
20 will accept comments and those comments will be
21 explored and considered in upcoming workshops.

22 Thank you, Dr. Shankman, she reminded me

1 it will be on the web. So as soon as this study
2 is released it will be made available on the
3 website. Does that answer?

4 MR. HALSTEAD: I'll save comment. Thank
5 you.

6 MR. EASTON: Let me just briefly discuss
7 three studies that we either have completed or
8 have in the works. The first we commonly refer
9 to as NUREG 0170, the correct title is given
10 right below that, but this was the first
11 comprehensive look at transportation safety
12 undertaking the NRC after its formation in 1974.

13 Its objective was to determine whether
14 package performance standards contained in the
15 commission's regulations were adequate to insure
16 public health and safety. As such it addressed
17 all radioactive material. It was not limited to
18 spent fuel. It considered both routine aspects
19 of shipment as well as accidents.

20 In analyzing the risk for potential
21 accidents, the study made certain assumptions.
22 That was in part because of the analytical

1 capabilities present in 1977 could not model
2 things in detail like you do today. So largely
3 accident analysis were based on good judgment.
4 Accidents were basically grouped into the
5 severities and judgments were made on which
6 severities led to consequences. These were in
7 large part very conservative assumptions. If a
8 package was assumed to be significantly damaged,
9 it is assumed that all of its contents were
10 released.

11 Given this, the study still concluded
12 that the risk of shipping spent fuel was low,
13 given that the likelihood of severe accidents and
14 the consequences of severe accidents.

15 As a result, he likes to jump the gun,
16 as a result the commission confirmed that its
17 regulations were adequate and noticed that in the
18 Federal Register and it committed at the same
19 time to keep transportation standards under
20 continuous review.

21 As part of that continual review, the
22 commission undertook a study about 1985 to do a

1 more detailed look on spent fuel cask response to
2 severe accidents. This is commonly called the
3 modal study. The term modal comes from the fact
4 that it considered both rail and highway modes of
5 transportation that's used as a shortcut in the
6 this area. So when I say modal study I'm
7 referring to the 1987 study on shipping container
8 response to severe accidents.

9 In this study, computer models were used
10 to predict the behavior of shipping cask
11 response. What was done was generic models were
12 developed for shipping casks. That's an
13 important point because we did not actually look
14 at individual shipping casks. We were looking at
15 a generic cask that minimally met performance
16 standards. That is that they only met the
17 performance standards given in a previous
18 design.

19 Many cask designs exceeded those, but we
20 were interested in the margins of safety provided
21 by the standards and not any particular package.
22 So this is why we developed generic models and

1 why individual packages do not show up in the
2 study.

3 Although advances in computer technology
4 allowed us to model casks in greater detail,
5 there were some aspects of the cask that could
6 not be modeled in detail we would have liked.
7 Those dealt with cask closures, impact limiters
8 and fuel behavior. Let me give a few words of
9 explanation on those.

10 Cask closures typically are bolted with
11 many, many bolts, 40 or so bolts that hold the
12 lid on the cask. The stated computer analysis at
13 that stage was not sufficient to model individual
14 bolts on the lid. Fuel behavior didn't actually
15 model how fuel lines, which contained the fuel,
16 would fracture or break or under severe impacts.

17 What was done was a number of
18 conservative judgments were made so as to
19 overestimate the actual consequences. This was
20 to compensate for a lack in detail of model.
21 Also the study looked at several real life, but I
22 must emphasize nonspent fuel accidents, to see

1 how casks would perform for those particular type
2 of accidents.

3 The reason we couldn't use spent fuel
4 accidents is because there weren't any. To give
5 you an example the type of accidents we looked
6 at, there was a pretty extensive tunnel fire
7 which involved a three vehicle collision with a
8 gasoline truck. There was a fire for over three
9 hours at 1900 degrees Fahrenheit and involved
10 about 8800 gallons of gasoline.

11 There was a bridge collision in which a
12 pickup truck failed, was involved in a collision
13 and fell 64 feet onto soil. Those were the truck
14 accidents looked at.

15 Two rail accidents that were looked at
16 was a train derailment called the Livingston
17 train derailment, which involved the derailment
18 of petroleum tank cars, large fires over several
19 days and there were two explosives. There was
20 also a derailment on the Alabama River in which
21 the vehicle, the train cars involved plunged 75
22 feet into the water and mud below.

1 These real life accidents were
2 translated into the computer modelling and from
3 those simulated various impacts and thermal
4 environment impacts. What the studies show is
5 that for all of these accidents, all four of
6 those accidents, there would not be a release
7 that significantly threatened public health and
8 safety.

9 In fact the study concluded that the
10 risk of accidents was low and lower than NUREG
11 0170. It turned out as we were able to more
12 accurately describe accidents, model accidents,
13 the risks were found to be lower.

14 This slide is concerning the upcoming
15 study that would come out in March of 2000. Why
16 are we doing this? Well, we want to keep up with
17 change. We know that the number of shipments is
18 changing. When the repository opens that will
19 significantly increase shipments. We know that
20 there are new cask designs with much larger
21 capacity. We would like to verify the
22 performance and severe accidents. We verify the

1 performance routinely to our performance
2 standards, but we would like to go over and above
3 that and verify what would happen in severe
4 accidents.

5 We have enhanced analytical capability
6 that we can do more detail models. We can focus
7 in on areas of the cask that before were not
8 amenable to detail computer models. This study
9 will be published in March 2000. I would again
10 encourage you to read it and comment.

11 Conclusions. Through a combination of
12 the shipping records, through our knowledge of
13 performance standards and how casks meet those
14 performance standards, our history of doing risk
15 studies, we know that spent fuel can be safely
16 shipped today. But we are not going to rest on
17 that fact.

18 We are committed to maintaining that
19 safety record completely and that is why we are
20 doing the additional studies. And the last point
21 I cannot overemphasize, is your participation
22 from both expert members of the public is

1 absolutely vital in assuring that we do the best
2 job in understanding this area of transportation
3 safety. Thank you.

4 MR. CAMERON: Thank you, Earl. I know
5 we're presenting a lot of information to you, but
6 I think it will serve us well as we go into the
7 discussions. We have one final brief
8 presentation that focuses on the new study that
9 is being planned and Mr. Rob Lewis from the NRC
10 staff is going to do that presentation for us.

11 Rob is a nuclear engineer. Again in the
12 Spent Fuel Project Office and he's been with the
13 NRC since 1992 and has worked on several projects
14 related to high level waste.

15 His current assignment is the project
16 manager for the package performance study that
17 we're going to be discussing today. He has a
18 master of science in nuclear engineering from the
19 University of Arizona and a bachelor of science
20 degree in physics from State University of New
21 York.

22 After Rob's presentation we will go to

1 you for questions in the audience. Rob?

2 MR. LEWIS: Thank you, Chip. As the NRC
3 staff's project manager for the upcoming package
4 performance study, I did a lot of legwork for
5 today's meeting and along with the help from the
6 technical team and several NRC staff and also the
7 Sandia staff, and I would like to thank you on
8 their behalf and my own thanks for taking your
9 time to be here today. We all believe it means a
10 lot to the success of this study.

11 There are three points I would like to
12 make during my talk. I would like to build on
13 Earl's talk and describe our starting point both
14 for today as well as for the package performance
15 study. I would like to describe how we will use
16 the package performance study and the approach we
17 are going to use which is a little different than
18 the approaches we used on the past studies that
19 Earl described.

20 This study that we're embarking upon has
21 been called the modal study two, has been called
22 the package performance study. We're using the

1 term today package performance study throughout
2 the day because there is a lot of confusion when
3 we first started calling it modal study two. A
4 lot of people believed we were starting from
5 scratch and redoing modal study and that's not
6 the case. I will describe a little bit what we
7 are actually doing.

8 Above all else as every speaker has
9 mentioned, we are here today to listen to and
10 understand any transportation concerns you have
11 regarding accidents, cask performance in those
12 accidents so we can take those concerns and fold
13 them into our study and build the most effective
14 study. We want your ideas on not only the
15 technical approach to the study, which I will
16 describe and Sandia will describe through the
17 rest of the day, but also we want your ideas on
18 our approach we are using to involve the public.
19 I'll discuss that a little more in a second.

20 If you hear any issues today we're going
21 to present several suggestions. If you don't
22 hear any issues that you believe needs to be part

1 of this project, please mention that. Provide
2 your suggestions if you have any on how you would
3 use analysis or testing to resolve those issues.

4 Now there are three factors that
5 influenced our approach for the package
6 performance study. These three factors are the
7 way we use accident assessments, the possible
8 role that physical testing might have in this
9 project and the, our desire to use public
10 involvement throughout this project as opposed to
11 after we have performed some analysis and
12 testing, after we have a draft or final report.

13 Regarding accident assessments, what
14 we're trying to do in the package performance
15 study is to build upon our safety record that we
16 established through the studies through our
17 transportation experience and our starting point
18 is, as it was for the modal study, is casks that
19 meet our standards and Part 71, the four tests
20 that were described by Mr. Easton.

21 We will update and improve our analysis
22 using modern technologies. We will use

1 assumptions that reflect the newer cask designs
2 and modern technologies and our whole approach is
3 based on our desire to focus on those issues that
4 are most important to safety during accidents.

5 During the past few years at NRC, there
6 is an initiative to use risk informed
7 techniques. What that means to us we use
8 accident assessments in all the areas we regulate
9 to focus our resources and our licensees'
10 resources on the issues that really affect safety
11 the most. We believe the result of that will be
12 an overall safer system.

13 We will also build upon the 19, I'm
14 sorry, the 2000 NUREG 0170 update that was
15 mentioned by Mr. Easton. Throughout the day
16 Sandia will describe what they did in the NUREG
17 0170 update. They're not done yet. We are in
18 the process of reviewing what they're doing.

19 Their starting point for that update was
20 the 1987 modal study and work that has been done
21 since and each topical area for the rest of the
22 day Dr. Massey from Sandia Labs will provide some

1 information about their methodology.

2 The second main bullet on the slide
3 shows the methodology that we plan on using to do
4 the package performance study. It's a
5 step-by-step walk through of the way we approach
6 accident assessments in transportation.

7 This is the same general methodology
8 that appears in the original 0170, the modal
9 study and the 0170 update. The methodology is
10 described much better in this blue brochure that
11 we publish. It's available in the back and I
12 believe that we've mailed it to most everyone in
13 this room.

14 You will note, by the way, that this
15 methodology, this five steps generally follow
16 today's agenda as well and there is a reason for
17 that. The reason is that once again this is the
18 methodology that we propose to use for the
19 package performance study. We're particularly
20 interested in your thoughts on our continued use
21 of this methodology.

22 Steps two and four in particular on this

1 slide are some of the more difficult steps. They
2 involve to a greater extent engineering judgment,
3 and conceptualizations of what happens. They
4 involve to a less extent the use of hard data and
5 therefore we're also particularly interested in
6 how we'll approach those two steps for the
7 package performance study.

8 It's reasonable to assume that physical
9 testing of some sort will have a role in any
10 follow on research to the original modal study.
11 Therefore, we selected Sandia Labs to start a
12 scoping study, if possible, follow on research
13 from the original modal study. They're currently
14 under contract to do that. Today is part of that
15 contract. You heard it mentioned as phase one.

16 We currently have one project for phase
17 two or any future phases. Those efforts would be
18 decided upon next year once we are through with
19 this phase one. And the end product of phase one
20 of Sandia's contract is issues and resolution
21 options report. That report will recognize any
22 concerns you raise today and it's akin to a

1 proposal for follow on research.

2 Sandia Labs was selected naturally
3 because of their testing, existing testing
4 facilities and their experience testing packages
5 for radioactive material transport, not only
6 spent fuel packages, they have done a lot of
7 tests in the past on packages for transporting
8 large quantities of radioactive materials.

9 Because physical testing will have a
10 role, we adopted it in a public involvement
11 approach that's a little different than the
12 public involvement approach we used for the modal
13 study for the 0170 update. The public
14 involvement, of course, is important to us in
15 general. But specifically for this project if we
16 do do testing we need to be very efficient in
17 doing that testing and we need to do it in a way
18 that collects data that is most relevant to
19 safety and most useful to guaranteeing the safety
20 of these shipments during accidents.

21 Final slide is a type of summation of
22 many of the comments that you have heard today.

1 I will explain here how we are trying to involve
2 the public for this project. The best way to
3 stay in touch with this project or to be involved
4 is to use our website. The address appears, the
5 URL address appears here. On that website we
6 have several things: background information,
7 there is a form for comments and responses and
8 there is a section in the website where we will
9 provide the comments we receive along with each
10 response.

11 As the project progresses we will update
12 frequently this website with project status, with
13 new reports as they become available, including
14 the reports from the sister project the NUREG
15 0170 reevaluation project that you will hear a
16 little more about this afternoon.

17 The second way we are trying to involve
18 the public throughout this project beginning
19 today is through these workshops in this forum.
20 We will also have a workshop very similar to this
21 in Henderson, Nevada on December 8th. That
22 workshop will be geared more towards western

1 interests; county governments, state and county
2 governments and locals in the West that have a
3 particular interest in spent fuel for reasons
4 that everyone is aware of; the Yucca Mountain
5 project and storage facilities and such.

6 As Mr. Easton mentioned we will be
7 performing additional workshops next summer. The
8 additional workshops will cover both the NUREG
9 0170 update and the issues and resolution options
10 report that I mentioned that comes out of the
11 package performance study. That should be
12 available sometime around May and our goal for
13 the 0170 update is sometime around March. So
14 shortly thereafter we will have these workshops
15 to try and merge these two projects and move
16 forward on the package performance study in
17 particular and on all of our work on
18 transportation safety.

19 We are also in the process of
20 establishing a mailing list. Sandia has produced
21 for us these very nice forms that have name and
22 address information at the bottom. If you would

1 fill that out and leave that with us or mail it
2 in to us we will provide you as the project
3 progresses with updates. If you don't like to
4 use the website in particular, this is a good way
5 to stay involved.

6 As I mentioned, for the rest of the day
7 Sandia will lead us through a technical
8 discussion of each of the issues that we will
9 look at during the package performance study
10 where potential follow on work, and Dr. Massey
11 will provide a kickoff, five minutes or so
12 kickoff, of each topic to try to stimulate
13 discussion.

14 We also have a handout in the back that
15 has discussion pointers to stimulate ideas among
16 the audience and the table participants to keep
17 the focus of the discussions to that topic.

18 I'm looking forward to your input today
19 and in conclusion I would like to thank you once
20 again for being here and I feel that what you
21 have to say will help us design the most
22 effective project. Thank you.

1 MR. CAMERON: Thank you very much, Rob.
2 That's the last of the presentations and I know
3 there is probably a lot of questions and perhaps
4 even a few comments on those questions and we're
5 going to go first to Marvin Resnikoff and ask
6 everybody to use their name tents to signify if
7 you want to make a comment.

8 There is a loose wire that will need to
9 be fixed at the break so I'm going to pass this
10 mike to you and if you could use that one to
11 respond. Marvin?

12 MR. RESNIKOFF: I have a list of
13 questions. I have been involved in
14 transportation issues as you know since, before
15 the NRC for Attorney General Lefwitz (phonetic)
16 involving transportation of plutonium from
17 Kennedy Airport that gave rise to NUREG 170 and
18 we commented on NUREG 170 and I'm interested that
19 you're doing an update on that, but I'm concerned
20 that there is no public input in that update.
21 There should be public input. You should issue
22 as a draft and you should allow the public to

1 comment on that draft. That's not a question but
2 if, you know, if you would like to comment on
3 that.

4 I'm concerned that the previous authors
5 of the modal study are not here. Larry Fisher,
6 Lawrence Livermore Laboratory -- I'm asking a
7 question about the continuity between the past
8 study and the present study. Are they going to
9 be involved? Is Lawrence Livermore Lab going to
10 be involved with Sandia? I just have a few
11 questions.

12 That brings me to another issue which
13 involves peer review of this study. Exactly how
14 are you going to do peer review? Who is going to
15 do it? Is Lawrence Livermore going to be
16 involved in doing that?

17 I have a more general question which is,
18 that's very confusing to me and to some of the
19 states that we work with such as the state of
20 Utah and that is what exactly is the relationship
21 between, I know you touched on the subject, but
22 what exactly is the relationship between this

1 study, modal study, and other studies that you
2 are doing? For instance, you have done NUREG
3 1437 which is an update of table S3, which
4 depends on, as I recall, on Wash 1238 an AEC
5 publication. You are going to do an EIS for the
6 BFS facility in the State of Utah. How exactly
7 does sabotage fit into this study?

8 Let me give you a suggestion as to how I
9 think it's going to go and I would sort of like
10 to know your comments on that. This study is
11 going to be input into the computer program which
12 will estimate accident consequences and incident
13 free consequences. And that in turn is fit into
14 the various EISs that you are going to produce in
15 the future. Is that what's going to happen and
16 if that's so, this is my final point, my question
17 is why are you bifurcating the process into
18 little teeny pieces? Why don't you produce a
19 large EIS which addresses all the issues involved
20 in transportation, involves the economic issues,
21 the economic consequences of accidents, involves
22 nonaccident situations.

1 In other words, a full EIS which
2 investigates the health and economic impact of
3 transporting nuclear fuel.

4 MR. CAMERON: Thank you very much,
5 Marvin. I'm going to go to Susan Shankman for
6 answers to these and keep in mind that one of the
7 purposes of this meeting is to get input on
8 suggestions such as that and we will be
9 discussing these issues in more detail during the
10 discussion. But Susan if you could provide some
11 answers.

12 MS SHANKMAN: I just wanted to say that
13 part of today is to get those comments and I
14 agree that as Earl discussed all the studies,
15 there have been many of them and each one has had
16 a particular goal and the integration of those
17 studies is part of this package performance
18 study.

19 The idea that you suggested about
20 sending out our update of the 0170 assumptions as
21 a public report and putting it out as a contract
22 report which is a final report, the goal is to

1 have comments on that, put into this study so
2 that concerns you have about that contractor
3 report can be worked into the design of the
4 study. We want to integrate it with the work
5 that's been done on severe accidents in modal
6 study. So the idea is to have all that available
7 before we have our public meeting in the spring
8 and at that time we will look at the design of
9 the study and whether it meets the goals that you
10 have discussed.

11 We have not chosen to do a complete redo
12 of the EIS that serves as the basis for our
13 transport activities. If that's an idea you have
14 I would like you to explain why you think we need
15 to redo the entire EIS. The update on spent fuel
16 transportation has meant and not to redo the EIS,
17 it's not a redo. So the EIS has been publicly
18 available, was commented on and was a final
19 document. What we were looking at is whether we
20 needed to reopen it and that's the update of 0170
21 is. It's not a redo of EIS.

22 Does that answer your question? And if

1 you think we need to redo the EIS I would like
2 you to tell me today as we go through it what
3 parts of the EIS or if you think we need to start
4 all over again.

5 MR. CAMERON: I'm listing issues that
6 come out of these questions right now on the
7 paddock to make sure as we go to our discussion
8 we come back and make sure there is a full
9 discussion of the, the integration, what I termed
10 the integration issue that Marvin brought up.

11 Earl, did you want to provide some other
12 information?

13 MR. EASTON: Yes, I would like to
14 respond to one of the questions raised and that
15 is the role of Lawrence Livermore in peer
16 review. In what we are calling the reevaluation
17 of 0170, it was done by Sandia. That was sent to
18 Lawrence Livermore for peer review. We are just
19 now getting the results of that peer review. So
20 unfortunately they couldn't be with us today but
21 they are involved in that study.

22 The other study that we're going to do

1 on the update is still in its early phases.
2 We're not really settled, I guess, on who is
3 going to do the peer review at this point.

4 MS. SHANKMAN: Lawrence was invited so
5 their absence is not because they were not
6 invited. The other thing is as Earl said the
7 design of the study, what I hear is you're
8 suggesting that when we design this package
9 performance study we should build into the design
10 peer review.

11 MR. CAMERON: Marvin is nodding
12 affirmatively. I know a lot of you are going to
13 have the same type of comments. We're trying to
14 do some clarifications here. Rest assured that
15 all of these issues which I think relate to
16 process, we will fully explore including peer
17 review and role of the public in this.

18 What I would like to do now is go to Bob
19 Halstead from the State of Nevada. Bob?

20 MR. HALSTEAD: Thank you, Chip. The
21 State of Nevada is dependent on the Nuclear
22 Regulatory Commission to carry out its

1 responsibilities. Because as you know we face
2 the prospect over the next five decades of
3 receiving by various estimates under different
4 scenarios up to 100,000 truck shipments of spent
5 nuclear fuel and/or other highly radioactive
6 materials. So under other scenarios up to 20,000
7 rail shipments and possibly another five to
8 10,000 truck shipments.

9 I very much appreciated Earl's comments,
10 general though they were, reminding us that this
11 is a hazardous material. The 26-year-old reactor
12 is a 17 by 17 Westinghouse LOPAR assembly,
13 moderate burn up. Even after 26 years of cooling
14 time we're talking about a bundle of rods that
15 has 80,000 curies total activity.

16 I very much appreciate the attitude that
17 the NRC is taking. And I especially appreciate
18 this effort because it is something that the
19 State of Nevada has asked for for 10 years, a
20 reassessment of the modal study with the type of
21 stakeholder input that I believe you are making a
22 commitment to here.

1 I further and especially appreciate the
2 scheduling of the December meeting in Henderson,
3 Nevada which is not only accessible to people of
4 Nevada, but many areas in the west could not be
5 at this meeting today. I further appreciate the
6 fact that an evening session has been scheduled
7 in that meeting which will allow members of the
8 general public who can't come because they're not
9 paid to deal with this issue like most of us
10 are. And because I came here to say these good
11 things, I'm going to try to not be upset if we
12 don't get to review the NUREG 0170 update and I'm
13 going to take you at your word that you are going
14 to give our comments whatever respect they
15 deserve on a final contractor report.

16 I do have a question because I've looked
17 at the website that you have set up and I think
18 based on our experience a website is an excellent
19 way to handle communications. I would ask that
20 you add a number of materials to the website and
21 I know you are just beginning this. One is there
22 are a number of reference materials in the past

1 that have been critical.

2 I understand going into this trying to
3 look at the new conditions, but there are some
4 lessons to be learned by rehashing, so we would
5 like to see the materials generated by the
6 Western Interstate Energy Board 1989 workshop
7 which included Larry Fisher and C.K. Chew. There
8 is also a transcript of that meeting.

9 There have been a number of letters and
10 review comments to the NRC that reference the
11 modal study and I personally have not done this
12 literature search, but I know there are a number
13 of conference proceedings, technical reports,
14 journal articles, many fine pieces of technical
15 literature may disagree with some assumption or
16 results, but nonetheless respect all of the work
17 that people at Sandia and Livermore have done and
18 I would hope that you would put someone to work
19 doing good bibliography survey and having that
20 accessible in a PDF format on the website is
21 important because many of these documents are
22 hard to access. So really I'm asking you to make

1 a commitment to go to what I see as the next
2 extension with your website to allow that to be a
3 one point source of contact for all of us who are
4 going to be involved. And thank you very much
5 allowing me this time.

6 MR. CAMERON: Thank you, Bob. Let's get
7 some response from NRC staff. Rob Lewis?

8 MR. LEWIS: Yeah, I just want to say
9 that that's a fine suggestion and we have no
10 problem with putting them on the website and I
11 think all along those documents were intended to
12 be part of this phase one literature search at
13 least in coming up with this issues and
14 resolution options report for May.

15 MR. CAMERON: Okay. Thank you. We will
16 note various recommendations that we hear
17 throughout the day on these flip carts. I'm
18 going to go to Amy Shollenberger and come back
19 over to Bob Fronczak. Amy?

20 MS. SHOLLENBERGER: Thank you. It may
21 not be possible to answer my question right now,
22 but I would like to just raise the issue of the

1 Department of Energy's EIS and how that section
2 of that EIS addresses transportation impacts, or
3 claims to at any rate, and I would like to know
4 how the review of the modal study will play into
5 the final EIS done by the Department of Energy,
6 whether there are plans to incorporate the new
7 information into the EIS and also whether the
8 modal study will be done in time. Looking at
9 your time on it it looks like it's pretty far out
10 there.

11 MS. SHANKMAN: I appreciate your concern
12 about the timing. We are as a federal agency
13 making comments on the EIS and then we will need
14 to look at that as we license the, whatever is
15 proposed, and in that process we will use
16 whatever information we have.

17 MR. CAMERON: Janet?

18 JANET: In the event that the department
19 finds the Yucca Mountain site suitable for
20 development of repository and develops a license
21 application that the Nuclear Regulatory
22 Commission would review, it would be at that time

1 that the commission would have available to the
2 final update of the modal study. You are
3 absolutely correct. It's not possible for us to
4 factor the results of the study that won't be
5 complete until 2003 into our comments early next
6 year on the environmental impact statement, won't
7 be available to others commenting as well.

8 I would second Chip's request that the
9 Department of Energy representative also speak to
10 that, but clearly in the consideration of a
11 license application, the commission would take
12 into account any additional information that had
13 become available and as I understand it the EIS
14 will be updated in a timely manner over a certain
15 period during a licensing process.

16 MR. CAMERON: Thank you, Janet. That
17 was very helpful. Dwight Shelor from DOE.

18 MR. SHELOR: My main comment is I think
19 the answer you received so far is absolutely
20 correct. The environmental impact, the final
21 environmental impact statement that we will have
22 to accompany the side recommendation report

1 unfortunately will be done prior to this
2 conclusion of this study. If there are at any
3 time after that some license application the EIS
4 will again be reviewed by NRC and if appropriate
5 even updated by the department.

6 MR. CAMERON: Thank you. Next let's
7 hear from Bob Fronczak and then we will see if
8 there is any clarifying questions out there in
9 the audience before we take a break. Bob?

10 MR. FRONCZAK: Just two very brief
11 questions. If we would like to supplement our
12 comments today with written comments who do we
13 address those to and what time frame are you
14 looking at for those? Seems like we've got some
15 time.

16 MS. SHANKMAN: In terms of timing,
17 Sandia will be submitting their report to us in
18 the late spring, early summer. If we could get
19 your comments through the month of January they
20 will be factored in and you can do that through
21 the website or you can write directly to me or to
22 Rob Lewis. All of our address is simple and it's

1 on the sheet of paper. You can call also.

2 Again, let me just encourage, and I'm
3 glad you asked the question, Bob. Today is not
4 the only chance to talk to us. We will be
5 soliciting input in December and Las Vegas. We
6 have three meetings scheduled there. One similar
7 to this evening meeting and then a follow on
8 meeting on Thursday. So that's where we will
9 physically be present to interact with people.
10 We are all available through e-mail. We are all
11 available through the telephone.

12 MR. CAMERON: And keep in mind I think
13 the NRC would like to have a specific discussion
14 at some point today about the process for keeping
15 the public involved over the course of this study
16 in whatever ways people have to suggest.

17 Let's go to the audience and see, does
18 anybody have a clarifying question out here
19 before we take a break on the presentations that
20 you heard this morning? Steve, are you
21 stretching or are you questioning? Anybody?

22 MR. CRAFT: Steve Craft. I was struck

1 by the presentations about the historical setting
2 of the regulations and the one question I had I
3 was trying to figure out how to frame it
4 correctly without implying something I didn't
5 mean. Is it safe to say that NRC has confidence
6 in its current set of regulations, that if they
7 are followed they lead to safe transport? Is
8 that an accurate statement?

9 MS. SHANKMAN: Yes.

10 MR. CRAFT: So those of us who live near
11 rail lines ought not fear radioactive cargo on
12 these rail lines; is that correct? As long as
13 it's moved according to your regulations; is that
14 correct? I don't live terribly far from the same
15 rail lines, Susan. I'm sort of wondering what
16 you are telling me here.

17 MS. SHANKMAN: I didn't mean to imply
18 anything. Yes. The answer is yes. We have
19 confidence in our current regulations and in the
20 information that we have. But it would be
21 foolish not to continue to look at things and to
22 see that we maintain that safe record. And as

1 Rob and Earl pointed out, I believe you know
2 there will be a significant campaign coming up,
3 so we want to make sure that our information is
4 as current as possible.

5 MR. CRAFT: That's why I hesitated
6 asking the question because I didn't want to
7 imply you didn't need to do the studies, I just
8 wanted to understand as you continue your
9 regulatory programs, there are people who will be
10 seeking cask certifications and there will be
11 people moving these materials while these studies
12 are ongoing. This is not to imply that those
13 shipments are somehow not safe.

14 MS. SHANKMAN: Right.

15 MR. CAMERON: Thank you, Steven. That's
16 the type of issue that could spur a lot of
17 discussion at this point and what I suggest doing
18 is we will hear one more comment or question from
19 the table and then let's take a break and come
20 back at 11 o'clock which will put us a half hour
21 behind schedule, but I think we will be able to
22 accommodate that during the day. Kevin?

1 MR. KAMPS: Thank you. Sorry to delay
2 our break. I would be remiss not to make at
3 least a brief comment at this point. I am from
4 Michigan originally and I've only worked at
5 Nuclear Information and Resource Service for two
6 months. But I've worked near the Palisades in
7 Michigan the last decade and the main point I
8 want to share with everyone in the room is that
9 the casks, the ventilated storage casks at
10 Palisades that have been used since the early
11 '90s, have come with some surprises for
12 everybody including the Nuclear Regulatory
13 Commission.

14 The generation of hydrogen gas inside
15 these casks was not foreseen by all the experts
16 at the utility, at the NRC, at the gas
17 manufacturer. And so our concern from the public
18 perspective is what surprises are in store with
19 transportation? And so I hear a lot of
20 confidence and I here a lot of congratulations,
21 but there is tremendous concern on the public
22 level.

1 In Michigan the experience with the dry
2 casks at Palisades has left the public -- I don't
3 think it's an exaggeration to say bitter and very
4 upset at having been locked out of the entire
5 decision making process from the beginning. I
6 have a concern that this process, the
7 transportation process is continuing that same
8 pattern of locking the public out.

9 And on a related matter of environmental
10 impact statement, the draft from the Department
11 of Energy, again most of the hearings are taking
12 place in Nevada. There is a handful of hearings
13 outside of Nevada and major transportation routes
14 are excluded from the public hearing process:
15 Chicago, which is one of the major transport
16 routes in the country does not have a chance to
17 have a public hearing on that issue.

18 In Michigan again with the dry casks,
19 the public has felt very excluded from any
20 significant involvement. Another issue I wanted
21 to bring up is the German experience with the
22 transportation of high level waste. Far from

1 being a routine and smooth operation, there have
2 been huge public protests of the transport mostly
3 because the dump site that was selected was
4 selected with total exclusion of the public and
5 the people that lived there were very upset about
6 that, and so when the transports actually began
7 there was tremendous protest that took place.

8 In 1998 the protest brought out 20,000
9 people and 30,000 police officers had to be
10 deployed. It was the largest deployment of
11 police since the Nazi regime. There were 500
12 arrests of people engaging in civil
13 disobedience. There were close to 200 injuries
14 and the total cost for transporting six casks was
15 \$100 million dollars mostly because of the police
16 involvement.

17 That was the next to last shipment that
18 took place. The one that took place after that
19 was speeded up by a week. The date that everyone
20 had been told that it would take place was really
21 a smoke screen. The actual transport took place
22 a week early. Even the police were not told

1 until the very last minute the transport was
2 going to take place so they were deployed in a
3 rush. It was very chaotic transportation that
4 took place and there was even a police officer
5 that was killed. He was struck by a train and I
6 attributed that myself to the chaos that was
7 involved. It wasn't the transport train itself
8 but another train.

9 There is now tremendous resistance among
10 the police forces in Germany to be involved in
11 this process at all not to mention the public.
12 So I just feel that this issue is a lot more
13 serious and dangerous than has been discussed up
14 to this point and I wanted to put some of the
15 public input in there at this point. Thank you.

16 MR. CAMERON: Thank you, Kevin, and
17 there will be an opportunity for all of you to
18 put your concerns on the table during the rest of
19 the day. I would just note two things. In terms
20 of what you said is that I think that there are
21 going to be discussion, there is going to be
22 discussion, there are going to be recommendations

1 today from your colleagues around the table to,
2 about the surprises as you called it. Items that
3 should be anticipated when this study is done.
4 So I think we're going to be hearing about
5 those.

6 And also just note that your point about
7 meetings and transportation impacted cities, I
8 think that that's a recommendation that the NRC
9 should consider and is considering also in terms
10 of this particular study. Let's take a break and
11 be back at 11 o'clock and we'll have working
12 microphones by that time hopefully.

13 (Pause in the proceedings.)

14 MR. CAMERON: There is a document that
15 Bob Halstead recommended it be put on the NRC
16 website and it's a critique that the State of
17 Nevada did of the 1987 modal study. Bob has put
18 copies of that out on the table I believe. So if
19 you didn't get a copy of it it's out there.

20 One of the things that we definitely are
21 going to go back to that is in our paddock list,
22 it was first brought up by Marvin and also was

1 referred to by Bob Halstead, that may be causing
2 a little bit of confusion based on my discussions
3 with people at the break, is what is the
4 relationship between the 0170 study to what's
5 going on now? And I think that we might need to
6 have a more extensive discussion of that issue so
7 that it's clear and I don't really want to do
8 that right now, okay? Because I think we want to
9 get into the first discussion issue here but I
10 just wanted to assure people that we will go back
11 and discuss that in a timing so that it won't
12 interfere with your understanding of the rest of
13 the agenda.

14 Our first discussion item is highway and
15 railway accidents likelihoods, and for all these
16 discussion items we've asked Dr. Charles Massey
17 of Sandia Labs to do a real brief set up for us
18 in terms of some background information about
19 that particular topic and he's going to do that
20 for each one of these.

21 By way of introduction, Dr. Massey is
22 the manager of the Transportation Safety and

1 Security Analysis Department at Sandia National
2 Labs and his groups are responsible for design,
3 testing, analysis of all types of radioactive
4 material, packages and the performance of
5 transportation safety and security assessments.

6 Dr. Massey has been with Sandia Labs for
7 10 years. Before he came to Sandia he was with
8 Oak Ridge National Lab, the University of
9 Pittsburg and a ship's officer for the United
10 States Navy. He got his bachelor's degree in
11 marine transportation from the Merchant Marine
12 Academy.

13 He has a master's of science degree from
14 the School of Engineering from the University of
15 Pittsburg and a second master's degree from the
16 School of Public Health at the University of
17 Pittsburg. And to top it all off his doctorate
18 is in radiation health, again from the University
19 of Pittsburg.

20 Dr. Massey, would you like to tee this
21 first issue up for us? Thank you.

22 DR. MASSEY: Thank you, Mr. Cameron. By

1 way of introduction here, what I'm going to do I
2 really have two functions during the day as we
3 proceed with our discussions on the package
4 performance study.

5 First is to present a little bit of
6 background. This may help also with these
7 questions of how does the modal study and the
8 NUREG 0170 reevaluation, how do those fit into
9 the package performance study? So I'm going to
10 walk a little bit of the evolution of where we
11 are in essentially our state of knowledge
12 regarding accidents and performance of these
13 casks and their contents during these accidents
14 and give you some suggestions that we have
15 proposed to the NRC as areas that we would
16 suggest be looked at in a package performance
17 study to essentially fill in the rest of the
18 pieces of the puzzle that we believe still may
19 exist.

20 The second function that I have is to
21 make sure that I understand as you may make
22 comments or suggestions about what should be

1 included in looking at severe accidents involving
2 these packages, I need to make sure that I
3 understand what your comment or concern is by
4 maybe asking you some questions because we want
5 to sort of clarify the types of environments and
6 scenarios and conditions that you would be
7 interested in and I need to understand that so we
8 can incorporate that in our issues that we look
9 at for posing what would be done in the package
10 performance study.

11 We are going to have six topical areas.
12 The first one that we're going to discuss before
13 lunch is highway and rail accident likelihoods,
14 but before I want to get into that I want to give
15 a little bit of background. Do this quickly
16 since I think most people are fairly familiar
17 with what we are talking about, but just in case
18 I want to make sure everyone has some basic level
19 of understanding.

20 Next to the individual in the white lab
21 coat here, you can see these are the types of
22 materials that we're looking at transporting into

1 package casks. That's fresh fuel assembly.

2 Now the cask itself, sort of highlight
3 to you the features. Here you have the spent
4 fuel assembly typically bundled and the size of
5 cask matters how many of the assemblies we can
6 fit inside. The cask walls itself are the main
7 part of the cask. On the ends you have impact
8 absorbers that are sort of made of some sort of
9 material that in the event of an accident hit one
10 of these ends or a side sticking out, these would
11 absorb some of the impact force and then these
12 contents which Mr. Easton mentioned earlier some
13 of the lids and bolts and seals and features to
14 close the cask.

15 To give a little perspective on the cask
16 we also have, made a cutout. If you were to look
17 at that sort of the circular part of the cask and
18 take a piece of that pie out, we have made a
19 model. This is an actual full size of the cask
20 that's currently going over the road right now
21 and I encourage you at the breaks or at lunchtime
22 to come up and look at this and pick it up if you

1 like, but this demonstrates this outer neutron
2 shield that you have on the cask with the outer
3 wall to contain whatever materials inside here.
4 Then really this inside piece is the cask
5 structure that we're most interested in and how
6 this performs in the event of an accident.

7 So as I go through I may refer to this
8 cask wall piece here to help give some context of
9 what exactly we're looking at.

10 To bring us back to where we are in rail
11 and highway likelihood and sequences, in the
12 modal study they used 1985 truck and rail
13 accident data from selected areas to determine on
14 a per mileage basis what is the likelihood that
15 the train or the truck transporting the spent
16 fuel could be involved in some type of event that
17 could possibly lead to release of materials, like
18 a collision or derailment. That's what they used
19 was 1985 data. Modal study as you recall was
20 issued in 1987.

21 Once they started they -- an assumption
22 there was some derailment or collision. Then

1 they went through a sequence of events:
2 Collision, impact another vehicle, did it impact
3 structure like a bridge? Let's say it did impact
4 a bridge structure, then was there a fire or
5 not? So they went through and developed a
6 sequence of accident events or developing what
7 could be the consequence from the accident.

8 As a result of their analyses, they
9 essentially determined that there would be 20
10 accidents in categories where they would put
11 mixes of collisions and thermal environments
12 together to determine what would be the
13 likelihood released from the spent fuel package.

14 They also developed distribution. They
15 looked at how likely is it to be at certain
16 speeds and forces and temperatures and how long
17 would the fire last as well put into the response
18 of the package.

19 NUREG 0170 reevaluation that is under
20 review at the moment. We use essentially three
21 year data than the modal study 1988 accident data
22 on much more national average. We did some

1 modification to the accident sequences that were
2 in the modal study. Instead of having the 20
3 categories where you could essentially bend or
4 place each of these thermal and collision
5 environments, we developed 19 for truck and 21
6 for rail accidents and we used the modal study
7 collision speed and fire duration distributions.
8 We did not develop new ones in the 0170
9 evaluation.

10 Now to stimulate a little bit of thought
11 and discussion on package performance study, here
12 are some of our suggestions of what we would
13 propose to do. First, we would like to update
14 using the latest 1999 accident rate data. We
15 would like to go in, essentially relook at these
16 train and truck accident sequences, how they
17 occur.

18 One of the things we have now which we
19 would like to take advantage of is with
20 geographic information systems that are out
21 there, ability to much more, more detail look at
22 structures along roads, and roads are very small

1 fine detail. We can look at where bridges
2 exactly are, where are their hard rock
3 outcroppings along routes; where are there
4 bridges that may offer if a truck or train were
5 to fall off a bridge and fall a substantial
6 distance. We now have the capability to get much
7 more route specific information that we would
8 like to incorporate into our accident sequences
9 and also when we start looking at distributions
10 of how these events would take place and the
11 likelihood of them, incorporate that into the
12 package performance study.

13 Since we do not know yet how these
14 sequences would fall out and what type of
15 potential environments would be seen, the number
16 of accidents or bins accidents could be placed in
17 will really depend on what comes out of the
18 study. With that I'm going to turn back over to
19 Mr. Cameron.

20 MR. CAMERON: Thanks, Dr. Massey. I
21 think it would be useful to leave this on for the
22 discussion. The objective here is to get your

1 ideas on what should be considered in terms of
2 accident probability sequences and scenarios.

3 Now Charles has talked about some of
4 their ideas. It would be useful to have comment
5 on those ideas as well as anything else that you
6 think should be considered in the relook, the
7 update of this study and we're going to go to Bob
8 Halstead, State of Nevada for first comment and
9 Bob, they, the microphones are working if you
10 could just press that button. Let's see if
11 they're working.

12 MR. HALSTEAD: I won't be shy having
13 asked for this opportunity to reopen this
14 discussion. I appreciate your introduction and
15 let me give you a few responses from the State of
16 Nevada's perspective. We have been looking at
17 these issues for a long time and hopefully will
18 prepare an outline briefing paper for you by the
19 Henderson meeting we weren't able to be at
20 because of the EIS hearing schedule.

21 An observation on accident rates. We
22 have studied average and route specific and link

1 specific accident rates on our own highway and
2 rail system, although unfortunately we haven't
3 had the funding like other organizations to
4 update that analysis for about six years. And
5 one of the things we have found is that the more
6 you go down to a route or link specific effort,
7 the variation from year to year in accident rates
8 is more apparent.

9 So as an opening thought I think you
10 might want to rethink the notion of using single
11 point accident rates. If you use a single point
12 accident rate you need to put some uncertainty
13 number with it. Our preference is to not try and
14 put out a false sense of specificity that the
15 data won't support. We're more comfortable now
16 to using a bounding approach to accident rates.
17 That's issue number one.

18 Issue number two, I very much appreciate
19 the comment that you made about GIS technology
20 developments, allowing us to do the finer look
21 at, you know, what planners usually call unique
22 local conditions. Again, we have been doing this

1 along the routes of Nevada partly pause we
2 anticipate a very contentious debate over
3 designation of state preferred alternative
4 routes. Particularly we need to designate a long
5 sequence of two lane highways to avoid the Las
6 Vegas Metro area and exactly the things that you
7 mentioned, identifying the location, the
8 characteristics of rock faces, rock outcrops,
9 drops from bridges, critical side slopes, that's
10 a really important part of this.

11 That was frankly one of the great
12 limitations of the first modal study, the use of
13 the California I-5 data on bridges, highways,
14 soil types and so forth. We're certainly
15 supportive of that and will assist in that
16 effort.

17 And thirdly, regarding the impact
18 types. There's a great deal to be said here but
19 in looking at our state and some other western
20 states perhaps peculiar vulnerability to
21 earthquakes and particularly looking at the
22 California system with elevated interstates and

1 in our own case increasing frequency of the need
2 to build overpasses over potential shipping
3 routes, the whole area of crush impacts from
4 falling bridge decks, falling overpasses is an
5 area that needs to be added and a second category
6 again important to us because of in particular if
7 you look at the new construction of these
8 overpasses and bridges in the Las Vegas area,
9 there is some range in the types of support
10 columns that are used. Some are almost diamond
11 shaped on the edge and others are round.

12 I probably have to give Bill Rhine
13 credit for raising this issue about the center
14 midpoint impact on a support column and a
15 consequent wraparound effect which obviously is
16 equally serious, but different from corn like
17 gamma shields as opposed to machine and weld
18 gamma shields, but in addition to the things we
19 will suggest later, we would like to see those
20 two types of impact accidents specifically
21 addressed.

22 MR. CAMERON: Thank you very much, Bob.

1 I would like to see if anybody else around the
2 table wants to add anything to the three issues
3 that Bob brought up. The bounding issue, the
4 specific route information and the example of
5 earthquakes and what that might augur in terms of
6 types of impacts that you would use.

7 SPEAKER: Would you add midpoint
8 wraparound? Those key words some of us will
9 know.

10 MR. CAMERON: Midpoint under
11 earthquake?

12 SPEAKER: No, it's separate. This is an
13 accident not an actual disaster.

14 MR. CAMERON: Midpoint wraparound. I
15 noticed that Marvin might want to comment on
16 those so let's go to Marvin Resnikoff.

17 MR. RESNIKOFF: I wanted to add just a
18 few points to what Bob has said. We are
19 interested in information on accident severities,
20 the severity distribution in different
21 locations: urban, suburban and rural setting.
22 In other words, how are accidents distributed in

1 order of severity in these different locations in
2 the United States? Is it all the same? Or does
3 it differ depending on whether you are in urban
4 or rural setting.

5 For instance, what about location of
6 severe fires? Do they occur more in urban
7 settings or rural settings?

8 We would like bounding accident. We
9 would like sabotage to be considered as a
10 bounding accident. I don't know if this Sandia
11 study wants to look at sabotage, but it's been
12 suggested by the State of Nevada that -- and
13 they've introduced a petition to the Regulatory
14 Commission that certain antitank missiles be
15 considered as leading to major releases from a
16 cask and we would like that considered as well.

17 The sequence of accidents concerns us.
18 Generally the kind of accidents that are looked
19 at -- well, just look at puncture, or there is a
20 sequence involving impact and fire. But we would
21 like one of those sequences reversed to see
22 whether that is more important. Namely, whether

1 cask heat up in a fire and then puncture is also
2 a scenario that should be considered seriously.
3 That at least happened in the Sandia test in the
4 sense that there was a fire and then the
5 structure gave way and then the cask fell down.
6 So we would like that kind of puncture accident
7 considered where the containers actually heated
8 first.

9 We would like seasonal changes
10 considered as well when looking at accident
11 probabilities.

12 We would like a, how should I say it,
13 a -- confidence intervals considered as well, not
14 just one determined number but actually a range
15 of numbers considered. Those are my points.

16 MR. CAMERON: Thank you, Marvin. I will
17 put that last point up here. But you can see we
18 are getting a number of specific recommendations
19 and we want to go and find out whether anybody
20 has anything to add to the list, whether they
21 have any comments on this.

22 I guess at this point I would want to

1 ask the NRC staff or Sandia if they have any
2 questions on what's been brought up so far and,
3 Susan, you can use your microphone.

4 MS. SHANKMAN: I just wanted to tell you
5 that we do have a sabotage study that we're
6 working on developing. It is not under the
7 Sandia contract but will be done in conjunction
8 with the work that they're doing and right now
9 we're working with the Germans and with some
10 others who are looking at those issues and one of
11 my staff members who was here earlier is going to
12 an international meeting on that in a couple of
13 months to frame the issues.

14 MR. RESNIKOFF: Who is doing that
15 study?

16 MS. SHANKMAN: We will be doing it but
17 in fiscal year 2000.

18 MR. CAMERON: Can I just remind
19 everybody if you are going to make a reply or
20 comment just turn your mike on and use it. I
21 think it might be useful for everyone if we just
22 provide a little bit more information on

1 something that's been mentioned twice already
2 which is the petition for rule making that the
3 State of Nevada submitted on the sabotage issue.

4 Is there someone here from the NRC staff
5 that could just sort of give us a quick summary
6 of what what's going on with that petition in
7 terms of what it requested the NRC to do and what
8 the status of the public comment period is. I
9 can try to do a little bit of that if that would
10 be helpful and, Bob, you may want to, Bob
11 Halstead may want to supplement that.

12 There is a process in NRC regulations
13 that provides for any member of the public to
14 send in a request, a petition to the Nuclear
15 Regulatory Commission that commission regulations
16 be revised and the State of Nevada submitted a
17 petition that called for a change in NRC
18 regulations address sabotage and also for an
19 accompanying risk assessment of the risk of
20 sabotage in terms of spent fuel statements.

21 That petition was published for public
22 comment. The comment period closes November

1 29th.

2 SPEAKER: Just recently been extended to
3 January 29 I believe that is a request from the
4 national, from the transportation research board
5 has a committee and certainly given the work load
6 we have on other things, we are very supportive
7 of that 60 day extension.

8 I wanted to add that since we filed that
9 petition and then we saw the draft EIS, a couple
10 of different modal issues have come to the floor
11 which we think are important not only in the
12 sabotage rule making but also things I neglected
13 to say. Really a lot of new ideas. One issue in
14 both the sabotage analysis for the petition for
15 rule making and in this study is the potential
16 heavy haul truck transport of large rail casks.

17 I know that in the Skull Valley proposal
18 there been discussion using casks as large as 140
19 or 145 tons. I personally would be surprised if
20 we see ones quite that big, but we're looking at
21 the DOE proposal at the possibility of 125 ton
22 rail casks being heavy hauled on the originating

1 end and some cases for distances as short as a
2 couple of miles, but in half a dozen cases maybe
3 up to 50 miles and those have -- again, I don't
4 know how feasible that is, but because it's been
5 identified in the draft EIS we all have to at
6 least evaluate. But having been on the other end
7 and having worked on reactor shipments it's hard
8 enough to do them by truck.

9 Issue number one is heavy haul truck and
10 we have a clearer sense of how this might happen
11 in Nevada. Again, I don't think if there is no
12 rail spur I don't think there will be a
13 repository, but there is the possibility in
14 Nevada some very tricky long hauls on big rigs,
15 so heavy haul.

16 Secondly, barge transportation has long
17 had some strong advocates both in the
18 transportation community and in the environmental
19 community. We have had some recent experience
20 with it. There is at least a cursory overview of
21 the issue in the Yucca Mountain draft EIS and I
22 would propose at least for open-end the

1 discussion, there is some literature that goes
2 back to the mid '80s that came out of Argon
3 National Labs where it was a fairly detailed
4 barge in Panama Canal transfer issue for the
5 first repository.

6 Thirdly, a number of people have been
7 discussing the possibility of running legal
8 weight truck casks on flatbed rail cars. I also
9 think that's not a very good idea, my personal
10 opinion, but it's something that might happen and
11 it's something that we need to at least in a
12 scoping sense identify here.

13 And certainly there is one other modal
14 scenario that was mentioned to me as recently as
15 last week, although I must tell you it occurred
16 in the Little Alien Cafe, a lot of exotic ideas
17 about aircraft occur, but a person there reminded
18 me there was some experience with air shipment in
19 one of the foreign research reactor movements and
20 I believe it was out of Columbia Venezuela. This
21 person said if we're going to do that, and this
22 was an ex-air force logistics person, well maybe

1 we need to look at air transport in some
2 instances. I think we've generally ruled that
3 out as a, you know, large scale movement
4 technique so I personally would not argue
5 strongly for putting aircraft transport, but I
6 would say those three we need to look at
7 seriously.

8 MR. CAMERON: Let me clarify something
9 for all of us. Bob, you said -- the petition on
10 sabotage into some other types of transport that
11 you think should be considered.

12 MR. HALSTEAD: These are issues we are
13 additionally going to raise in the sabotage rule
14 making because, for example, we feel the security
15 issues of a large rail cask on a heavy haul truck
16 are different than the security issues and we
17 have asked for dedicated trains as a condition
18 for rail shipment.

19 Let me quickly say we identified about
20 eight specific areas in the regulations at
21 10CFR73 and primarily we focused on expanding
22 existing regulations. For example, we've asked

1 that the route approval process be made mandatory
2 using the criteria identified in the guidance
3 document.

4 This of course raises some problems with
5 trade-offs between routes. We've suggested
6 upgrading the escort performance for both truck
7 and rail and declined the current guidelines for
8 heavily populated areas to the entire distance of
9 the route.

10 We've asked for some minor
11 modifications. For example, extending some of
12 the planning requirements for strategic special
13 materials to schedule shipments to avoid civil
14 disorders and natural disasters. Some of these I
15 don't think are going to be real controversial.

16 Others like the suggestion that
17 dedicated trains should be used for all rail
18 shipments, we do expect to be controversial. So
19 we on the one hand said look at trends and
20 terrorism, look at trends and the capabilities of
21 the weapons available. Look at the way that the
22 larger number of shipments along the routes will

1 create new opportunities and look at the new
2 shipping cask designs which may or may not be
3 more vulnerable to attack and based on what we
4 already know we're asking for immediate relief in
5 the way of changes in the current regulations.

6 We're also asking for a more detailed
7 assessment because of various uncertainties that
8 we may not have evaluated. So that's the scope.

9 MR. CAMERON: Thanks, Bob. Let me try
10 to wrap this up a little bit before we go over to
11 Amy and the rest of the panel at this point.

12 It has been suggested, recommended by
13 Marvin sabotage be considered. Very clearly the
14 sabotage issue is in front of the NRC and keep in
15 mind that the end result of the update of the
16 petition for rule making, all of this funnels
17 into, should there be changes to the regulatory
18 framework at NRC, so that there is a forum a
19 mechanism for sabotage to be considered. If you
20 want to comment the comment period has been
21 extended. The commission will then consider
22 whether to grant or deny or grant in part that

1 particular petition.

2 Charles, do you have a specific question
3 because I do want to go over to Amy, but go
4 ahead.

5 DR. MASSEY: For the barge, dedicated
6 train, these other different modes besides just
7 truck cask going down the road, are you
8 suggesting that in the accidents when we look at
9 the overall package performance, that those be
10 issues that we address as well, separate from any
11 kind of be sabotage?

12 MR. HALSTEAD: Let me answer it this
13 way. For the heavy haul truck I have a specific
14 concern based on knowledge of roadway conditions
15 on certain routes in the Nevada that there are
16 actually greater potential for a fall impact
17 scenario involving a large rail cask in heavy
18 haul transport, than there are on any of the rail
19 conditions that I'm aware of in Nevada. That
20 doesn't mean that there are not conditions
21 outside of Nevada where the rail cask and rail
22 environment is subjected to a greater impact.

1 Secondly, specific issue for us on the
2 truck cask, the smaller mass of the truck cask in
3 a rail accident fire environment is a big concern
4 to us. We're basically working under the
5 assumption that the regulatory fire has to run
6 about 20 hours to cause large scale fuel
7 degradation in the large rail cask, but only six
8 to eight hours in the truck cask. So putting
9 truck casks in a rail environment may actually
10 raise some different scenarios.

11 MR. CAMERON: Thank you and a good
12 clarification. Some of these issues that Bob
13 brought up in terms of type of transport also are
14 important outside of the sabotage area. Let's go
15 to Amy Shollenberger.

16 MS. SHOLLENBERGER: First of all I would
17 like to say that I'm really happy to hear you are
18 planning to use the GIS system to look at route
19 specific data. That was one of the issues I was
20 going to raise today. Along with that I would
21 really be excited that you would actually name
22 those routes and state where they're going to be

1 and say what routes specific data you are looking
2 at with the GIS system.

3 I know we're in accident likelihood
4 right now and not in public participation but I
5 can't resist saying that I would be even more
6 exited if you would allow the public access to
7 your GIS system to look at those routes. I think
8 that would really show that the NRC is looking
9 for public involvement.

10 MR. CAMERON: Susan, do you want to just
11 ask a question before you go on, Amy?

12 MS. SHANKMAN: I'm not clear what you
13 are asking.

14 MS. SHOLLENBERGER: I think that, first
15 of all, I'm asking for the transportation routes
16 to be named. They are not named in the
17 environmental impact study that the DOE has
18 done. I was in a meeting where the DOE said that
19 they didn't feel they should name the routes
20 because they may change over time. But I think,
21 you know, you could say potential routes or
22 possible routes and still name them.

1 And as far as access to the system, I
2 think it would be really great if the public
3 could somehow, I'm assuming it would be through
4 your website, get into the GIS system and have
5 access to maps of potential routes.

6 MR. CAMERON: The question, and I think
7 we should try to clarify that for everybody, is
8 how will, how can the update consider the
9 specific routes that might be taken in terms of
10 accident scenarios and to the extent that it does
11 or through some other mechanism is that
12 information going to be available to the public?
13 Susan?

14 MS. SHANKMAN: Yeah, I guess I'm having
15 a hard time understanding. Are you speaking
16 about the to the repository only?

17 MS. SHOLLENBERGER: Not only but yes.

18 MS. SHANKMAN: Because I think that most
19 of the routes, potential routes of what you asked
20 for are already fairly laid out in terms of where
21 the plants are and where they move to. In terms
22 of rail lines I don't think we're going to have

1 many alternative rail lines. In terms of highway
2 there are routes specific guidelines DOT requires
3 to be followed in selecting the routes.

4 So it will be part of the proposal of
5 Sandia to tell us the kind of route data that
6 they're going to look at and at that point you
7 can comment on.

8 MS. SHOLLENBERGER: I would also like to
9 like to follow-up on the earthquake comment that
10 Mr. Halstead made. I would like to see weather
11 related scenarios for all the different areas
12 with that in the study. I think that earthquakes
13 are definitely a major concern.

14 I think there are some portions of the
15 country that are very prone to flooding. I think
16 there are some portions of the country that are
17 very prone to snowstorms, sudden squalls, ice
18 storms, tornados. I would really like to see
19 that factored into your study of both accident
20 likelihood and the impacts of, for instance, a
21 truck, you know being caught in a flood or
22 something like that.

1 MR. CAMERON: Note the relationship to
2 Marvin Resnikoff's seasonal point. I think there
3 is a tie in there.

4 MS. SHOLLENBERGER: Also I would like to
5 see human error factors addressed. I think that
6 looking through the reports of not necessarily
7 technically what you would call accidents, but
8 maybe incidents with casks, there have been
9 situations where a cask wasn't tied down properly
10 and it slid a little bit or whatever happened and
11 even there is -- would even be human error in the
12 creation of the cask which was not addressed in
13 your first study because you were using computer
14 models and now you have actual tests. And so I
15 would like to see human error factored into both
16 accident likelihood and potential impacts.

17 MR. CAMERON: Not just the human error
18 in terms of the cask construction that's been
19 mentioned, but human error in terms of this
20 particular issue, its application.

21 MS. SHOLLENBERGER: Right, all kinds of
22 things that could happen.

1 MR. CAMERON: Go ahead, Susan.

2 MS. SHANKMAN: Can I frame that a little
3 bit differently and say perhaps we should be
4 looking at the relationship between operational
5 controls and casks. Do you have do rely on some
6 kind of operational control or human activity
7 because of a weakness in the cask? What's the
8 relationship of that?

9 MS. SHOLLENBERGER: I think I would like
10 you to look at that, but I think I would also
11 like to see outside of that the, you know, you
12 look at the number of accidents and say here's
13 how likely an accident is. You could look at the
14 number of times the cask wasn't tied down
15 properly and then say here's the likelihood of
16 that happening and somehow combine that with the
17 number of accidents and say here is the
18 likelihood that a cask would be involved in an
19 accident and it's not tied down properly.

20 MR. CAMERON: Charles, is that clear?

21 DR. MASSEY: Yeah.

22 MR. CAMERON: Let's go to Felix and then

1 Eileen and come over to Kevin and then Bob
2 Fronczak.

3 MR. KILLAR: I just want to make a
4 couple of points along the lines that Bob and
5 Marvin already brought up. I think one of the
6 things we have to be very careful of is that we
7 do do bounding studies. Charlie can retire doing
8 studies but we need to have finite data to say
9 this is the results.

10 Along those same lines we do have to
11 have sensitivity studies as part of that. If you
12 say the temperature is going to be X and squat,
13 if you go up two more degrees what difference
14 does it make one way or the other? So I think
15 you need to take into consideration sensitivity
16 studies and provide that information.

17 And the final aspect you have to bring
18 in reality. You have to make sure that when you
19 are done with your studies and come up with the
20 results you have to bring in reality. I think
21 that's the one thing that the modal study
22 particularly was very good at doing because they

1 did look at actual accidents and put the cask in
2 those type of accidents. I think that's one of
3 the things we need to be very careful of.

4 On the GIS system, I think it's
5 important that you do this. Once again concerned
6 that you get too specific on routes and get too
7 specific because then what happens is you get
8 into a question of sensitivity and bounding what
9 have you, and you say gee on my route that's
10 coming through my area I have a bigger outcrop of
11 rock than you do or the rock that you looked at
12 was shale and I've got granite or vice versa and
13 things on that line.

14 So I think you have to be very careful
15 that you look at the bounding studies and look at
16 the sensitivities and not get too tied down to
17 the GIS studies.

18 MR. CAMERON: GIS is geographic
19 information system?

20 MR. KILLAR: Sounds good to me.

21 MS. SUPKO: Felix covered a number of
22 points I was going to make.

1 I would also like to add that while you
2 are looking at this growing laundry list of
3 possible issues to address in the modal study
4 that risk informed analysis take place, that we
5 really look at what increases safety. What can
6 NRC do and assess that will help increase the
7 safety of spent fuel transportation and protect
8 the public. I think that's the bottom line. You
9 did mention that was going to be part of the
10 process and I think it's going to be a difficult
11 exercise on the part of NRC staff to go through
12 all these issues that everyone is bringing up and
13 try to apply those and get a result that
14 everybody is satisfied. But that has to be the
15 end result is what increases safety.

16 MR. CAMERON: Let me ask you a
17 clarification on that. It may be sort of a
18 chicken and egg situation where the results of
19 the update are going to be looked at by the NRC
20 in terms of whether to increase, in terms of
21 whether to change the regulations.

22 Were you suggesting that Sandia should

1 factor into the study in the first place what
2 might decrease risk from a change in
3 regulations?

4 MS. SUPKO: No. I'm not suggesting that
5 the regulations need to be changed. The issue is
6 there are a lot of public concerns related to
7 spent fuel transportation. What issues either
8 through update of the modal study through testing
9 or through additional analysis can we do to show
10 the level of safety associated with
11 transportation and possibly in Sandia's
12 assessment of all of the things that it might
13 choose to look at, it would probably be useful to
14 try to assess certain pieces will add to the
15 discussion more than others might. There is only
16 going to be a limited amount of time, a limited
17 amount of money available to spend on this
18 project. I'm quite certain it's not unlimited.

19 So you are going to need to somehow or
20 other address where do you get the most bang for
21 your bucks, so to speak.

22 MR. CAMERON: What you are suggesting is

1 that the NRC and Sandia may have to make choices
2 in terms of whether to address certain issues or
3 conduct certain types of tests and that that
4 should be a risk informed decision. All right.
5 Let's go to Kevin.

6 MR. KAMPS: I just wanted to follow-up
7 on some things that I was hearing about
8 operational controls and cask robustness and it
9 gets back to something I mentioned before and
10 someone asked me during the break what I was
11 referring to about the surprise, the Palisades
12 and other facilities that use the ESE 24 casks.
13 What that was was unforeseen chemical reaction
14 inside the cask, the generation of hydrogen gas
15 which is combustible, highly flammable, explosive
16 and the way that that was discovered was an
17 explosion at the Point Beach Nuclear Plant VSE 24
18 in 1996. And just the relationship to this
19 discussion of likelihood. I don't think anyone
20 at NRC or the utility or the cask manufacturer
21 would have seen an explosion in a VSE 24 cask as
22 a likely event.

1 So in the discussion about likelihood
2 about transportation of highly irradiated nuclear
3 fuel, there are so many problems taking place
4 with the casks that are stationary, these casks
5 are going zero miles per hour at Palisades
6 Nuclear Plant and the casks that we're discussing
7 today are going to be on our highways and on our
8 railways going at high speeds and so we're very
9 concerned about the unforeseen problems that will
10 take place with these casks.

11 Another problem at the Palisades Nuclear
12 Plant has been the manufacturing of the casks.
13 There are a number of defective casks at
14 Palisades and so that needs to be considered in
15 the likelihood of accidents, not only the
16 severity of an accident, but also the likelihood
17 of an accident taking place is how will defective
18 casks enter into that?

19 Also about the likelihood of events
20 taking place and it's been discussed already, but
21 terrorism -- in their earlier study terrorism was
22 not high on the priority list of considerations,

1 but it's becoming more so unfortunately in this
2 country and around the world. And so I just
3 would like to reemphasize the importance of
4 terrorism as really taking a central place of the
5 discussion of the safety of transporting highly
6 irradiated nuclear fuel across the country.

7 And just to reemphasize, and I feel a
8 lot of sympathy for the representative from
9 Prairie Island, coming from the Palisades area
10 the closest residents to Palisades in the dry
11 casks are several sand dunes removed from that
12 danger, but at Prairie Island the casks are --
13 how close are they to residents?

14 MS. WESTRA: Approximately six hundred
15 yards.

16 MR. KAMPS: I'm not sure how many
17 hundred yards at Palisades the closest residents
18 are, but I just wanted to reemphasize that the
19 transport of these casks will take the stationary
20 casks at the present time and move them very
21 close to the homes of millions of people in this
22 country and I'm happy that the NRC is saying that

1 there is an interest in involving the public, but
2 I would really urge the NRC to involve the public
3 in very meaningful ways in this process because
4 millions of people being very concerned are going
5 to change the dynamics of the discussion and it
6 will be removed from an academic or theoretical
7 discussion into a very charged one and, yeah.

8 Another point is a consideration needs
9 to be made of even the safe and smooth transports
10 of these materials and the exposure to workers
11 and to the public of the gamma radiation that
12 will flow out of these casks. That's removed
13 from an accident scenario and hearing that there
14 is not going to be an environmental impact
15 statement involved with this, that concerns me
16 because there are environmental impacts to public
17 health from even the smooth transportation
18 accident free of these casks.

19 MR. CAMERON: Okay. Thank you Kevin.
20 Susan, did you want to respond.

21 MS. SHANKMAN: I just wanted to make a
22 clarifying point that the storage casks are not

1 transport casks and even cask designs where there
2 is a system where both the encased or contained
3 spent fuel that has been stored, that container
4 may be transported but it would not be
5 transported in the same configuration as it is
6 stored. So the experience in storage is useful
7 but it is not necessarily the same as transport.

8 I know your concerns about Palisades but
9 I don't want people in the room to think that the
10 Palisade casks as they stand on the pad will be
11 put on the truck or rail and shipped.

12 MR. CAMERON: Thank you for that
13 clarification.

14 MR. KAMPS: I didn't mean to imply that
15 the same casks will be used for transportation,
16 what I was meaning is that the history of our
17 experience shows the problems and the NRC has
18 recently decided to allow cask manufacturers to
19 proceed without a certificate of compliance on
20 cask designs and that was the very problem at
21 Palisades, that the public tried to be involved
22 in the process with those casks that had defects

1 that were not caught by the NRC and so the
2 current policy of NRC is to allow the
3 manufacturer of casks without a certificate of
4 compliance? And so the risks are too great, I
5 think, for those unforeseen problems both
6 transport and with storage.

7 MR. CAMERON: I don't want to get us off
8 on an extended discussion of this. Susan we may
9 think about you coming back and presenting a
10 clarification on that. I guess what I infer from
11 some of your comments, Kevin, is the idea of
12 unlikely events should be considered throughout
13 all of the issues that are addressed in the study
14 and we hearken back to the hydrogen that you
15 talked about.

16 MR. KAMPS: And the definition of
17 unlikelihood.

18 MR. CAMERON: Thank you. We're going to
19 try to get through some other cards here because
20 we do have a little bit of time left here. Bob,
21 why don't you give us what your concerns are and
22 we'll talk to other people.

1 BOB: First of all, I would like to
2 support some of the previous comments that were
3 made. I think you're going to be looking at a
4 lot less accidents because the accident rate used
5 in the modal study was a 1980 number 11.9
6 accidents per million train miles.

7 The other thing I would like to support
8 Bob Halstead's comment about crush loads, train
9 transportation by definition is multiple vehicles
10 traveling together and I don't know if you ever
11 been to a main line train derailment, that is a
12 very real possibility in rail, so we support you
13 looking at that.

14 Another thing that Bob talked about the
15 collision with structures and falls. In the
16 modal study I think they evaluated highway
17 wayside conditions and rail wayside conditions
18 are very different than highway. You have to go
19 through a lot more cuts and fills because you are
20 very limited by rail transportation and it looks
21 like you are going to look at that and you are
22 going to look at wayside conditions.

1 A few other things I would like to bring
2 up. We felt that the force estimates that the
3 modal study used were underestimated. We looked
4 at locomotive trains and just the standard rail
5 car has to be able to withstand an impact of a
6 million pounds force without defamation.

7 A locomotive train can go to 3 million
8 to 10 million pounds so we would like to have you
9 factor that in. We think the frame impacts were
10 underestimated in the modal study. We think you
11 ought to take a look at that.

12 I don't know if this is the time to
13 bring it up, but we also think that the modal
14 study took a less than considerable approach on
15 thermal frequencies. So we think you ought to
16 take a look at that again. We just had one in
17 1996 in Wisconsin where we had an 18 day fire and
18 that was done by design.

19 Twenty years ago those tank cars
20 probably would have exploded and probably would
21 have had some fatalities. Now they're designed
22 to vent and burn. We think you ought to take a

1 look at that too.

2 MR. CAMERON: Thank you, Bob. I would
3 note that, and this is good, we're getting a list
4 of items that should be considered here and we're
5 not having much dialogue on some of those items
6 which is fine.

7 We're going to go to the others that
8 have their cards up but one thing for the group
9 to keep in mind, is there anything that you heard
10 in terms of suggestions that, that you have a
11 disagreement with? Not a -- and we're going to
12 get to you right now as a matter of fact, but if
13 there are things that you do disagree with, and I
14 don't mean need to supplement, but if you
15 disagree with that I think that would be useful
16 for the NRC to know and Jack Edlow is going to
17 give us a sample on this, I guess. Go ahead,
18 Jack.

19 MR. EDLOW: I do wish to disagree with
20 two items that I have heard suggested this
21 morning but I will agree with one other. I want
22 to start first by talking about this issue with,

1 that I've heard discussed as sabotage or
2 terrorism or similar type issues.

3 This is certainly an issue which needs
4 to be addressed, that the NRC has addressed in
5 the past, Part 73 regulations, which needs in the
6 future to be addressed because sabotage,
7 terrorism is real. However, I don't think it
8 needs to be part of this study. I think it's an
9 apples and oranges type issue. This is my
10 understanding related to accident conditions and
11 the effect on the equipment and the vehicles
12 related to accident conditions. I think that is
13 the specific purpose of it and that sabotage,
14 terrorism are not accidents. Although they do
15 need to be addressed. That's number one.

16 Secondly, I disagree with Ms.
17 Shollenberger about naming the routes. I think
18 it is counterproductive to name specific routes
19 for a variety of reasons, not the least of which
20 is I can name you a route today and it may not
21 exist in ten years. We don't know where you will
22 live in ten years and it's difficult for us to

1 focus on that.

2 One should assume under existing DOT NRC
3 regulations that material when properly packaged
4 and when introduced into the transportation
5 system of the United States, it can go on any
6 route because that is the legal situation in this
7 country. So if the public wishes to know where
8 the material can go, the answer should be it can
9 go anywhere when it's properly packaged and
10 licensed and ready for transport.

11 The fact that states have the right to
12 designate routes for this type of material means
13 that they should discuss the matter with their
14 state authorities or those who are responsible
15 for establishing the route control within those
16 frameworks. Otherwise, assume it can go anywhere
17 because frankly it does.

18 Now the one thing that I will support
19 and don't fall off your chair, Bob, I'm going to
20 support the idea about the barge because while
21 this is titled highway and rail accident
22 probabilities, and maybe that's what you want to

1 study, I do happen to think there is some reasons
2 for you all to consider barge and even more so
3 dedicated ship transports because it is in fact
4 possible that there could be at some time in the
5 future t he need to move this material coastally
6 via water even using dedicated ships rather than
7 barges which have their own particular reason.
8 So I would support that and there are lots of
9 other things we could get into but it's almost
10 lunch. Good-bye.

11 MR. CAMERON: I'm going to make an
12 assumption here, open the challenge by anybody to
13 try to maybe close off on one particular point.
14 We talked about the concern over sabotage. We
15 have identified separate mechanism to address
16 that and I'm sort of assuming that the important
17 point is that the issue be addressed somewhere
18 but doesn't necessarily need to be addressed as
19 part of this update.

20 Jack gave us a contra in terms of the
21 specific routes. Other people may want to chime
22 in on that if we have some time. Let's go to Ed

1 Pritchard and then we'll go to Heather Westra and
2 come back to Uldis, the State of Maine. Ed?

3 MR. PRITCHARD: I just wanted to first
4 offer assistance in your studies dealing with any
5 of the data from our accident reporting section
6 and also a review of some of the severe accident
7 derailments that have taken place since the study
8 was done.

9 Today we did come to an agreement as to
10 some of the things that need to be looked at and
11 there were some severe rail accidents that took
12 place since that study was done. We had a train
13 derailment caused by an earthquake this year
14 which we never had recorded before and it
15 happened to be an Amtrak train.

16 The other thing I want to make available
17 to you is our safety compliance and oversight
18 plan for rail transportation of high level
19 radioactive waste and spent nuclear fuel. It's a
20 partnership of the Department of Energy and the
21 association of American Railroads and it goes
22 above and beyond 49 CFR for the transportation of

1 hazardous materials. It's a proactive approach
2 that we have taken.

3 My staff member, Kevin Blackwell,
4 sitting behind me here is the author of it and I
5 want to give him credit for it because he spent
6 quite a bit of time putting it together. In
7 fact, the department has taken this, Department
8 of Transportation has taken it. They have
9 expanded it to include highway and water so we're
10 working on that with the Coast Guard and the
11 Federal Highway Administration. It's a flag ship
12 initiative under Secretary Slater and we also
13 have a dedicated train study report that is due
14 out sometime next year.

15 MR. CAMERON: There may be information
16 that other agencies have reference to what's
17 being done in other countries before -- this, I
18 imagine, could either be factored into the update
19 or supplemented, supplement the update in terms
20 of what the NRC should do, if anything, in terms
21 of regulatory change, Susan?

22 MS. SHANKMAN: Right. Part of the phase

1 one is literature review and to look at expand
2 data that we could use and I'd also offer that as
3 part of the website, although I don't think we
4 can post everything, we certainly can post
5 references to other websites and so that if you
6 can't -- if you have a website where you have
7 this then we can list that and what are our
8 resources that someone can find them.

9 So I guess I'm agreeing that we're going
10 to try to keep this as our website as
11 informational as possible and Sandia is on the
12 hook to be doing that.

13 MR. CAMERON: Thanks, Susan. Let's go
14 to Heather Westra and then over to Uldis and then
15 take a final comment from Amy and see if anybody
16 in the audience has anything to say. Heather?

17 MS. WESTRA: One thing I see related to
18 accident scenarios and I'm not sure whether or
19 not it would be addressed in this study or is
20 available in other studies, and it's regarding
21 emergency response to the various accidents under
22 various conditions under various scenarios. Is

1 any of that information available? The
2 notification time when something occurs. How
3 long it took the responders to get to the site.
4 How many responders per each given type of
5 accident were on the scene? Number of people
6 potentially impacted by the various accidents?
7 And then the total time needed to resolve the
8 accident. Clean it up. That would be something
9 we would be very interested in seeing as a
10 jurisdiction that would be seeing those shipments
11 and would likely have to respond to some kind of
12 accident.

13 MR. CAMERON: I guess maybe perhaps two
14 questions. One is how is emergency response
15 factored in, if at all, into the update of the
16 modal study? And secondly apart from the modal
17 study, and this is one of those separate
18 transportation concerns, is there a way to
19 provide the type of information that Heather is
20 talking about somehow?

21 Charles do you want to try to answer the
22 first one? What is the role of emergency

1 response in trying to, in updating the study?

2 How do you treat that, if at all?

3 DR. MASSEY: Sort of answer with a
4 question. Right now when we developed these
5 accident sequences, we do not take credit in the
6 scenarios for intervention, such as responders
7 come on the scene, put the fire out quickly.
8 That is not in our distributions right now. That
9 is certainly something that could be considered
10 to be incorporated, but we tend to try to look at
11 it, let's assume there is no response? How does
12 the package perform under the conditions
13 evaluated? The whole emergency response once
14 there is an accident, that's a separate issue
15 than what we're planning to look at but we can
16 certainly incorporate that as a suggestion in our
17 accident sequence.

18 MS. WESTRA: That would certainly be
19 part of what the public want to know. Yeah,
20 these shipments might be safe but how prepared
21 are the jurisdictions to respond to these? There
22 are lessons learned out there that could be

1 argued, incorporated into this analysis.

2 MR. CAMERON: Let's go to Susan for
3 perhaps an answer or to someone on the NRC staff
4 about the availability of the information apart
5 from the modal study.

6 MS. SHANKMAN: Heather, I would say that
7 by not taking credit for any emergency response
8 is a conservative way to look at the safety
9 margin. The Department of Transportation will be
10 working with the center on issues related to
11 accident response. Rick, do you want to add? I
12 think that there are local conditions and we
13 could look at whether we can factor it in.

14 MS. WESTRA: I'm just wondering is that
15 a realistic assumption though. I can understand
16 that it's a conservative approach. Is that a
17 realistic assumption that nobody would respond?

18 MS. SHANKMAN: No, I agree with you.
19 We'd have to look at how we'd factor that in
20 given the variability of local response. The
21 emergency response system is developed with the
22 Department of Transportation and FEMA and other

1 agencies. NRC is not involved in that
2 specifically.

3 MR. CAMERON: We may want to talk more
4 about this off-line in terms of the information
5 but I think the point has been made.

6 Earl, do you want to add something?

7 MR. EASTON: Just a point of
8 clarification what the NRC's role in emergency
9 response is.

10 We have a formal policy statement issued
11 by our commission somewhat dated goes back to
12 1985 on what the NRC's exact role in responding
13 to emergencies. That might be something you want
14 to put on the website also.

15 Also we did a survey in 1990 on the
16 capabilities of states to respond to emergencies
17 done by the University of Indiana. That might be
18 of interest, but that was basically a survey of
19 states.

20 The primary response to all accidents
21 lies with the fire department, police department
22 and that varies from locality to locality. I

1 don't know if there is any real comprehensive
2 look at the response time and how it varies from
3 county to county.

4 I think that a lot of programs related
5 to repository have training funds to actually, in
6 fact, upgrade and train people along proposed
7 routes or suspected routes, and I don't know if
8 it's addressed at that point, but it might be an
9 avenue you might want to pursue.

10 MR. CAMERON: Final comment, Heather,
11 before we move on.

12 MS. WESTRA: Sure. I'm just stating
13 that it would be helpful for potential responders
14 to understand more, what all would be involved
15 under these various scenarios.

16 MS. SHANKMAN: Right, and I take your
17 point. We will look at that.

18 MR. CAMERON: Thank you. Thank you very
19 much. We're going to take Uldis and Amy and go
20 on to the audience and, Felix, if we have time we
21 will circle back to you. Uldis?

22 MR. VANAGS: My comment really follows

1 what Heather was talking about. There really
2 needs to be a reality factor incorporated into
3 the study. It's unrealistic to think that spent
4 fuel for Maine is going to be shipped during a
5 snowstorm or an ice storm. It's just not going
6 to happen. There will be state controls, and
7 emergency planning response. It's going to be
8 monitored and regulated very closely. Somehow
9 those being incorporated, for instance, I'm
10 looking at the accident rate data. I can't help
11 but think we have accidents, tractor trailers on
12 95 in Maine, I frequently travel that road. I
13 see the tractor trailers all turned over because
14 they just don't want to slow down during the snow
15 and ice. I'm sure those accidents are in that
16 data. That isn't going to happen. They just
17 won't be traveling. We know the weather in New
18 England quite well. We know when it's okay to
19 travel and not okay to travel. So somehow there
20 has to be a reality factor.

21 MR. CAMERON: That's a good point that I
22 think we've heard from Felix and also it goes

1 back to something that Amy said before and
2 something that Marvin said in terms of, of
3 weather.

4 Let's go to Amy for a final comment from
5 the table and then see who has something to add
6 from the audience.

7 MS. WESTRA: I just want to respond to
8 the comment Mr. Vanags just made. Actually it's
9 a question that I have. If I understand it
10 correctly the states don't have any control over
11 when the shipments happen. That's not true?

12 SPEAKER: The states do have some
13 control.

14 MS. WESTRA: What is that?

15 SPEAKER: There is a cooperation with
16 the DOE. Right now the North East Regional
17 Transportation Task Force is having discussions
18 now about these issues, about weather related
19 issues and so forth. All these factors will have
20 to be taken into account. They are big state
21 concerns. The DOE is being responsive to these
22 concerns.

1 MR. CAMERON: Thanks for that
2 clarification, Uldis. Amy, the rest of your
3 comment?

4 MS. WESTRA: I just have one other thing
5 but I just want to mention it quickly. I would
6 like to see you all look at the likelihood of
7 accidents after the loading and unloading of both
8 the shipping casks especially at places like
9 Palisades where they have problems with the casks
10 and also just in general what's the likelihood of
11 an accident when you are taking the cask off of
12 the train onto a heavy haul truck or off of the
13 truck onto a train or from a barge or whatever.

14 It seems like in my reading of the modal
15 study I didn't see that addressed anywhere and I
16 think that there probably is some likelihood of
17 that happening.

18 MR. CAMERON: Quick clarification on
19 that from either NRC or Sandia in terms of how
20 the point of transfer, the unloading point has
21 been or is going to be or might be considered.
22 Charles?

1 DR. MASSEY: No. I think that's one of
2 the things we want to look at that we have in our
3 proposal is considering looking at especially
4 transfer points, that's one of the issues of
5 concern. And are there environments that could
6 be present that we'll need to analyze. That's a
7 good point to consider.

8 If you have specific issues at the
9 loading facility or at an unloading facility or
10 some set of circumstances that you can envision
11 that you would like us to specifically consider
12 then I would like to get some more detail about
13 that.

14 MS. SHOLLENBERGER: I think it would be
15 really important to look at, Dr. Shankman had
16 mentioned the storage casks are not the
17 transportation casks and so you have situations
18 around the country where there are storage casks
19 that are having problems and it's not at all
20 clear that anybody knows how to get the rods out
21 of those casks into the transportation casks and
22 I would like to see you address that.

1 MR. CAMERON: Thank you very much, Amy.
2 How about those of you in the audience? Does
3 anybody have a comment?

4 MR. HANNON: my name is Dick Hannon.
5 I'm with U.S. DOT. Continuing the reality theme,
6 I think the reality is that I don't believe
7 shipments would be dispatched in the teeth of a
8 blizzard and so forth, but that's not to say that
9 shipments if they went from say Maine to a far
10 west state to be named later, that there wouldn't
11 be some inclement weather somewhere along the
12 line. I think steps would be taken for safe
13 havens. This would be part of normal planning,
14 but shipments don't just stop because of the
15 inclement weather, but by regulation we don't ban
16 clear precise thought. People will not dispatch
17 that way, but I wouldn't want to think that a
18 state as far as the origin. I think further down
19 the line you could run into bad weather as
20 defined by whatever the state wants to define it.

21 Another question or response to Heather,
22 there is a large activity of emergency response

1 training that's done year in, year out. Section
2 180 in the NWPA Act to provide emergency
3 preparedness training along the routes.

4 I'm with DOT. We have a grants program
5 that is available to all states. There is --
6 always use more money. There is an attempt we're
7 making now to triple the amount of monies that
8 are available to train the emergency response
9 community. But as Earl Easton pointed out it's
10 essentially a local response, be it the federal
11 level provided to the extent that it can to make
12 them prepared at the various levels.

13 There is a comprehensive federal
14 response plan that is coordinated by FEMA, but
15 there are steps that have been taken previously
16 and they would be implemented again I believe.

17 MR. CAMERON: Thank you very much, Mr.
18 Hannon. Yes, sir. Please state your name and
19 affiliation, if appropriate, for the transcript.

20 MR. HANSON: My name is Allen Hanson.
21 I'm with a company Trans Nuclear. Trans Nuclear
22 has been involved in the transport of radioactive

1 materials for more than 35 years. I just feel I
2 need to make a comment in order to keep the
3 record straight and this would be far more
4 appropriate coming from Dr. Shankman but she
5 hasn't had the opportunity to fully respond.

6 As a company that is deeply involved in
7 the fabrication of casks for storage and for
8 transportation, I think the court would recognize
9 two fundamental regulations. First of all, no
10 one is allowed to fabricate casks for
11 transportation until they have the NRC approved
12 quality assurance program and the NRC verifies
13 that in fact they are using that program
14 appropriately.

15 Secondly, no cask is put into service
16 until it has issued a valid certificate of
17 compliance by the NRC and the fabricators are
18 responsible for building that cask in exact
19 accordance with that certificate of compliance
20 and the NRC is also very aggressive in making
21 sure they inspect and enforce that part of the
22 regulations.

1 I would not want to leave the impression
2 in anyone's mind that fabricators or designers
3 are in any case running off and building things
4 without first getting all necessary approvals
5 from at least the Regulatory Commission.

6 MR. CAMERON: I'm sorry. I'm glad you
7 added that and I know there may be other comments
8 on that that I think we're going to have to deal
9 with perhaps off-line and we'll talk about that.

10 Is there anybody else in the audience
11 who would like to say something at this point
12 about the issue of accident possibilities
13 sequences scenarios? Okay. We need to take a
14 lunch break. And I will talk to Kevin and Felix
15 about their comments and how we might get that
16 in.

17 (Luncheon recess.)

18 MR. CAMERON: I think during our first
19 discussion period we developed a lot of good
20 ideas with NRC and Sandia to think about for
21 incorporation into the study methodology. There
22 will be time during our final session, it's sort

1 of an open session for us to revisit some, any
2 lingering comments that we might have from
3 earlier sessions.

4 What I would suggest that we do during
5 this session after Dr. Massey, after Charles tees
6 the subject up for us, is we'll go to our first
7 discussant for an idea and let's see if we can
8 test that idea or thought out among the rest of
9 you before we go to another concept the danger of
10 trying to do that is perhaps that there will be a
11 whole lot of ideas at the end that we'll sort of
12 have to rush to get them on to the transcript.
13 Charles?

14 DR. MASSEY: Good afternoon. We're
15 going to start off the afternoon with talking
16 about container performance during collisions.
17 And to sort of get you up to speed on our
18 knowledge base to date where we would propose
19 areas of investigation for the package
20 performance study, we'll start off with the
21 original modal study, what it did and how it
22 analyzed the performance of the spent fuel cask

1 during collision environments.

2 First, it looked at a generic steel lead
3 steel. I will try to use my usual displayer as
4 much as I can. You have a stainless steel lead
5 steel essentially intercast. This is the
6 structural strength of the cask. It modelled
7 that on a generic basis did not have a particular
8 cask design we looked at. Just looked at
9 essentially a cask completely constructed that
10 looked like this. They did not take into account
11 the impact limiters on the cask when they did
12 their analysis. They did not look at, this is
13 probably a function of our computer capabilities
14 after the time, did not take into account the
15 cask closure mechanisms and design on the cask.

16 To make up for that they made
17 conservative assumptions about how much material
18 could be released. They did not model the cask
19 closure system. And finally for how much
20 material could actually escape from the cask,
21 what they looked at was the inner strain or the
22 strain on this inner cask wall and by looking at

1 how much strain was on this piece, hard to hold
2 up, this is heavy. But this inner wall is how
3 they determined the leakage, properties of the
4 cask in collision events. They looked at how
5 much strain was put on that piece.

6 In the 0170 reevaluation we looked at
7 the effects of essentially collision and chemical
8 type loads on four different cask, generic cask
9 designs and we started to look at in some detail
10 cask closure mechanisms. One thing I will point
11 out on this one, so I remember to do it on our
12 proposed suggestions, is that the bolts when we
13 did the study we essentially modelled those as
14 square bolts, not the round bolt that you would
15 see in reality. But that was partly a function
16 of our computation capabilities at the time. So
17 again we had to make some conservative
18 assumptions about how that square bolt was
19 attached to the cask and help secure the lid.

20 We looked at collision forces on the
21 cask hitting an unyielding surface. A hard
22 unyielding surface is a, typically some type of a

1 design or a feature that all of the impact when
2 the cask would hit that is put onto the cask.
3 Whatever it hits doesn't absorb any of the forces
4 from the collision. That's an unyielding
5 surface. So we looked at collision of other
6 casks onto these hard unyielding surfaces.

7 We looked at forced speeds, 30, 60, 90
8 and 120 miles per hour onto these hard and
9 unyielding surfaces and looked at three
10 orientations for each of those speeds: a side,
11 corner and an end. We also took into account for
12 weight purposes that there were impact limiters
13 on the cask, but we assumed those were already
14 crushed. There was no absorbent fact or features
15 left in the impact limiters so they could not
16 take any of the crush force off of the package
17 and finally we modelled that without this neutron
18 shield. This outer piece here, we did not model
19 this on the cask at all. This was considered
20 structurally unimportant for us in the collision
21 environment. That's what happened in our 0170
22 update that's under review.

1 Based on our examination of that's been
2 done today and our analysis in the 0170 update,
3 what we're suggesting for the package performance
4 study is that now we have even the increases in
5 ins computer capabilities are amazing from point
6 of view of how well we can do analyses now. We
7 would like to take some of that into account and
8 do a much more detailed look at the cask closure
9 system.

10 For one, we can model the bolts now
11 almost as they're exactly designed and how they
12 fit into the cask. Another thing we want to look
13 at is if one bolt starts to fail, how does that
14 impact other bolts that might be in the series,
15 sort of like a zipper effect start to go down.
16 How does that impact the rest of the bolts in the
17 system?

18 Little more detail look at the closure.
19 One of the things we're proposing to do is do an
20 analysis again looking at a corner impact. We
21 want to explain something here, maybe use another
22 slide. When we talk about trying to do a test,

1 an analysis of having the center of gravity of
2 the package so essentially the weight in this
3 test, the weight is centered over this point and
4 what we'd like to do is look at a crash or drop
5 test of the package that would be testing to
6 compare with analysis, but have it over in the
7 corner so we could inspect the most damage to the
8 cask as possible.

9 So when we get into the collision area
10 we like to do this analysis of what we predict
11 would happen in this type of environment and
12 compare that with the test. We're looking at
13 some speed greater than 60 miles an hour and get
14 some suggestions on. What sort of speeds are
15 people interested in and how can we get to those
16 speeds? And then again finally would like to do
17 a pretest prediction, make that publicly
18 available somehow so people can see how the
19 models, how the accuracy, how that is in
20 comparison to a test results.

21 With that I'm going to turn back to you.

22 MR. CAMERON: Okay. Thank you very

1 much, Charles. There is a number of suggestions
2 that Sandia is proposed to do in the study and I
3 would open it up for comment either on those
4 suggestions or on new items and we'll go first to
5 Bob Halstead and, Bob, when you have your one
6 major point on, let me see if I can get some
7 reaction to it also. Go ahead.

8 DR. MASSEY: Can I interrupt one second
9 for one thing I forgot to add on? In the
10 collision analyses I forgot one thing. We would
11 also look at having simulated fuel weight inside
12 the cask during these collision events to take
13 into account the momentum, forces caused by
14 addition of fuel inside the cask.

15 MR. HALSTEAD: There were three things
16 that I wanted to speak to so I will do them one
17 at a time.

18 MR. CAMERON: I'll tell you what to be a
19 little bit more efficient. Why don't you put the
20 three on the table and let's go get some
21 discussion on that and then we'll come over to
22 Marvin and Felix. Do you still have your card

1 up? We'll go to Felix. Go ahead, Bob.

2 MR. HALSTEAD: First of all, we endorse
3 more attention to modelling the bolts. Everyone
4 knew that was a problem with the first modal
5 study. Consequently discussions particularly we
6 had with people from BNFL, based on their testing
7 results led them to believe, and this is, you
8 know, anecdotal that I'm passing on, that inner
9 strain, inner shell strain as low as one percent
10 might cause bolt failure based on analyses that
11 they had done. That's certainly an area we would
12 endorse paying attention to.

13 Secondly, the speed issue is complicated
14 by first looking at the speed of the transport
15 vehicle and secondly the issue of whether you
16 also want to consider speed as a factor for other
17 vehicles being involved in a multivehicle
18 collision.

19 As probably everyone around the table
20 who has got an anecdotal experience with driving
21 on the interstate these days can tell you, at
22 least there seem to be and I haven't kept a hard

1 count, but I seem to see a lot of big rigs
2 passing me at over 75 miles an hour and I have
3 seen fully placarded 1203 gasoline tankers and
4 exotic loads with liquid hydrogen passing me at
5 over 75 miles an hour. So in terms of other
6 vehicles that might complicate the highway crash,
7 I certainly think you need to look at the 75 mile
8 per hour range.

9 With rail, and Bob I don't mean this to
10 be taken as an aspersion on operating practices,
11 but we have looked at a couple of runaway
12 accidents. I'd like to think through a
13 combination of good operating protocols,
14 administrative controls imposed by regulations as
15 well as the common sense of the railroads that we
16 wouldn't have any runaway trains, but we do have
17 some experience in this country with runaway
18 trains derailing and in some cases colliding with
19 nearby objects at speeds in excess of 90 miles
20 per hour. I would certainly argue that something
21 in the range of 85 to 90 ought to be looked at.
22 And again I'm assuming that we would operate

1 under train operations that are about 55 miles
2 per hour in the western part of the country.

3 The third issue is the issue of multiple
4 bolt failure. I hadn't heard the word zipper
5 effect before, but that actually captures an
6 issue that we've been thinking about in the
7 context of attempting to model human error.
8 There are all kinds of other ways to get at the
9 human error issue, but I can think of about 20
10 different types of human error that might result
11 in improper unexpected performance of the lid
12 closure in an accident. And so a question I pose
13 to you, because I'm not sure whether this can be
14 modelled in the cost effective way, but one way
15 to approach the impact of human error in cask
16 performance would be to look at a specific
17 consequence of any number of human errors that
18 might result in a condition like zipper effect
19 around 50 percent of the closure creating a gap
20 say of a half inch to an inch that would effect
21 the block regions above 35 or 40 miles per hour
22 or some -- obviously there is a certain amount of

1 arbitrary judgment call in this. But those are
2 the three things I want to throw on the table but
3 focus on bolts is good. We'd like to see 75
4 miles per hour for truck and 90 mile per hour for
5 rail speeds and also looking at the speeds of
6 other vehicles impacting them and we'd like to
7 look at some discrete ways of modelling the
8 implications of human error for cask performance
9 under absolute conditions.

10 MR. CAMERON: Thanks a lot, Bob. Let's
11 see if we can take the bolts and human error
12 together and then go to speed. I realize people
13 have their cards up to throw other ideas on the
14 table, but to sort of discuss this at one time,
15 is there any gloss that anyone wants to add to
16 the -- while it's a good idea we're modelling
17 bolts issue? How about this idea of human
18 error?

19 Ed, did you want to say something about
20 that or are you waiting for the speed?

21 MR. PRITCHARD: I'm waiting for speed.

22 MR. CAMERON: Anything on the human

1 error? We heard Amy bring this up before. Let's
2 go to -- Susan, do you want to make a
3 clarification?

4 MS. SHANKMAN: Can we frame that as
5 human performance rather than human error?

6 MR. HALSTEAD: Human factors make it a
7 little broader. You're right. I stand
8 corrected. I'm trying to learn to communicate
9 better, Susan.

10 MR. CAMERON: Rick, you want to talk to
11 human performance?

12 MR. BOYLE: Thanks, Chip. Just to make
13 one point which I think one of the speakers made
14 earlier about the requirement for NRC approved
15 quality assurance programs for design,
16 fabrication, maintenance, use, reuse, all of
17 those aspects of cask utilization. So that
18 looking at human performance you should be done
19 in a context of human performance under a rather
20 rigorous quality assurance program.

21 MR. CAMERON: This is an interesting
22 point even on emergency response that we had.

1 Should human performance be factored in assuming
2 that there is an a rigorous and rigorously
3 enforced quality assurance program is the
4 question. Do we have any thoughts on that
5 particular issue? Susan, do you want to say
6 something about that before, for the group?

7 MS. SHANKMAN: I think we will look at
8 it. I guess I want to couch it in clarification
9 that human performance and most other risk
10 assessments that we've done has been shown to be
11 as much a contributor as a savior, and in many
12 ways it's human performance that has prevented an
13 area and there are only maybe three ways to
14 standardize human performance. One of which is
15 to engineer it, most expensive and most
16 successful. And the other is to proceduralize it
17 which is less expensive and medium in success and
18 training which the least expensive overall and
19 the least likely to predict human behavior. So
20 we can look at it but I think that this is not,
21 unfortunately my personal sense, that this is not
22 so significantly different than any other

1 activity in which humans perform a safety
2 function.

3 I think we can use some of those insides
4 from other venues and see whether they speak to
5 us here and so I think we should include it in
6 the study. But I don't think we have any clearer
7 sense of what somebody else does of danger that
8 speaks to this particular activity.

9 We have some in nuclear power plants
10 because it's recorded by procedural personnel in
11 other ways, so if you know of the database I
12 think we really need to know where that is.

13 MR. CAMERON: Let's explore this a
14 little bit further. The issue is is should the
15 study be done with the assumption that rigorous
16 QA program is in place? Kevin, you want to add
17 something on that particular issue?

18 MR. KAMPS: Yeah, just the experience of
19 Palisades bears on this again in that I've heard
20 said that quality assurance was in place with the
21 casks of Palisades and that certificates of
22 compliance was in place, but there have been

1 breakdowns at both of those at Palisades.

2 The quality assurance at CR Nuclear,
3 Incorporation which manufactured the cask system
4 was found to be very shoddy years after the fact
5 upon going back and looking locking at it,
6 inspecting it. Yeah. Just again a three year
7 cessation in the loading of casks because of the
8 explosion in Wisconsin and this summer, the
9 summer of '99, in June Palisades went to load the
10 first VST 24 cask in three years and the whole
11 idea for the three year suspension was to get
12 everything in order and again there were
13 inadvertent hydrogen burns with the casks and
14 this was due to a breakdown in the administrative
15 controls.

16 So definitely human error and breakdowns
17 in these in these procedures and regulations are
18 contributing factors to something that is
19 unprecedented which is the consequence of an
20 accident that releases radioactivity into the
21 environment of this intensity that any mistakes
22 that occur are long lasting permanent damage to

1 communities and to the land. So that is
2 unprecedented the nature of the material we're
3 talking about.

4 MR. CAMERON: All right. Thank you.
5 Anybody else on the QA issue? Go to Felix and
6 then Amy.

7 MR. KILLAR: I think what you have to do
8 when you start looking at things like this is you
9 have to include this with other type things that
10 could occur. You can't single out human error.
11 Certainly we have very extensive quality
12 assurance programs. We have very extensive
13 training programs to minimize human errors, but
14 human are humans and things happen. So I don't
15 think you can avoid it. But at the same time I
16 don't think you need to single it out. I think
17 you can include human error such as other type
18 errors or problems such as you get a bad set of
19 bolts. You have a straight spec maybe as far as
20 a bolt but it wasn't tightened correctly or it
21 was tightened correctly but it's the wrong bolt.
22 I think things like that have to be grouped into

1 a category of others or other impacts or what
2 have you because I think if you try to focus on
3 human error, it's going to be a continuum to
4 where you will never come up with an answer that
5 is satisfactory to all people. Assuming human
6 errors will occur and that's what we do in our
7 industry, we assume human errors occur and so
8 therefore we try to have back up systems and we
9 try to have other things. But when you're doing
10 your study and designs you've got to look at what
11 type of errors can occur whether it's welding
12 deficiency, a wrong bolt, wrong torque or the
13 operator for whatever reason forgot to the put
14 the seal in or whatever could have happened
15 happened and see what impact it has and it's
16 really the consequences of that action not the
17 action itself.

18 MR. CAMERON: Thanks, Felix. Amy,
19 quality assurance?

20 MS. SHOLLENBERGER: I just wanted to say
21 that it seems to me like all the other factors
22 that we've discussed, we talked about

1 conservative approach where Dr. Massey has
2 suggested that the impact limiters weren't
3 considered in a crash test because that was the
4 conservative approach. And it seems like this
5 question is the same type of question. So it
6 seems like in order to take the conservative
7 approach you would not consider the quality
8 assurance program because it's like impact
9 limiters, it limits the impact of human error
10 just like the impact limiters limits the impact
11 of a collision.

12 So I think that in order to do a correct
13 study, a conservative study, you should say yes
14 there is a quality assurance program and yes
15 there is an impact limiter but we're not going to
16 consider those things in our test.

17 MR. CAMERON: Thank you, Amy. Let's go
18 to the speed issue and then we're going to ask
19 Marvin to put some of his issues on the table.
20 Yes, Bob.

21 BOB: Before you close that human error
22 discussion, Felix did a really good job of

1 stating some things that I didn't state very
2 well. I just want to clarify. I just want to
3 make two points. One is you have to look at
4 human error in spite of the fact that you assume
5 that you have rigorous NRC approved QA QC
6 programs.

7 And secondly, as a modelling proposition
8 I'd like to try and sum up a range of human
9 errors, equipment problems, and focus on maybe
10 one, two or three conditions that could result
11 from any number of causes and then try to assess
12 so that we have some quantitative handle on how
13 those effect cask performance.

14 Felix, I really like the way you -- when
15 I said human error I was covering the whole broad
16 range of things you wouldn't technically classify
17 as human performance. Thing like counterfeit
18 parts.

19 MR. CAMERON: Thanks, Bob, for that
20 clarification. We're going to go to the points
21 Bob made on speed.

22 One is don't just look at the speed of

1 the transport vehicle, but consider the speed of
2 other vehicles. As speed figures to use 75 miles
3 per hour truck, 85 to 90 miles per hour train. I
4 think that that got, Ed wanted -- did you want to
5 say something about that? Go ahead Ed Pritchard
6 and Bob Fronczak.

7 MR. PRITCHARD: Just want to respond
8 back to the about regulatory and runaway trains.
9 The federal railway administration did take
10 regulatory action after those accidents.

11 What the train device does for those
12 nonrailroaders in the room, there's quite a few
13 that are not railroaders here, it permits the
14 engineer to apply the brakes from the back as
15 well as the front of the train. And it's done
16 electronically and it's required on freight
17 trains over a certain size and weight and going
18 over certain grade. So we do have those
19 regulations in place right now as a
20 clarification.

21 MR. FRONCZAK: One of the advantages
22 assuming, or with the use of dedicated trains,

1 would be you could use electronic brakes and
2 apply the brakes much more quickly at the speed
3 of light instead of speed of sound and do that
4 instantaneously you decrease your stopping
5 distances or increase them by like 30 to 50
6 percent.

7 As far as the speeds go you recommended
8 90 miles per hour. I don't know if that's the
9 right speed or not. I think you are right. I
10 think we would like to see track speeds, normal
11 track speeds for freighter approaching 70 miles
12 an hour out west and you could have two trains
13 doing that or you could look at 55 miles an hour
14 for this shipment assuming that spent nuclear
15 fuel would be transported at two trains speed and
16 then another train coming in at 70 miles an hour.

17 MR. CAMERON: Thanks, Bob. That goes to
18 a couple of issues. One is the speed not only of
19 the transport vehicle but the speed of the other
20 vehicle and you said normal track speed in the
21 west, so I guess that's a regional variation.
22 Much has been suggested along those lines looking

1 at regional and seasonal variations.

2 Let's go to Dr. Lee for a comment.

3 We're on speed, Henry.

4 DR. LEE: I have a comment on speed
5 because the study we are performing and also in
6 the regulation is the impact and of course you
7 know considering the two vehicles hit each other
8 and the both have speed, but then this is a more
9 realistic situation in the real world, but I
10 think that the unyielding surface is not a
11 realistic assumption and if we're going to look
12 at this very severe impact with such a high
13 speed, then we will really have to consider real
14 objects and we'll have to -- impact energy has
15 been shared by both objects and not just by one
16 alone.

17 MR. CAMERON: Thank you, Henry. Do we
18 have other comments on speed before we go to
19 Marvin? One final or perhaps two. Go ahead,
20 Felix.

21 MR. KILLAR: I just want to say on speed
22 we agreed that I don't think we need to go any

1 more than 90 or 100 miles an hour for speed on
2 the rail lines. The other thing I think we need
3 to be careful of is you talk about head-on
4 impacts either by trailers or head-on impact by
5 trains. While you don't want to see that happen
6 they have happened from time to time. But if you
7 start looking at those type of scenarios you need
8 to put them in realistic scenarios and that that
9 cask is not out of the head of the cab of the
10 train or out of the head of the cab of the truck
11 and so you do have quote unquote impact limiters
12 whether it be the locomotive or the cab.

13 You need to make these things realistic
14 as you start looking at these analysis and don't
15 go off on a wonderful analysis that don't make
16 sense to life.

17 MR. CAMERON: I think that that's a
18 point we're going to come back to as a general
19 point. How are these various accidents, other
20 things that are being considered, how is the
21 analysis supposed to be bounded?

22 Eileen was talking this morning about

1 the risk in forming the setting of priorities.
2 That can be looked at and studied. I think it's
3 an important issue and I believe later on in the
4 day Mike Wangler and others may have something to
5 say to that. Let's have one final comment on the
6 speed issue then I want to go to Marvin
7 Resnikoff. Rick?

8 MR. BOYLE: Thanks Chip. Having just
9 come back from four years in the international
10 arena, I can tell you that the issue of something
11 like test speeds probably get more attention than
12 any other issue by all modes of transport. The
13 international maritime organization, the
14 international aviation organization are all
15 interested in package performance for their mode
16 of transport. There are studies underway for air
17 transport, for example, to look at what are the
18 forces transmitted to a package. And so you end
19 up recognizing that one has to consider impact
20 velocity, angle, orientation, crush of the
21 conveyance, softness of the target, and the
22 relative stiffness of the package on the target.

1 So it's a very complicated and complex modelling
2 and undertaking. But I think as it's been said
3 the important thing is using real world speeds to
4 use real world targets and real world crash
5 scenarios.

6 The British, for example, crashed a
7 locomotive at 100 miles per hour. That's a real
8 world speed in a real world scenario and the
9 damage was minimal because there was nothing
10 behind the cask so it went bouncing down the
11 tracks. So there are many different analytical
12 techniques that can be used to predict
13 performance, but in both cases you have to use
14 apples and oranges if it's an unyielding target
15 then the speed has to be modified to reflect what
16 a real world target will be like.

17 MR. CAMERON: Okay. Thank you very much
18 for that, Rick. Marvin, would you like to put
19 some issues on the table for us for discussion?

20 MR. RESNIKOFF: Yes, I have three more
21 issues I want to put on the table but this
22 relates to what was just raised about realism,

1 but it goes in the other direction.

2 First, there is the issue of how heavy
3 these containers are. Do you just take into
4 account the cask? Do you take into account the
5 cask plus the fuel plus the impact limiters?
6 Yes. Or do you also take into account the rail
7 carriage? Does that also have to be taken into
8 account?

9 For instance, if you have a high star
10 one hundred cask you're talking about the impact
11 limiters 145 tons. But if you include the entire
12 carriage including the, what do I want to call
13 it, the skiff that holds the cask itself it goes
14 up to 211 tons. Is that the weight you should
15 look at when you look at a collision? I would
16 argue that it is. I would have that entire
17 package in a sideways impact to a hard rock
18 surface and that would be one of my bounding
19 accidents. Because it's a credible accident.

20 I want to bring up another issue which
21 was raised at the National Technical Waste Board,
22 a Nuclear Technical Waste Board meeting and that

1 is the issue of where are these casks actually
2 sitting in the train? Are we having a dedicated
3 train or are we having a heavy cask sitting next
4 to the locomotive or are we having the heavy cask
5 sitting at the end of the train with a bunch of
6 light cars in between?

7 It's important to have the actual model
8 of how the train is designed. Because if you
9 have a heavy car at the end of the train and
10 there is a, you know, derailment, then the whole
11 cask can go flying if there are a bunch of light
12 cars in between.

13 Finally, I want to raise an issue that
14 was raised earlier which is cask wrap around an
15 abutment. The modal study looked at casks
16 wrapped around an abutment and also more recent
17 versions of the modal study, which should come
18 out by Lawrence Livermore, which looked at a
19 truck cask. But they did not, they looked at the
20 effect on strain, but they did not look at the
21 effect on welds and bolts. That's an important
22 issue when you are looking at casks wrapped

1 around an abutment. What is the effect of that
2 on that on the welds and the bolts?

3 MR. CAMERON: Great. Thank you,
4 Marvin. And let's explore that first issue.
5 What weight is considered in the collision and
6 Marvin was suggesting that the weight of the
7 container should be considered, the weight of the
8 under carriage or skiff, I'm not sure what the
9 correct terminology of that is. Are there
10 comments on what weight should be used?

11 Charles, do you want to give us -- is
12 there a usual assumption that is used in this
13 case?

14 DR. MASSEY: As Marvin noted there have
15 been differences in what they have assumed is the
16 weight. What we are suggesting for the package
17 performance study is that we assume or take into
18 account the weight of the impact limiters, weight
19 of the contents inside the package and then the
20 package.

21 We'll certainly explore your comment of
22 whatever the transport vehicle is either for the

1 truck or rail car, that additional weight. Then
2 we also have to balance that against too in the
3 consideration of now that cask may also be
4 protected somewhat by the undercarriage. It's
5 not always cask is flying off, has all that
6 weight of everything behind it if it's still
7 attached to the rail car or to the --

8 If your suggestion is that we look at
9 that whole envelope of activities, I think that's
10 certainly something we'll take a look at.

11 MR. CAMERON: Other comments on what
12 weight should be considered? Rick?

13 MR. RAWL: Thanks, Chip. Just a
14 consideration that the tie downs would play an
15 important point because as the dynamics of the
16 accident progress, the cask in all likelihood
17 will be removed from the rail car because of
18 failure of tie down and it would be relatively
19 low G forces that would happen. So considering
20 whether to take the weight of the rail car into
21 account is you know depended on the dynamics one
22 is considering. The skid that it's mounted on

1 most likely is going to stay with the cask
2 because it's typically very securely mounted in
3 the skid, but that the skid is tied down to the
4 rail car in a different way.

5 MR. CAMERON: Thank you. I think Jack
6 Edlow has a comment on that. Go ahead, Jack.

7 MR. EDLOW: Is it not considered the
8 design that the cask should break away from the
9 car to move elsewhere as it's done in other
10 packages that are supposed to eject from the
11 vehicle so that they're removed from the
12 accident. Is this not necessarily a design
13 feature?

14 MR. RAWL: It ends up being that way
15 because the tie down attachments on the package
16 itself has to meet the NRC requirements.
17 Whereas, the tie down to the rail car meets the
18 DOT requirements which are not that stringent.
19 And you are right, in the end it's a good design
20 approach because that avoids having the tie downs
21 causing failure to the package.

22 MR. CAMERON: Thank you. Henry, do you

1 want to give us a little comment?

2 DR. LEE: Yes. Regarding the weight of
3 the cask, the content of the cask, and the impact
4 limiters, they are all considered as part of the
5 package so it's always considered. Actually it
6 may be a secret but most casks that were reviewed
7 and certified was tested, at least simulated
8 test.

9 Rick just said that the tie downs, the
10 NRC requirement really is very stringent and
11 actually probably is more stringent than any
12 country in the world because this is one part we
13 are not completely in compliance with. So most
14 likely it's going to break away from the vehicle
15 in a severe accident.

16 About those shipping skids, these things
17 probably if it's attached towards the package
18 probably will act as additional impact limiters
19 and absorbing energy.

20 MR. CAMERON: And thank you. Everyone
21 keep in mind that the suggestion that Marvin and
22 others are making, although there may be opinions

1 around the table on this, that suggestion, those
2 suggestions will ultimately be considered by the
3 NRC and Sandia in formulating phase two of this
4 project. Let's not lose sight of that.

5 Marvin, do you have a follow up on your
6 weight issues?

7 MR. RESNIKOFF: Actually I was hoping
8 the moderator would be Jerry Springer and not you
9 so we could just have it out.

10 MR. CAMERON: I'll try to create some
11 hostility here. I thought you people would create
12 it yourself.

13 MR. RESNIKOFF: You're calming everyone
14 down and we want to get at it.

15 I wanted to respond to what Dr. Lee
16 said. The whole tech design that I have looked
17 at, the one that has 145 ton cask and 211 ton
18 package, are you telling me that it's only a 2G
19 tie down? Is that your knowledge, yes or no?

20 DR. LEE: No.

21 MR. RESNIKOFF: What is the force? Is
22 it 2G or more? It's more is the answer.

1 MR. CAMERON: Is that the answer, it is
2 more?

3 DR. LEE: Yes, it is more than 2G.

4 MR. RESNIKOFF: So why did you tell
5 everyone it's 2G force, it's all going to break
6 away? That's not true.

7 DR. LEE: As you know I am NRC and I
8 don't know exactly what is the tie down of
9 requirements for rail cars or highway trailers.
10 I think they are more 2 Gs. NRC tie down
11 requirements is 10 Gs in the direction of travel,
12 5 Gs transverse the direction of travel and the 2
13 Gs in the vertical direction and all these three
14 component of forces apply the same time
15 simultaneously. So at least to the attachment
16 point of the package is this 10, 5, 2 G. So
17 these think about the weight of the package.
18 These tie down forces are very, very large and we
19 have been criticized by many people that this 10,
20 5, 2 Gs regulation is not developed when we have
21 such a big heavy cask, packages in mind.

22 MR. CAMERON: Let me just -- Marvin, did

1 you get, did we get the correct answer out on the
2 table for you?

3 MR. RESNIKOFF: No. The regulations are
4 one thing but actually how the design is is
5 another thing. I've looked at a design and I'm
6 going to go back and look at the SAR and actually
7 get the number and I'm going to send it to
8 Dr. Lee.

9 MR. CAMERON: Thank you. Thank you very
10 much. Let's go to the next issue that Marvin
11 brought up which is, I take it, a recommendation
12 that the study should consider where the cask is
13 cask located on a train. I would imagine that
14 the answer would be different for a dedicated
15 train, obviously I suppose, versus an undedicated
16 train if I could use that term.

17 Ed and Bob, do you want do talk about
18 that? Go ahead.

19 MR. PRITCHARD: The requirements on
20 train placement are the same for dedicated train
21 and regular freight train service. It's a one
22 car train placement for an occupied caboose or

1 locomotive.

2 MR. CAMERON: And, Bob, do you want to
3 add to that?

4 MR. FRONCZAK: I think in practice what
5 we have seen is a buffer car between locomotive
6 and first cask that's usually a gondola or flat
7 car. We think there are some things you can do.
8 First of all that buffer car ought to be a
9 similarly weighted vehicle and if it was a
10 gondola let's say with some stone in it, it could
11 actually act to absorb energy in case of a
12 derailment.

13 MR. CAMERON: Okay. Thank you. Anybody
14 else on the -- Bob Halstead?

15 MR. HALSTEAD: Two aspects of this issue
16 are -- again I hate to think of these casks being
17 transported on general freight trains, but to the
18 extent that that's still possible, even with
19 buffer cars properly placed you still have to
20 consider the possibility of interaction in a
21 derailment with other hazardous materials.

22 We ship a lot of mining explosives out

1 west. We ship, and I've had some experience, one
2 horrific one in Roseville, California, humongous
3 military shipment accident, bombs in this case.

4 There are other kinds of complicating
5 hazardous materials. They fall in a number of
6 categories. Ones people usually think about are
7 flammables or explosives but you also have to
8 look at cargoes like PVC chips that can fuel a
9 long sustained high temperature fire and
10 chemicals like acids that might both complicate
11 the response which I know in this exercise maybe
12 we're not looking at it, but may also have an
13 impact for example on cask components
14 themselves. The last and probably less important
15 but certainly the flammables and explosives need
16 to be considered. I would argue that you have to
17 look at these mixed loads two ways.

18 One, the interaction between these other
19 cargoes and cask car if the cask is being shipped
20 in a mixed freight train, but you also have to
21 look at the possibility of a two train collision
22 even if you are using the dedicated train for the

1 spent fuel cask and the possible interaction and
2 I'm particularly concerned about mining
3 explosives and military weapons being shipped by
4 rail also.

5 MR. CAMERON: That's the similar point
6 that you made in our first discussion about what
7 accident scenarios should be considered. We're
8 going to talk about Marvin's last point and then
9 we're going to go over to Amy Shollenberger for
10 her general comments on this.

11 Marvin's last point cask wrap around an
12 abutment, don't just look at the impact on --
13 look at the impact on welds and bolts. I see Bob
14 Halstead is definitely shaking his head.

15 MR. HALSTEAD: A minor clarification
16 since that was my point. Yes, when I brought it
17 up earlier we were talking about looking at the
18 wraparound on different cask designs and
19 materials, but Marvin is absolutely correct. It
20 might even be more important to look at the
21 impact of the wraparound on the performance of
22 the bolts, closures and seals.

1 MR. CAMERON: Anybody have any other
2 comment on that particular issue? Let's go to
3 Bob Fronczak and then Ed Pritchard.

4 MR. FRONCZAK: These are a few points I
5 wanted to make anyway, but we do think that the
6 original study focused too much on relating
7 accidents to the regulatory test conditions and
8 not enough going to real accidents. So we do
9 think you ought to spend some time and look at
10 what can happen. And we already talked about
11 what our real surfaces, rock surfaces, bridge
12 abutments or whatever. I'm sure you will address
13 that.

14 The other thing is a locomotive sill. A
15 locomotive sill is a very strong structure. It's
16 going to be in every train that is transporting
17 spent nuclear fuel, so it does have a real
18 possibility of impacting a cask. And I think the
19 modal study looked at that not on a point basis
20 but on more of a distributed load basis. We
21 think you ought to look at it on point of impact.

22 MR. CAMERON: Could you just say that

1 term again? A locomotive --

2 MR. FRONCZAK: Sill?

3 MR. CAMERON: S I L L?

4 MR. FRONCZAK: S I L L, yes.

5 MR. CAMERON: What is that for those of
6 us who don't know?

7 MR. FRONCZAK: It is the structure of
8 the locomotive. It is the mainframe of the
9 locomotive.

10 MR. CAMERON: Thank you very much. Ed,
11 do you want to add on the --

12 MR. PRITCHARD: I just want to remind
13 NRC to look at our Part 174 for train placement
14 requirements that covers not only the radioactive
15 material next to locomotives and occupied
16 cabooses but also next to explosives and other
17 hazardous materials. That's all.

18 MR. CAMERON: Okay, thank you very
19 much. Eileen do you have a point on the wrap
20 around?

21 MS. SUPKO: I think in trying to assess
22 what have been termed real world accidents,

1 whether it be the wraparound type conditions or
2 others, the difficulty is going to be in saying
3 what's a real world accident? Where do you set
4 your bounds? What are the limits? You can keep
5 adding condition, upon condition, upon condition
6 until you have something that is no longer real
7 world but is extraordinary and isn't an accident
8 that could happen. I think you need to be very
9 careful about defining what those real world
10 accidents might be.

11 MR. CAMERON: Again, I think that
12 underscores the need to perhaps have a specific
13 discussion of this whole idea of bounding real
14 world conservatism that we've been talking
15 about. There is a tension there and I think we
16 need to have a discussion on that.

17 Henry, do you have a quick comment on
18 the wraparound issue?

19 DR. LEE: I think the impact wraparound
20 accidents are very import. We should look into
21 it, but I would like to point out that the cask
22 has many layers of protection. We have inner

1 shell one and a half inch thick and we have gamma
2 shell several inches and then we have outer shell
3 two and-a-half inches thick and then outside of
4 that we have absorbing materials. All these
5 things in the real world will absorb energy and
6 even hit the real hard object.

7 The weight of the package is so great
8 and it's hard to think that the object will stay
9 stationary or no damage or no yielding. But like
10 I say you know this is a good comment and we will
11 look into it. Besides the material we use to
12 construct these packages very ductile and it can
13 subject to a large deformation without breaking.
14 So I think we have adequate protection.

15 MR. CAMERON: Okay. Final comment on
16 this before we go to Amy? Go ahead, Bob
17 Fronczak.

18 MR. FRONCZAK: Follow-up to you,
19 Eileen. There is a database, fairly
20 comprehensive database that we've got that's got
21 tank accident data for years and that's one of
22 the ways we have improved tank cars significantly

1 over the years. So that might be a place to look
2 at what are real forces that are experienced in
3 accidents.

4 MR. CAMERON: Thank you. What we're
5 going to do is go to Amy for her issues and then
6 I want to quickly go to the audience and then I
7 want to go into collision by fire so that we can
8 collision by fire. You know what I mean. Go
9 ahead, Amy.

10 MS. SHOLLENBERGER: I will be quick. I
11 just have a few points. First of all, I just
12 want to reiterate as often as possible that
13 public citizens would like to see full scale
14 testing done with real casks. Just to make sure
15 that's on the record.

16 MS. SHANKMAN: Full scale testing with
17 real cask. Can you just say a little bit more
18 about real casks?

19 MS. SHOLLENBERGER: What I mean by real
20 cask is one that has been constructed not a
21 computer simulated model. I know you all say you
22 plan on doing that.

3 MS. SHOLLENBERGER: Yes.

6 MR. CAMERON: We have a whole discussion
7 area on this issue so we'll bring it back then.

13 Also I have two questions and these are
14 questions about whether this is a good idea or
15 not because I'm not sure. I would like to see
16 what would be, if it could be in the study what
17 could cause the cask to create a release? Rather
18 than trying to think of accident scenarios and
19 then testing those scenarios, can you say here is
20 what would compromise the cask. This would have
21 to happen.

1 know that on the trains buffer cars are required
2 in between the casks and I know in the study you
3 have a picture where if the train crashes there
4 is a thing with the couplers that makes it stop
5 before the casks run into each other. My
6 question is if the train derails and there is
7 more than one cask on the train, can we look at
8 likelihoods and impacts of cask-to-cask
9 collisions? Because as you said these casks are
10 the various things that we make and maybe if they
11 run into a bridge abutment it's not going to
12 compromise it, but what's going to happen if two
13 casks collide with each other and is that
14 possible?

15 MR. CAMERON: I want to get the answer
16 to the first question which I believe Charles
17 could probably give us an answer to. In other
18 words, in the study Amy is suggesting look at
19 those accident scenarios that would create a
20 release and this may get us back into the
21 bounding issue again, but if you could just
22 briefly give her some information on that and

1 then we'll hear something about the multiple
2 casks colliding. Do you want Jerry to answer
3 that?

4 DR. MASSEY: I think one of the things
5 that will come out of the study is we look at
6 these severe accident regimes, unyielding
7 surfaces and go to some yielding surfaces of two
8 trains colliding. One of the things that we will
9 be able to tell is get better models that can
10 predict cask performance and then we can start to
11 get some feeling for where in these regimes might
12 we see the releases of material from the
13 package. Something we can vision as coming out
14 of the package performance study.

15 MR. CAMERON: Thank you. Bob, you want
16 to talk about the multiple train derailment,
17 multiple cask.

18 BOB: One piece of technology that we
19 use all the time, and this is primarily on
20 hazardous materials transportation, it's what's
21 called shelf couplers where you have something
22 restraining the couples from becoming uncoupled

1 so the cars stay coupled in a derailment and that
2 eliminates or greatly reduces the possibilities
3 of the vehicles impacting each other. You see
4 that commonly in an Amtrak derailment where the
5 cars don't come apart because you don't want the
6 cars impacting each other.

7 You bring up a good point and it goes
8 back to the tie down requirements. If you have
9 lose tie downs where the casks come off, then the
10 casks can impact each other. We think that it's
11 probably a better idea to keep the casks on the
12 car and then keep the car parked.

13 MR. CAMERON: Okay, thank you very
14 much. We're going to have one last comment at
15 the table in regard to your first point. Amy and
16 then I want to see if anybody in the audience has
17 anything to say. Go ahead, Eileen.

18 MS. SUPKO: While I think that the
19 exercise of attempting to test to destruction a
20 cask might be interesting academically. I don't
21 see the point of it under real life circumstances
22 and I think that as, I mentioned earlier, we need

1 to keep this study focussed on what is real, what
2 are the bounding conditions that a cask might
3 actually meet under real transportation
4 conditions and use that to frame the study.

5 Academics aside, yes, it would be
6 interesting what would we have to do to this cask
7 in order to destroy it and cause a leak, but I
8 think everyone agrees as I mentioned earlier, the
9 current regulatory framework exists that makes
10 these casks safe for transport and we don't need
11 to push things to the limit in terms of trying to
12 see where the pie in the sky accident, it's not
13 going to occur, what that might result in.

14 MR. HALSTEAD: I don't necessarily
15 disagree on testing a failure mostly because it's
16 difficult to do that in the real world. But I
17 think modelling the failure, and I'm familiar
18 with some of the work that the mechanical
19 engineering group at the University of Reno did,
20 University of Nevada at Reno did under DOE
21 funding to determine failure thresholds by say
22 running the regulatory fire. Actually I should

1 say that, make the general point here that
2 determining failure thresholds, some of us feel
3 is very valuable, but it doesn't necessarily have
4 to be done through full scale testing. I like
5 full scale testing for other purposes but it
6 isn't necessarily, I think, just an academic
7 exercise, because in public meetings with people
8 when you tell them how robust the casks are the
9 question always comes up just how good are they?
10 Where is the failure point? Some studies already
11 tell us where that probably is for thermal. I
12 don't know where those points are for impact.

13 MR. CAMERON: Thank you, Bob. Anybody
14 in the audience who wants to comment on the
15 container performance collision issue before we
16 go on to the container performance and fire? Bob
17 just talked about a failure threshold there so
18 we're going to get into that.

19 Charles, would you set up the next topic
20 for us and I believe that we're also going to
21 have another member, an expert from the NRC staff
22 come up who we will introduce as soon as Charles

1 is done with his set up. Go ahead, Charles.

2 DR. MASSEY: The next topic is the
3 container performance during the fires. In modal
4 study there was a 1B (phonetic) analysis of cask
5 response. They looked at two fires, an 800
6 degrees centigrade fire which is the regulatory
7 standard and a 1,000 degree C fire, very
8 simplified version of cask response to the
9 thermal environment.

10 On the outer edge of these casks where
11 they have the neutron shielding material with
12 some stainless steel layer on the outside, this
13 was modelled as having this outer stainless steel
14 wall in place. Nothing inside here. There was
15 no water under -- neutron absorbing material.
16 But the existence of this couple inches of air
17 gap, stainless steel does act as an insulator to
18 decrease the heating of the cask in a fire. But
19 that was essentially modelled on the cask.

20 They did look at, during thermal events,
21 that this lead layer inside the structural
22 strength of the cask, that there was some

1 deformation of melting, movement of the this lead
2 which would increase the gamma dose, two people
3 near the cask. Really they focussed on response
4 of the cask not so much of the contents to the
5 thermal environment.

6 In the NUREG 0170 reevaluation, we
7 looked at the fully engulfing chromium fuel
8 fire. Essentially a fully engulfing fire as we
9 look at a cask suspended in air, completely
10 engulfed by the fire, so there's no heat loss or
11 shielding or offset distance that would pass from
12 the fire to try to get the maximum heat meet load
13 that we could into the cask.

14 We looked at that thermal environment on
15 the ordinary cask that we remodelled. Again, we
16 assumed that there was a neutron shield still on
17 the container, but that it does not contain any
18 water or other shielding material. We again
19 modelled, tried to calculate loss of gamma
20 shielding and the impact of that on personnel
21 around the cask and we did take some steps in
22 looking at inside thermal environment. What

1 happens to the contents inside the cask? A
2 little more expiration of rod performance under
3 thermal conditions.

4 For the package performance study, what
5 we're proposing to do is use a fairly new
6 three-dimensional thermal model that can go into
7 much more detail looking at the thermal response
8 of the cask and its contents to any fire
9 scenario.

10 We're proposing to model optically
11 dense. What that means there is no heat loss
12 from the fire. Essentially all that heat from
13 the fire is put into the cask a thousand degree
14 centigrade fire. Again, an empty undamaged
15 neutron shield tank so there is some insulating
16 effect of having an outer shield.

17 One of the things we would like to
18 explore because we don't have a pretty good
19 handle on what the impact of this is on a cask is
20 have the cask lying on the ground. So it has a
21 fire but there is some contact with the cask on
22 the ground because most situations the cask is

1 going to end up lying on the ground to be
2 involved with fires. We want to have a better
3 idea of how the cask responds and is there really
4 any impact of having it on the ground? Any loss
5 of heat to the ground? Those sort of issues.

6 We also want to take into account that
7 there is spent fuel inside the package and
8 there's been some criticisms in the past that we
9 haven't taken into account that there is heat
10 generated by that spent fuel. That's something
11 we should also take into account as we look at
12 the temperature of the fuel as a result of a
13 fire. We'd like to do those calculations then
14 actually perform a full fire test and prepare
15 model predictions to the test results.

16 MR. CAMERON: Thank you very much,
17 Charles.

18 I would like to introduce Mr. Ron
19 Parkhill who is with the NRC staff, Spent Fuel
20 Project Office. Ron has a bachelors of science
21 in mechanical engineering. He's a professional
22 engineer. Before he joined the NRC he was with

1 the Commercial Nuclear Power Plant Industry and
2 also an architect engineer for the industry.
3 He's been at the NRC 15 years and he's the expert
4 on thermal. It's on the team for this particular
5 project.

6 Let's do what we did the last time and
7 go to those of you around the table who have
8 either comments on the Sandia suggestions. We're
9 going to keep going this, but I will let you do
10 it or other things that they think that the study
11 should address in terms of container performance
12 during fires and, Bob, can I turn to you again to
13 put a couple issues on the table for us?

14 MR. HALSTEAD: Yes, umh-humh. One
15 category of fire impacts in addition to the
16 engulfing fire that we continue to have some
17 concern about and particularly this is, we have a
18 heightened awareness of this as a result of the
19 potential for propane fires and also one of the
20 Montana rail accidents is the potential for a
21 torch impact.

22 Generally speaking, we would assume that

1 that's more of a high temperature short duration
2 and I'm not really ready to give you the full --
3 this is one of the things I hope to address in
4 more detail in Henderson. One area we'd like to
5 add to this is the torch fire impact.

6 Secondly, we will be looking at the
7 thousand degree C fire. Again, I can't give you
8 an alternative value right now. And thirdly, I
9 can tell you that we think much longer duration
10 fires, particularly for the rail environment,
11 need to be considered and I'm in the process now
12 of looking at a select group of very severe rail
13 accidents involving fires that have occurred
14 between 1982 and 1988 and we'll be trying to give
15 you some more specific guidance on that.

16 Finally, I wanted to mention that the
17 thermal testing that I referred to earlier, which
18 for the benefit of the court reporter the
19 principal investigators are Miles Greiner,
20 G-R-E-I-N-E-R and Richard Wirtz, W-I-R-T-Z, at
21 the Department of Chemical Engineering,
22 University of Nevada, Reno. Their primary

1 interest was in looking at fire impacts on fuel
2 integrity. I may mix that issue up. They did
3 some work on fire impacts on seal integrity, but
4 looking at the thermal impact it's hard to
5 separate some of these issues, cask performance
6 from fuel, and if I confuse that issue I hope I
7 clarified it some.

8 MR. CAMERON: Three good issues for
9 discussion.

10 Could you explain a torch fire as
11 opposed to other types of fire?

12 MR. HALSTEAD: Fire resulting from a
13 puncture of a propane tanker or I'm not familiar
14 with the full range of other materials that might
15 be involved in that kind of fire a fire in which
16 a short duration, but very intense flame is
17 applied to a very limited region of a cask and so
18 you are not looking at the distribution of that
19 thermal input of the entire mass of the cask
20 because of the limited region of it.

21 MR. CAMERON: Marvin, do you want to
22 comment? Anybody have anything to say? Bob, on

1 torch fire? Some facts for the NCR team to
2 consider in thinking about torch fires.

3 ED: We do have requirements for tank
4 cars on transporting PIH materials and flammable
5 gases. There is a 30 minute torch fire
6 requirement and 100 minute pool fire requirement
7 so it's something you should take a look at and
8 that will also go with the information I gave you
9 this morning on the fire test studies that we
10 did.

11 MR. CAMERON: Amy did you want to
12 comment on the torch fire.

13 MS. SHOLLENBERGER: No.

14 MR. CAMERON: Second issue that Bob
15 raised was the 1,000 degree centigrade value.
16 Does anybody have anything to offer on whether it
17 should be -- yes, Marvin.

18 MR. RESNIKOFF: I wanted to just
19 generalize that a little. I think the study
20 should look at real materials that are being
21 transported on rail and the flame temperatures
22 for those materials. You should look at

1 profane. You should look at materials that are
2 really traveling the rails not just petroleum and
3 look at the flame temperatures of those.

4 DR. MASSEY: Also take into account the
5 inventories or assume different inventories of
6 material and if you look at the higher
7 temperature burn for exotic chemicals and also
8 get some idea on the amount of those materials
9 that are shipped. We have inventory that will
10 help us determine fire duration.

11 MR. RESNIKOFF: If you're looking at
12 probabilities too, you might want to look at what
13 materials would be transported; the amounts, yes.

14 MR. CAMERON: Okay. Good. Thank you.
15 Felix, you have a comment on the 1,000 degrees
16 and then we'll go over to Bob.

17 MR. KILLAR: The point I was going to
18 make on what Marvin just brought up, it's
19 important to look at the flame temperature of the
20 various chemicals that's being transported, but
21 it's also very important to look at the
22 temperatures of vaporization to see how much of

1 that is going to evaporate rather than burn or
2 can this stay in a liquid form or gassy state?
3 That makes a lot of difference how long your fire
4 lasts.

5 MR. CAMERON: Thank you. Bob?

6 BOB: I just want to follow-up on the
7 probability deal. You could look at a lot of
8 different materials and I think if you look at
9 fuel oil and LP gas you are going to get 90
10 percent or better of the fires that actually
11 occur. So you ought to focus your look at all
12 these different chemicals.

13 MR. CAMERON: Thanks, Bob. Rick, Rick
14 Rawls.

15 MR. RAWLS: Thanks, Chip. In the same
16 way that speed is one aspect of mechanical
17 insult, flame temperature is the one aspect of
18 thermal insult. The NRC regulations specify the
19 emissivity, coefficients and also some other
20 coefficients that go into defining the thermal
21 flux.

22 In real world accidents you may have a

1 large pool which is going to be cooler in the
2 center than if you have a small pool because the
3 flame is oxygen starved. So there are many
4 different real world considerations that go into
5 trying to determine the thermal flux to the
6 package, other than just the maximum flame
7 temperature, much less the average flame
8 temperature in other phenomena that go on.

9 Again, I guess it's just a matter of if
10 the studies look at real world accidents it
11 should look at it in the real world situation as
12 well.

13 MR. CAMERON: Look at the entire context
14 I think is something that Felix was saying too.
15 Bob?

16 BOB: Quick add-on and point others have
17 raised. In looking at those real world fire
18 environments, it's also important to look at
19 environments that may affect fire one way or
20 another such as presence of a fire occurring in a
21 tunnel, fire occurring under a interstate
22 overpass where there may be an depression

1 underneath that contributes to a pooling and also
2 in terms of the way that the fire is fueled.
3 It's important to consider a variety of sources.

4 It's possible that you could capture
5 this or envelope all these in the construction of
6 the pool fire, but it's important to remember
7 different sources of flammables which could be a
8 tanker travelling either by rail or by highway.
9 It could also be a stationary storage force like
10 a petroleum storage tank located near a highway.
11 Very common, for example, with liquefied
12 petroleum gases and also you have to look at the
13 potential of fire being fed by a pipeline and you
14 have some experience with accidents that have
15 occurred on top of pipelines co-located right of
16 ways and other cases where trains derail on top
17 of pipelines. One famous one in Las Vegas and
18 fortunately there was just enough soil to prevent
19 rupture of a pipeline. So endorse the concept at
20 looking at real world but look at that broadly
21 both in terms of sources of sources of the fuel
22 for the fire and then the environment that

1 actually contributes to the duration and of
2 temperature of the fire.

3 MR. CAMERON: I was going to add this
4 not only refers to temperature but also
5 duration. Bob, you said particularly for rail.
6 I think you are going to be developing some more
7 information on this. Do other participants
8 around the table have comments on the duration of
9 the fire, types of fires that should be
10 considered or effects of fire by the NRC and
11 Sandia? Kevin Kamps.

12 MR. KAMPS: Just a quick comment that
13 came up when emergency response discussions took
14 place earlier and that is talking about
15 combinations of real world things that no one
16 would think of. If there is a material on the
17 train, there may be different materials, some
18 that are explosive in the presence of water where
19 the emergency responders try to put out a fire
20 with water and cause a worse condition. So these
21 are the complications that need to be looked at.

22 MR. CAMERON: That's an interesting

1 one. Felix, do you have one comment here on
2 duration?

3 MR. KILLAR: Well, actually mine is on
4 responders which goes a little bit to duration.
5 I think what you have to do is assume that the
6 responders will not be there for a number of
7 reasons. As pointed out earlier in the current
8 situation they vent the fires and therefore don't
9 try and put the fires out. If you look at the
10 forest fires in the West now, the idea is to
11 possibly not put the fires out.

12 I did want to point out a little bit on
13 responders and that when you started looking at
14 these instances, you can't look at responders as
15 completely separate study, things on that line.
16 Responders can either be a help or hinderance.
17 So clearly the responders in trying to help or
18 not make things worse best thing is not to
19 consider responders in this particular analysis.

20 MR. CAMERON: Is that the point that you
21 were going to make previously? Okay. Great.

22 Amy do you have one point to add on what

1 Felix just said or a question for him?

2 MS. SHOLLENBERGER: One.

3 MR. CAMERON: Okay.

4 MS. SHOLLENBERGER: Well, first of all
5 I'd like to say that it seems like the venting
6 only is true on the trains. It seems like if
7 there is a truck accident where there is a fire,
8 emergency responders are not going to get it.
9 Just burn out. Especially if it's on a highway
10 where there are other people around that they're
11 going to come and put out the fire.

12 What Felix said also got to the point
13 and again this is just a question because I don't
14 really know the answer not being a scientist.

15 In the study I remember reading that
16 even if the cask was compromised and rods
17 exposed, they wouldn't go critical unless there
18 was some material present such as water to allow
19 the neutrons to interact with each other and it
20 seems like that could be a really important
21 question around emergency response. If something
22 happens to the cask and it's compromised and a

1 fire truck comes up and sprays water on it and
2 water goes in and the rods go critical and that
3 could be a major thing. I think it's something
4 that's worth looking at.

5 I would like to make one more quick
6 comment and that is this is a public involvement
7 question. I think one way to involve the public
8 is to really make sure all the information is
9 easily understood. You are trying very hard to
10 do that, but I would like to point out that both
11 in the study and in the summary all of the
12 temperatures were in Fahrenheit.

13 MR. CAMERON: That's a point well taken
14 is to do a better job of communication of this
15 information.

16 MS. SHANKMAN: Particularly 0170 update,
17 we're going to have a summary like we did for the
18 past modal study and the agency editors hopefully
19 will do what they have done in the past which is
20 insist that we give both values and more familiar
21 values, so familiar to you and me.

22 MS. SHOLLENBERGER: The question is moot

1 to me because I don't know what it is.

2 DR. MASSEY: 1,000 degree centigrade is
3 about 1850 degrees Fahrenheit. The 800 degrees
4 centigrade is 1,475 degrees Fahrenheit.

5 MR. CAMERON: Thank you. Let's go to
6 Jack, do you have comments on these?

7 MR. EDLOW: Yes. Thank you. I guess I
8 have a general comment about many of these points
9 that have been discussed over the last hour or
10 so. I think the current standards that have been
11 developed and have been accepted by the United
12 States and the international community, were not
13 arbitrarily selected. And the United States is
14 part of a new national regime that has agreed on
15 certain standards by which packaging is designed
16 and tested and that accident conditions are
17 applied for purposes of the package criteria.

18 I'm not prepared to sit here today and
19 urge you to redevelop the international standards
20 and I think that you have to bear in mind that
21 the U.S. standards and international standards
22 are set on a basis that are used to qualify

1 existing packages. Any discussion that these
2 would be inadequate or that somehow we have to
3 test at a higher level, we have to design at a
4 higher level, I think under cuts, potentially
5 undercuts international standards and U.S.
6 regulatory situations. So I would urge you to be
7 very careful how you go forward with this process
8 because this can be misconstrued in some ways by
9 not just the public but by U.S. government
10 officials that somehow what's been done up to now
11 is inadequate, which I think it is not based on
12 NRC policy at this time. Thank you.

13 MR. CAMERON: Thank you, and we're going
14 to go to Felix and then we're coming back over
15 the Marvin. But the point you raised not only in
16 terms of undermining the standard point, but I
17 guess it is a legitimate question in terms of how
18 you bound the feasibility of what happens.

19 Discussion, thread that's been running
20 through these discussions is how do you consider
21 the existing regulatory structure including QA,
22 etc., etc., in deciding what accidents you are

1 going to look at. I think we will revisit that.
2 Felix?

3 MR. KILLAR: I just wanted to bring up
4 two points. As far as use of water putting out
5 fires, whether it be train or truck, the fire
6 departments use their discretion. We had a very
7 good instance in Springfield, Massachusetts a
8 number of years ago where we had a new fuel
9 shipment that was on a truck involved in an
10 accident on the interstate. The fire department
11 elected not to put out the fire but it was their
12 concern that the run off could cause
13 contamination and what have you, which ended up
14 being a worse fire for the container although it
15 came out fine, but as a result of it they burned
16 up a truck. So whether they use water or not is
17 certainly at the discretion of the fire
18 department particularly chemicals we're carrying
19 like PCPs. The fire department will not use
20 water or foam on PCPs because they're afraid the
21 run offs will cause more of an environmental
22 impact and would rather let the stuff burn up.

1 Assumption that you won't use or will use water
2 is not, I think, a good assumption. You're just
3 looking for the worse situation.

4 Similarly with water and criticality for
5 a fuel cask, whether it be new fuel or spent
6 fuel, that is taken into consideration of design
7 and the assumption is that in the event of an
8 accident that the fuel will reconfigure into its
9 most reactive form will be with water and it has
10 to be assured it will not go critical under those
11 circumstances. So once again water is not an
12 issue as far as criticality of a cask in an
13 accident.

14 MR. CAMERON: I guess Amy's point really
15 went to the criticality issue which is our next
16 topic of discussion.

17 MR. RESNIKOFF: Two quick points I
18 wanted to make. With regard to this new study
19 that you are suggesting, and the neutron shield
20 tank, I note that the old modal study had used
21 the neutron shield tank or water tank and assume
22 that water was not in the tank. The effect is

1 that it served as an insulator in a fire and
2 essentially reduced the effect of what the fire
3 would be.

4 Similarly, you are going to take an
5 undamaged neutron shield tank and I think rather
6 than that I will take a damaged neutron shield
7 tank and in other words I would see exactly how
8 the shield tank decreases the heat input into the
9 cask and see whether if there were not, if the
10 shield tank were damaged how that would effect
11 the heat input to the cask.

12 The second point I want to make also
13 concerns fire, but it involves how one evaluates
14 the consequences. In some of these older studies
15 they assume that deficient products that might
16 get out of the cask plate out on the cask wall
17 and it accounts for reduction in the amount of
18 material that can get out of the cask. I don't
19 think that's proper in case of a fire. When you
20 have hot walls, hot cask walls, whether the
21 material will actually plate out on those walls.

22 That's an issue that I would also like

1 you to look into whether there will be plate out
2 of fission products on the cask's walls.

3 MR. CAMERON: That term was plate out.

4 MR. RESNIKOFF: Yes.

5 MR. CAMERON: Charles, do you have a
6 question for Marvin?

7 DR. MASSEY: I just want to follow-up
8 with Marvin for a minute. When you're talking
9 about the damaged neutron tanker, are you looking
10 at, consider it being crushed so it's flat up
11 against the inner container?

12 MR. RESNIKOFF: Precisely.

13 MR. CAMERON: Ask the audience if there
14 are any questions or comments on container
15 performance in the fire area before we go to a
16 break? Okay, let's take a break. It's about
17 3:19 by my watch. Let's be back and we'll start
18 at 3:45 with the spent fuel criticality issue.
19 Thank you.

20 (Pause in the proceedings.)

21 MR. CAMERON: Can we have two more
22 substantive topics, so to speak, before we

1 revisit some issues from this morning on process,
2 the whole relationship of the 0170 update to
3 what's going on here suggestions from all of you
4 on how the NRC can keep the public involved in
5 this process.

6 The whole issue of what I'm calling the
7 bounding issue that we mentioned and I'll talk to
8 someone about trying to put that into perspective
9 for us for discussion. You will note that these
10 two topics, the next two topics spent nuclear
11 fuel assembly behavior in accidents, physical
12 testing and computer simulation that we already
13 had a number of comments on, are shorter on the
14 agenda and maybe even shorter in real life
15 perhaps, because I do want to get you out of here
16 by 6 o'clock. We will finish at 6:00 and note
17 that you can submit written comments. Rest
18 assured, though, that the comments that you gave
19 to the NRC today are just as good as written
20 comments. In other words, unless you have
21 something to add, a finer point to make, don't
22 worry that you need to follow them up with

1 written comments because the staff will consider
2 the comments that have been made today. I want
3 to do assure everybody of that.

4 Rob Lewis, who we introduced earlier
5 today, he is the expert on criticality who is
6 going to be sitting at the table with us to offer
7 any information that's needed. I'm going to ask
8 Charles to set it up for us again.

9 DR. MASSEY: Thank you, Chip. Before I
10 even get started I would be remiss, I want to
11 make sure I point out so after this meeting if
12 you like you can talk to them, there are two
13 other individuals from Sandia with me here today
14 Dr. Ruth Weiner and Dr. Jeremy Sprung, so if you
15 do have other questions or clarifications or
16 comments please feel free to see them after the
17 meeting as well.

18 What I want to very briefly introduce is
19 a little topic session on the spent fuel assembly
20 behavior itself in the event of collision or
21 fire. The modal study estimated the number of
22 rods that could be damaged in a collision or a

1 fire based on one more collision essentially
2 the -- how much damage did they expect on the
3 inner cask wall and then they related that to
4 some estimation of the number of fuel rods that
5 would be damaged.

6 Then once they assumed that they had
7 some fuel rod damage they made assumptions based
8 on some previous studies not particular to
9 transportation to see how much material in the
10 fuel rod could get out into the cask. Once the
11 material was in the cask they assumed that all of
12 that would be released into the environment.

13 In the 0170 reevaluation under -- Sandia
14 calculated looking at the impact and thermal
15 forces calculated the fraction of the fuel rods
16 inside the cask that would be damaged. Then once
17 we had some damaged fuel rods we then calculated
18 how much material inside the fuel rod could be
19 released to the inside the cask. Then once we
20 had the material inside the cask we did
21 calculations on how much of that material would
22 be deposited inside the cask and depending on the

1 thermal or environment and then how much could be
2 released in the environment. So much more
3 detailed calculations on fuel response in the
4 event of a severe accident condition.

5 For the package performance study we'd
6 really like to get into, instead of using some of
7 our best engineering judgement and calculations
8 do some laboratory skilled experiments to get a
9 much better handle on the fuel behavior itself in
10 the event of structural and thermal forces.

11 One thing we'd like to look at is the
12 rod failure. Try to get some better handle on
13 how many of those could be expected to fail in
14 collision and thermal environments. Also, look
15 at inside the fuel assemblies themselves. Inside
16 the fuel rods are ceramic pellets. What we'd
17 like to look at is how did those pellets also
18 perform? How much breakup could you get in those
19 pellets particularly in a collision type
20 environment, so we have some idea how many very
21 small particles could be produced -- one could
22 partially get outside the cask.

1 Breakup of deposits on fuel rods,
2 another criticism has been when the fuel rods are
3 in the reactor in the storage pool, we get
4 deposits on the outside, the CRUD. In a
5 collision environment or thermal how much of that
6 CRUD that was on the fuel assembly, how much of
7 that would come off? So we'd like to get a much
8 better definition on how much of that material
9 would be available for potential release.

10 Also have on there the particle beds.
11 There's been a lot of talk on if you have a
12 fracture of the fuel rods and small particles
13 build up, how much of that could come out, but
14 also realizing that there's other material at the
15 bottom that has to be essentially filtered
16 through that bed of material. So we'd like to
17 get some data on the effect of particle beds.

18 Then I guess really the overall is to
19 get a much better definition of how much material
20 that's inside the rods in the cask is available
21 in the release mechanisms for a damaged cask
22 under thermal and structural conditions? So with

1 that I will give it back to Chip.

2 MR. CAMERON: Thank you, Charles. Does
3 anybody have anything to add to what Sandia is
4 proposing to do in the study in regard to spent
5 nuclear fuel assembly behavior? And let's go to
6 Marvin.

7 MR. RESNIKOFF: We've been considering
8 these issues because they've have been concerns
9 to us in the PFS proceeding in Utah. So I have
10 four different points I wanted to raise
11 concerning them.

12 One is Sandia should look at higher burn
13 on fuel than the standard 33,000 per metric ton
14 fuel. It can be cooled for five years but it
15 should be higher burn on fuel than previously
16 considered and more representative of fuel that
17 may be shipped.

18 We're particularly concerned about the
19 cladding. You actually look at cladding which
20 has been irradiated. It has been in the reactor,
21 you know, for the appropriate length of time
22 rather than just to take unirradiated cladding.

1 We would want you to faithfully consider the
2 properties of irradiated claddings when you do
3 the studies.

4 We looked at the analysis that has been
5 done previously by Lawrence Livermore Lab
6 concerning breakup of cladding. There is a paper
7 that was done in 1987 which is inconsistent with
8 the modal study and shows that cladding is
9 damaged when the G forces on the order of 60, 60
10 G., not 100s of Gs but a much lower amount. You
11 should look at that study. I'm sure you are
12 allowed to look at Lawrence Livermore work even
13 if they don't have the funding for this project.

14 Finally, there are two other points. We
15 would like you to do a dynamic analysis of what
16 happens if cask is dropped sideways. In other
17 words, you ever cladding and then you have fuel
18 pellets inside the cladding and when the entire
19 rod drops, the cladding, the pellets inside may
20 act as, I don't know how else to describe it, but
21 a hammer force. An additional -- rather than
22 consider simply the cladding weighing an

1 additional amount to account for the fuel pellets
2 inside the cladding, actually consider the
3 cladding as a separate rod. Actually consider
4 the pellets as a separate rod inside the cladding
5 and consider what would happen dynamically when
6 the entire rod falls sideways.

7 Finally, the radionuclides that you
8 consider inside the fuel assembly should include,
9 and they weren't included in the original modal
10 study, should include americium 241. That wasn't
11 included in the original study and chlorine 36.
12 That also needs to be included.

13 DR. MASSEY: Look at really a much more
14 representative inventory inside the spent fuel
15 assemblies representative of the higher burn up
16 and higher enrichment fuels that we expect would
17 be shipped. Does that pretty much get to the
18 point?

19 MR. RESNIKOFF: Yes.

20 MR. CAMERON: Let's go around to others
21 to examine that point to see if anybody else has
22 anything to say. Bob Halstead?

1 MR. HALSTEAD: I know probably everyone
2 is getting fatigued like I am, but we have two
3 specific values. I'm sorry we have two specific
4 types of spent fuel that we'd like to suggest for
5 evaluation purposes.

6 While we have a lot of questions about
7 the selection of the typical fuels that DOE has
8 identified in the draft EIS, if we use a bounding
9 approach to this we're comfortable saying that
10 one of the spent fuel types should be the spent
11 fuel that DOE has identified as the quote unquote
12 typical spent fuel to be shipped to the
13 repository. That fuel would be, and I'm trying
14 to make this less difficult for the court
15 reporter, Westinghouse 17 by 17 Lopar, L O P A R
16 assembly, that has been cooled 26 years after
17 withdrawal from the reactor that has a burn up
18 history of about 40,000 megawatt days thermal.
19 It has an initial enrichment of about 3.7
20 percent. Now that's one fuel type that you
21 should use that all other things being equal may
22 end up being typical of the fuel that is the

1 predominate fuel shipped over the next 40 years
2 or so if the Yucca Mountain goes forward.

3 On the other side, we would suggest as
4 an upper bound the fuel characteristics that the
5 commission accepted in NUREG 1437, which is a
6 comparable type of PWR fuel, but in this case
7 it's only been cooled out of reactor for five
8 years, it has an extremely high initial
9 enrichment by current practices of five percent
10 and a very high burn up by current practices,
11 62,000 megawatt days thermal.

12 Again, going back to the very earliest
13 point that I made, we're uneasy about single
14 value analyses and document like this and we may
15 not always agree, Felix and I or Eileen and I, on
16 the particular values on a bound, but I do think
17 the issue we brought up we do want to try and
18 take some kind of a bounding approach here
19 because there is a lot of uncertainty about what
20 will actually be shipped and the uncertainty has
21 to reflect the utilities need to manage the fuel
22 in their pools.

1 There are some utilities that are going
2 to exercise their contract rights possibly and
3 ship very hot out of reactor fuel as opposed to
4 shipping fuel from dry storage. DOE may decide
5 that it wants to receive some hotter fuel because
6 they haven't decided on their thermal loading
7 strategy. And on the other hand, we all know
8 that a lot of the fuel in the inventory is very
9 old and less radioactive and less hazardous than
10 the fuels I've just described that indeed it may
11 turn out that the oldest fuel first philosophy is
12 shipped, that fuel that's been cooled 30 years
13 may be early in the queue. So a bounding
14 approach to the characteristics of the fuel that
15 you select for analysis is absolutely important.

16 I'm going to waive the other comments
17 that I have because it's late in the day and I
18 will get more into the subject in detail when we
19 meet again in Henderson, Nevada. Thank you.

20 MR. CAMERON: Thank you, Bob. Kevin, do
21 you have a point on the type of fuel?

22 MR. KAMPS: Yeah. I just wanted to also

1 address that point that what actually is going to
2 be shipped needs to be taken into consideration.
3 At the Big Rock Plant in Michigan that being an
4 experimental reactor, there were fuel claddings
5 that were experimented there, that were tested
6 there; fuel rod types; plutonium fuels that were
7 tested there. And again with the Palisades cask
8 defects, the deterioration of the fuel in those
9 casks, what will the fuel be like that's actually
10 transported? If it is deteriorated to a
11 significant extent, how will it behave in an
12 accident? So just to reemphasize that.

13 MR. CAMERON: Thank you, Kevin. Amy, do
14 you have a separate point?

15 MS. SHOLLENBERGER: Separate.

16 MR. CAMERON: Rick, are you on type of
17 fuel or kind of? Go ahead.

18 MR. RAWL: In looking at some of the
19 information that's presented to us, one of the
20 things that always comes out first in an analysis
21 of cask response are those radionuclides which
22 are first available for release, the volatile

1 radionuclides. Those are the ones that will come
2 out when the cask is damaged minimally. They
3 will come out when the cask is damaged more
4 severely. So the calculations of release are
5 always building on the number or the amount of
6 those volatile nuclides that come out.

7 So in the bounding scenarios that have
8 been set, I just wanted to point out how
9 important it is to have good numbers for the
10 volatile radionuclides in order to ensure that
11 all the other radionuclides that come out as
12 particulates are being added to an accurate
13 base.

14 MR. CAMERON: Thank you very much,
15 Rick. Bob, do you want to comment on the type of
16 fuel or you have a separate point? Let's go to
17 Marvin's second point and, Marvin, I'm not sure I
18 captured this one. You were talking about
19 consider the properties of irradiated cladding
20 and you were talking about use the 60 G force.
21 I'm sure others understand what this means and I
22 guess I would ask them if they had any questions

1 about it or -- does everybody understand what
2 Marvin's point is there? I don't need to
3 understand. But is there anybody else who could
4 use an explanation of it?

5 Marvin, could you just explain that,
6 that one what you are trying to get to there?

7 MR. RESNIKOFF: Some of the studies I
8 have seen and I think it's the modal study, too,
9 look at the damage done to fuel assemblies, to
10 fuel cladding in particular and they have forces
11 that are up in the hundreds of Gs before cladding
12 is damaged. On the other hand, there is a
13 Lawrence Livermore study that we have looked at
14 which looks at cladding and looks at this
15 particular fuel assembly that Bob mentioned, the
16 Westinghouse 17 by 17 fuel assembly and does a
17 static analysis. In other words, drop it and
18 look at where the spacers are in the fuel
19 assembly and look at the length between spacers
20 and see what the force will be when you drop it,
21 how much it will bend.

22 Those show damage for forces on the

1 order of 60 G. In other words you only have to
2 drop the cask on the order of a couple feet to
3 get that kind of damage level. Even those
4 studies concerned us because we were concerned
5 that the cladding itself may not have all the
6 properties of irradiated cladding. So we wanted
7 Sandia in particular to particularly test
8 cladding which has been irradiated to see if it
9 becomes more brittle when it's irradiated
10 particularly to higher levels and whether it
11 would shatter more easily, you know, with a lower
12 force.

13 MR. CAMERON: Okay. I thank you for
14 that. I think that that's clear and I would just
15 ask if anybody around the table who has any
16 comments on that recommendation? We do
17 understand it. All right.

18 Marvin's third point was do a dynamic
19 analysis of a cask that is dropped sideways.
20 Treat the pellets as a separate rod inside the
21 cladding. Now Charles, Rob, do you understand
22 the nature of Marvin's suggestion? Okay. Does

1 anybody else have a comment on that particular
2 point.

3 The last one goes to the elements
4 americium and forget what the number was and
5 chlorine but those should also be considered. Do
6 you want to give me those numbers again and I'll
7 put it up for people to see.

8 MR. RESNIKOFF: Americium 241 and
9 chlorine 36. Americium 241 was not considered in
10 the modal study. They looked at fuel essentially
11 that came out of the reactor and americium 241
12 builds up over time. So in the decay of
13 plutonium 241, americium 241 builds up and so if
14 you can have fuel that's aged five years or
15 longer you need to look at the build up of
16 americium 241 and fuel.

17 Chlorine 36 behaves similarly to iodine
18 129 and that's why it's important because it is a
19 volatile material. It's important to look at
20 that in accident situation.

21 MR. CAMERON: Okay. Thank you. Bob
22 Halstead, comment?

1 MR. HALSTEAD: At this hour I'm not
2 going to belabor this by fishing the number out
3 of my briefcase, but I remember reviewing
4 particularly older fuel in the 20 to 30 year
5 range. Marvin is right, americium becomes one of
6 the top six or eight of radionuclides in terms of
7 securing concentration.

8 MR. CAMERON: Thank you for that
9 clarification. Any other comments on the
10 americium, of chlorine or related radionuclides?

11 MR. KAMPS: Just one I forgot before.
12 The Department of Energy's proposal to burn mox
13 fuel in U.S. reactors also introduces different
14 quality of highly irradiated nuclear fuel that
15 would be transported. That needs to be
16 considered.

17 MR. CAMERON: Thank you. Let's go to
18 Bob Fronczak for some points on criticality.

19 MR. FRONCZAK: Actually my points aren't
20 as far as criticality. It's the response of the
21 cask including the contents. Our understanding
22 is that the modal study didn't consider the

1 contents of the cask or said that they would have
2 little effect and it wasn't explained very well
3 because there weren't a lot of details provided
4 so we'd just like that that be clarified.

5 The other thing is that we felt the
6 contents of the cask could also add stiffness to
7 the cask that wasn't considered in certain impact
8 scenarios. So we'd like you to consider that
9 too.

10 MR. CAMERON: Any comments on Bob's
11 suggestions? Felix?

12 MR. KILLAR: Just a clarification. When
13 you are looking at the contents of the reaction
14 of the fuel, I assume you are going to take into
15 consideration the space and the bundle containers
16 as far as adding to the weight of the cask but
17 also adding to the structural strength and
18 stability of the fuel itself.

19 I also want to point out that americium
20 241 is very important because that's what you use
21 in your smoke detectors at home.

22 MR. CAMERON: Bob, you have a comment?

1 MR. HALSTEAD: I found that value. It's
2 1,700 curies of americium 241 per pressurized
3 water reactor of the reference type so while it
4 has many, many good uses, Felix, this is one we
5 could do without.

6 MR. CAMERON: Thanks, Bob. Amy? I
7 think we're ready for a different comment.

8 MS. SHOLLENBERGER: Again I have a
9 question about whether this is viable for the
10 study or not. My question is if there are
11 accident scenarios where fuel rods get jostled
12 where pellets come off, I wonder if the study
13 could somehow consider then what happens after
14 that. It seems like all of the scenarios in the
15 study ended with the accident. Here's what
16 happened. This much came out or this much didn't
17 come out, but it seems to me that at some point
18 after the cask has fallen off the train or the
19 truck has fallen off the bridge and you have to
20 fish the cask out of the river and you have to
21 put it on another truck and you have to still
22 take it to some point in the West yet to be

1 named, and get it into the mountain which will be
2 in a different container so it's got to come out
3 of the cask and into another container and I'm
4 wondering if somehow the effects of that could be
5 looked at in this study or if not in this study
6 in another one.

7 MR. CAMERON: The point is, and it may
8 not be a point for this study, but nevertheless
9 an important point is if a cask is involved in an
10 accident how is that cask, if there is no I guess
11 apparent damage or whatever, how is that cask
12 treated when it gets to the repository? Maybe
13 the NRC could answer question although there may
14 not be a lot of experience with this is what
15 would happen if a cask was damaged en route to
16 the repository or if there was somewhere else.

17 Rod, do you want to do that or Susan?

18 MS.SHANKMAN: I think the point of the
19 study is to look at the dynamics that would
20 create that accident and the recovery from it has
21 to take into account what would happen if there
22 is no release and the cask is undamaged then you

1 have a physically large heavy object that has to
2 be resited on its vehicle and moved exactly, but
3 I don't think that that would be any different
4 from another heavy object that has to be
5 reaffixed to whatever it's transporting.

6 If there is damage to the cask there are
7 ways to recover from that and we have to figure
8 out whether the probability is so high that we
9 needed to change the training of the emergency
10 responders. I think that's where it leads us and
11 why we're doing the study.

12 MR. CAMERON: Rick, you wanted to say
13 something?

14 MR. BOYLE: I think it's safer to say if
15 a cask is involved in an accident, even if it
16 does not appear to be damaged, I'm sure the cask
17 will be inspected greatly. In this case or in
18 that transportation case the first thing the
19 Department of Transportation is going to look for
20 is to go to the NRC and say is that cask still as
21 described in your certificate? If they verify
22 that it is then that it could continue on more

1 than likely than an different carriage, probably,
2 whatever rail, vehicle or truck that it was on is
3 no longer serviceable so it would be off loaded
4 onto a different one.

5 If it is not as described in the
6 certificate, then whoever the shipper is is going
7 to have to come into the Department of
8 Transportation and get a special approval we call
9 it an exemption, from the regulations, because if
10 it's not approved by the NRC it's not allowed to
11 be transported domestically under the regulations
12 which will kick in a whole application process
13 and a whole review process and consulting with
14 NRC and in this case it would be the Department
15 of Energy to say if it's not in accordance with
16 the regulations, what special precautions are you
17 going to take? And I think the Department of
18 Transportation's view there is you will be better
19 to move it to a safe location. That wouldn't be
20 a siding on the road, it might not be the final
21 repository. It may be the closest reactor to
22 repackage it, but you are going to have to get it

1 out of the community and the transport approval
2 will take all that into account as to how it
3 should be moved.

4 MR. CAMERON: Thank you for that
5 information, Rick. Let's hear from Jack and then
6 Marvin. Jack Edlow.

7 MR. EDLOW: That's a very good question
8 I appreciate your question about what would
9 happen in the case of an accident afterwards. I
10 would like to say that there are thousands of
11 shipments of radioactive material every year and
12 millions of shipments of hazardous materials
13 every year. Of course there are accidents
14 involving various materials hazardous and
15 radioactives not necessarily spent fuel all that
16 often, but other types of materials as well. So
17 that clearly industry has already faced this kind
18 of situation before both haz mats and for
19 radioactives.

20 These kinds of procedures have been
21 looked at and have been dealt with in accordance
22 with the way that Rick has said in the past. For

1 spent fuel shipment it would be effectively no
2 different in the process. It's just that this
3 particular type of material is viewed by some as
4 more hazardous and more heavier and somehow it's
5 special, but in any case it would be dealt with
6 in the same way. But thank you very much. It's
7 very thoughtful.

8 MS. SHOLLENBERGER: I just wanted to
9 clarify I wasn't suggesting you didn't have a way
10 to do it I was just asking if the study could
11 address what the effects of it would be. I
12 wasn't saying you didn't know how. I don't know
13 if you know how or not. What I was asking, since
14 this is a study about the transportation of spent
15 fuel, and so it should address the scenarios that
16 can occur because of the transportation of spent
17 fuels.

18 MS. SHANKMAN: The study is meant to
19 look at some of the factors that would be
20 involved in the stresses that might lead to
21 damage of the container or the contents. It's
22 not a definitive study of the transportation of

1 spent fuel. But it isn't, I mean may be another
2 way in which we consider that and so I'm glad you
3 bring it up. But I'm not sure how we work that
4 into this knowing what stresses we created and
5 what we would have at the end would help us
6 understand what kind of response we have to
7 prepare for.

8 MR. CAMERON: Thank you, Susan.
9 Marvin?

10 MR. RESNIKOFF: I think the point is
11 well taken for a more a couple of reasons. One
12 is my experience that in reviewing the BFSSAR in
13 Utah, we've raised the issue what happens if a
14 cask has surface contamination on it. And the
15 answer to that, which is in the SAR, is that cask
16 is shipped back to the reactor. No matter with
17 the levels of contamination, the SAR says that
18 cask goes back to the reactor. Even if it's
19 above DOT regs, there is no provision that the
20 BFS facility for actually cleaning the cask.

21 So the issue is I think well taken at
22 least in that situation where a cask is

1 contaminated. You know, somebody has an idea how
2 that's going to be handled, some private
3 contractor coming in, I don't know, but BFS says
4 it's not going to be their job.

5 The second reason I think the point is
6 well taken is that there actually was an
7 accident. Which isn't listed in one of the six
8 or eight accidents that were listed previously,
9 which involved the shipment fuel to the Patelle,
10 Columbus facility in 1980 in Ohio in which a fuel
11 assembly was put in that was too hot. Contrary
12 to the certificate of compliance, the workers put
13 a fuel assembly in that was too hot and the
14 effect of that is the fuel oxidized and when they
15 opened up the cask under water large amount of
16 radioactive contamination came out of the cask
17 and into the pool. Of course it was evacuated,
18 but workers were contaminated, workers were
19 exposed in the process of decontaminating the
20 entire pool.

21 I think the NRC also, I should say, has
22 taken steps so that won't happen again and since

1 they now inert the cask, they have helium inside
2 the cask rather than oxygen as they had before or
3 water, but I think point is well taken because
4 there is one specific example that there was
5 something that was shipped contrary to
6 regulations and it led to certain consequences at
7 Patelle, Columbus.

8 MR. CAMERON: I think we had some
9 reaction to that, Marvin.

10 Before we go to Rick Boyle, PFS stands
11 for private fuel storage and that is a licensing
12 hearing before the NRC to approve a spent fuel
13 storage facility in the State of Utah and I hope
14 that that provides enough information on that.
15 Rick?

16 MR. BOYLE: Thank you. I completely
17 disagree. The packages that are not in
18 compliance with DOT regulations are transported
19 anyway, be that for contamination, labelling,
20 anything else. And it doesn't matter if the
21 safety analysis report for the package does not
22 address what would happen in this case.

1 I think if you are looking at that,
2 customs has stopped packages because they're hot
3 and then we have to deal with it from there. If
4 you go to any scrap metal facility they have
5 meters going in and when the rail car comes in
6 and its hot, it's sent off to the side. That
7 scrap metal facility has no license to possess
8 and we have to work out an exemption so it can be
9 sent back. The same is true of landfills.

10 It's just not true that if a violation
11 is found it's marked return to sender and sent
12 back. That's no way. No how. I'm sorry, we
13 just have to correct an inaccuracy in that
14 matter.

15 MR. CAMERON: Marvin?

16 MR. RESNIKOFF: I suggest that he direct
17 his anger toward the Nuclear Regulatory
18 Commission, that he respond to the EIS and the
19 SAR. They come out as a cooperating federal
20 agency. You tell PFS, you tell the NRC that
21 that's wrong. I suggest you submit comments as a
22 cooperating federal agency. I encourage that.

1 MR. CAMERON: Apparently maybe there
2 needs to be more exploration of this particular
3 point that we don't necessarily have to explore
4 it at this point. But thank you for those
5 comments and I would ask if there is anybody in
6 the audience who wants to make a comment on spent
7 nuclear fuel assembly behavior in accidents and
8 then we'll come back up to the front.

9 Final comment on this from Kevin and,
10 Rick, I didn't know whether you wanted to say
11 anything else at this point on this issue but you
12 can if you want after we go to Kevin.

13 MR. KAMPS: Just wanted to bring up the
14 German experience again. A transport of highly
15 irradiated nuclear fuel returning from France was
16 found to be 3,000 times the appropriate level or
17 the acceptable level and so this is a very
18 significant issue that needs to be addressed.
19 And again that contamination event and the
20 locking out of the public in Germany have led to
21 a situation where the transport of highly
22 irradiated fuel has been stopped for political

1 reasons in Germany. So it's a very significant
2 issue.

3 MR. CAMERON: Thank you, Kevin. Rick?

4 MR. BOYLE: I think that point is well
5 taken because Kevin is completely correct that
6 there were high contamination shipments made in
7 Europe and it highlights the point that once they
8 were identified shipments stopped. They didn't
9 continue and say we know they're hot and we
10 shipped them anyway. And I think you would see
11 in several European countries they aren't making
12 shipments today because once the problem was
13 identified, shipments were stopped.

14 MR. CAMERON: Thank you. Are we ready
15 to move on to the next discussion point? Yes?

16 MR. KAMPS: Just that it took years for
17 that information to come out to the public the
18 cover-up involved is a pretty significant issue.

19 MR. EDLOW: That's ludicrous.

20 MR. CAMERON: There's some disagreement
21 here about whether was a quote "cover-up" unquote
22 and I think we're just going to move on to the

1 next discussion area which is the whole testing
2 computer simulation methodology. Go ahead,
3 Charles. And I don't mean that I want to stop
4 anybody from getting into these issues. We can
5 do that if that's what people want to do, but I
6 think at this point it's most profitable to move
7 on. Go ahead and we're bringing our NRC expert
8 up to the table who we'll introduce in a few
9 minutes. Charles?

10 DR. MASSEY: Thank you, Chip. The next
11 topic area is physical testing simulation and
12 here I just want to give a little background, I
13 think a lot of this we covered earlier, a little
14 bit of background on the progression and the
15 study regarding severe accidents and how we have
16 calculated and predicted response to the cask.

17 The modal study was all computer
18 simulation, mathematical models developed to
19 permit cask response and collisions and fires.
20 There was no testing done specifically for the
21 modal study. The models were based on test data
22 from other experiments and test that were done,

1 but there was nothing specifically done for modal
2 studies.

3 For the NUREG 0170 update that we
4 recently submitted to NRC for review, we've used
5 improved computer models based on data that we've
6 gotten from other test and experiments have been
7 conducted, but again there was no testing
8 specifically conducted for NUREG 0170
9 reevaluation.

10 Where we sort of differ from that past
11 history in the package performance study, we
12 would suggest that simulation and testing be done
13 of some representative cask and we actually take
14 a cask design, looking for comments on this, what
15 that would exactly be, but use our models that we
16 have developed, thermal and structural models,
17 look at the collision and thermal scenarios that
18 we have discussed, but do that sort of pretest
19 prediction on the cask response, then actually do
20 the test. And then compare that and see how well
21 you can predict performance of the cask. And
22 with that I'm going to turn back to Chip and get

1 moving.

2 MR. CAMERON: Thank you, Charles. I
3 just wanted to introduce Jeffrey Hornseth who is
4 a materials engineer, an expert in metallurgy and
5 is involved in this issue as are expert on
6 physical testing. He's been with the NRC since
7 1991. He has a master's of science degree from
8 George Washington University. Let's go right
9 into this for comments.

10 Bob, you have your card up. Do you have
11 some points on the physical testing computer
12 simulation issue?

13 MR. HALSTEAD: Yes. As a person who has
14 pursued this issue for 20 years, I'll give you a
15 short version and this is one the issues that we
16 plan to discuss in detail at the meeting at
17 Henderson.

18 First point, I think it would be a good
19 ground rule to say in this discussion that we
20 separate the issue of cask testing for the
21 purposes of this modal study update from the
22 larger issue of whether full scale testing should

1 be required as a condition of certification. I
2 think we'll eat up all the time we'd like to talk
3 about if we try to resolve that larger issue
4 about the desirability of testing, for
5 licensing.

6 I would restate briefly the arguments
7 for that larger testing issue. The State of
8 Nevada has argued in favor of full scale testing
9 as a condition of certification which it requires
10 full scale testing of a prototype of every cask
11 that goes to the NRC. We have developed cost
12 estimates on it. We have developed an outline of
13 what the testing protocols would be. We
14 published a report by Dave Snediker (phonetic)
15 who many of you know worked as a cask designer
16 for many years, looking at some of the pros and
17 cons of full scale testing, documenting the past
18 experience with it.

19 We are also cognizant of the
20 improvements in the codes that allow us to
21 address some of these questions through computer
22 simulations and we're certainly open to a

1 discussion of a combination of something less
2 than -- let me say before I say this -- we are
3 not satisfied with the current test requirements
4 which allow one tenth and one quarter scale
5 modeling and generally combine simulations to
6 provide the information required in the safety
7 analysis report and constitute a basis for
8 certification.

9 The question for us is given the
10 inadequacy of the system, do we need full scale
11 testing and a lot of additional simulations or is
12 it possible at least with some package designs
13 that have scale model testing allows us to
14 capture small details like performance of bolts,
15 for example. So we're open to a discussion
16 there.

17 For technical validation purposes. In
18 terms of public confidence we would argue that
19 (A) there is probably no substitute for full
20 scale testing; and (B) the full scale testing
21 must be the boring, repetitive, laboratory
22 condition testing that was conducted with the

1 true pack two container rather than the kind of
2 dramatic public demonstration testing which is
3 what I would argue the Sandia test in the '70s
4 constitute. I would even argue the testing in
5 the U.K. of the mox fuel flask falls into that
6 category because when they did the drop test,
7 they actually found that the drop test did
8 greater damage to cask integrity than the
9 locomotive hitting the cask test.

10 In terms of what you do for this
11 particular effort, I'm just going to throw an
12 issue out that I think as much as I would like to
13 see you take a particular design that we think is
14 likely to be used, someone would have to pay to
15 have GA4 constructed, for example, so that you
16 could test it. I hesitate to say this, but I'm
17 not sure it's a good idea for you to take on
18 physical testing of a cask as part of this effort
19 if you think it's going to address the criticisms
20 that those of us who believe there should be full
21 scale testing have raised.

22 I don't think it's possible within the

1 context of this study to take that issue on and
2 walk away leaving anyone satisfied. And my
3 primary concern is that the package that I think
4 is most in need of testing in terms of meeting
5 the concerns of most of the effective
6 stakeholders have is a GA4 cask, which is
7 probably, if anyone wants to pony up the money to
8 have say 10 or 15 of them constructed, the cask
9 that would be used for early shipments to a
10 repository for truck shipments to a storage
11 facility.

12 It is true that there are some casks,
13 multi-canister and dual purpose canister that are
14 certified like the GA4, and I'm not sure Marvin
15 may know or someone from the NRC may know, if
16 there is going to be one of those casks out. I
17 think it is an incredibly bad idea to test a cask
18 which is not one of the actual casts that will be
19 used in the largest upcoming shipping campaign,
20 i.e., Yucca Mountain, if the department decides
21 to go forward and submit a license application.

22 And so I think you really want to think

1 very carefully about how you want to pose the
2 cask testing question and I will certainly try to
3 give you a little more guidance of our thinking
4 about it when we meet in Henderson.

5 MR. CAMERON: Thanks, Bob. You made a
6 number of points there including the one that,
7 there is separate issue here on cask testing in
8 terms of the actual certification. I think that
9 you said that this mix of scale model computer
10 simulation full scale testing would depend on the
11 type of package, but you gave us a caution on
12 the, what the potential value might be of doing a
13 full scale test for this study on a cask that's
14 not going to be representative of the major cask
15 that's going to be used in shipping.

16 MR. HALSTEAD: Slight clarification.
17 You amazingly managed to get most of it pretty
18 accurately. In terms of Nevada's position right
19 now the current requirements are inadequate.
20 That is the combination of scale models less than
21 half scale plus simulations constituting
22 sufficient evidence that the cask performance

1 criteria are met for certifications purposes,
2 that to us is unacceptable.

3 The question of whether we would accept
4 something less than full scale testing, and I
5 suggested half scale testing, we're willing to
6 consider that which frankly has not been our
7 position for most of the last 10 years, but I
8 think I captured the other points very carefully.

9 MR. CAMERON: Thank you very much.
10 Susan, do you have a question?

11 MS. SHANKMAN: Little clarification.
12 I'm interested in what other setting full scale
13 testing is done of every design where you feel
14 that it's been beneficial. I'm not familiar with
15 another industry that does that and if you know
16 of another industry we could look at that and how
17 it's proved its efficacy for safety if you know
18 of one.

19 MR. HALSTEAD: I'm not going to address
20 that larger issue right now because frankly I can
21 tell from the last discussion that a lot of
22 people's tempers and attention spans are perhaps

1 getting to a point where we need to wrap this day
2 up and I think you need to consider planning for
3 Henderson how you want to pace the day.

4 I think what we learned this is a very
5 intense topic and since I just had a cappuccino
6 I'd probably run for another 30 minutes, so I
7 think we want to make sure if you have a real
8 important question, I will pose it to you another
9 way: The only truly acceptable, politically and
10 technically in my mind shipping campaign that's
11 currently in progress is the Transranic
12 (phonetic) shipping campaign to WIEB.

13 You may wonder how it is that states
14 like Nevada that have very little good to say
15 about the Department of Energy, sometimes about
16 the NRC and sometimes about the industry, have
17 generally accepted the WIEB program (phonetic)
18 for transportation.

19 One issue is the operation of protocols
20 for accident prevention and emergency response.
21 That's an important part of it. Those were
22 jointly developed by the states in DOE.

1 Another part has to do with routing. I
2 don't want to reopen that issue, but the bottom
3 line is a different approach was used there. The
4 routes were identified in the EIS. It took 10
5 years to work them all out and it was a consensus
6 that the safest roads and routes were chosen.

7 Third issue, for a variety of reasons,
8 not this one, the NRC decided to require full
9 scale testing of the true pack two and indeed in
10 the testing we found that things that hadn't been
11 anticipated. I can tell you that without making
12 this a largely theoretical issue, the very fact
13 that those tests were subjected to rigorous full
14 scale testing is (A) a major reason why governors
15 of the western states based on the advice of
16 their technical advisors, have all signed off on
17 protocols in support of this shipping campaign.
18 (B) It is a major reason why people like myself
19 are willing to stand in front of a sometimes
20 incredulous public, who is used to hearing us do
21 nothing but criticize the NRC and DOE industry,
22 and say look you can like it or not like it. I'm

1 giving you my best judgment as a person who has
2 worked on these issues for 20 years.

3 The bottom line is I can stand up there
4 with confidence and say not only on the technical
5 issue, but on the institutional issue the NRC and
6 DOE were willing to demonstrate that. That's not
7 the best answer I would like to give to you, but
8 it's the only example I can give you where both
9 the people who give technical advice to political
10 decision makers and the political decision makers
11 have said okay we are satisfied with the safety
12 of this program. It's not all about full scale
13 testing, but I'm willing to bet you that if there
14 had not been full scale testing to true pack two,
15 there would still be enormous state government
16 opposition in at least half of the western
17 states.

18 The thing I want you to think about at
19 the NRC is whether you want to risk hanging the
20 validity of this modal study update on an issue
21 as volatile and difficult to predict the outcome
22 of as full scale cask testing, unless you are

1 willing to go to the great lengths of testing one
2 of the casks that's going to be used for the
3 future shipments.

4 So I'm trying as a person who is a long
5 time advocate of full scale testing, and I remain
6 an advocate of full scale testing, I really want
7 you to seriously rethink whether you want to tie
8 that issue to this particular undertaking which I
9 think is very valuable and something that we're
10 fully supportive of. I just don't know that you
11 want to tie full scale testing into it. I think
12 that's the issue today, not whether full scale
13 testing is necessarily a good idea.

14 MR. CAMERON: Thank you, Bob, for both
15 drawing the distinction between full scale
16 testing and also for that caution for the NRC to
17 consider. Let's go to Eileen and to Felix.
18 Eileen?

19 MS. SUPKO: I had a different reaction
20 to the possibility of testing than whether or not
21 we were testing, proposing full scale cask
22 testing or something else. What I thought I

1 heard earlier in the day as part of the purpose
2 of physical testing is the fact that there are
3 new cask designs that are coming out that may not
4 be accurately reflected in the computer models
5 and part of the testing program would be to
6 benchmark your models, which is basically what
7 you said you would run the predictive models
8 first, do the testing and find out how those
9 components behave compared to what you
10 predicted.

11 One of the things I would encourage in
12 doing that is laying out very clearly prior to
13 embarking on the testing program and whether it
14 be individual components or scale models of
15 casks, the stated purpose of your tests, what do
16 you hope to accomplish, are you testing an
17 individual component, is it a seal, is it a bolt,
18 is it the behavior -- the fact that you have
19 canistered fuel now instead of fuel sitting in an
20 basket. What the are the acceptable testing
21 requirements that would yield the results that
22 you want? If it's a bolt do you need to do a

1 full scale test on a bolt? What analytical codes
2 are you planning to use and is one of the end
3 results possible changes to your analytical
4 codes? Because we have do have different designs
5 that are potentially going to be used in the
6 future. And then basically identifying the
7 testing parameters that you are planning on
8 doing. You may not need to go through the
9 thermal tests for all of the different
10 parameters, it may be drop tests, it may be
11 something different, but laying all that out with
12 what your stated objectives are and again I'll go
13 back to my initial statement about getting the
14 most bang for your buck and looking at what it is
15 you are trying to achieve by doing the study.

16 I think that it may be that the issue
17 isn't we're going -- trying to address the
18 concerns of groups, full scale cask testing, but
19 your purpose is something different.

20 MR. CAMERON: Thank you very much for
21 that, Eileen. Let's hear from Felix and then
22 let's hear from Mike Wangler over here on this

1 end.

2 MR. KILLAR: My comments are along the
3 same line as Eileen and also on the same lines as
4 Bob.

5 I think if you are looking at testing
6 for this program you have to be very careful what
7 you use in testing because I think what the
8 question will come up is that you tested this why
9 didn't you test that? And then you end up in an
10 infinite doolooop and you're never solving and
11 come to a final answer to the question.

12 I think what you have to do is identify
13 where you have questions and where you need
14 testing to validate your computer codes and
15 computer models and then do the testing
16 appropriately, but not just do testing for the
17 sake of testing because what's happening you will
18 never get to the end of your testing.

19 MR. CAMERON: Your message, Felix, the
20 NRC is to be very cautious about getting into the
21 full scale testing area. Mike?

22 MR. WANGLER: I think I might be the

1 fourth person to kind of support that idea. I
2 think that you do have to be careful in how the
3 test data is used.

4 On the question of full scale testing
5 I'm neither an opponent or proponent of full
6 scale testing. I'm one of the three groups
7 within DOE that's authorized to approve
8 radioactive materials packaging for the type A,
9 type B. For my type A packages I require full
10 scale testing before approval.

11 MR. CAMERON: Mike, could I just stop
12 you right there and just tell people what type A
13 packages include so there's no confusion?

14 MR. WANGLER: Type A packages are the
15 much lesser quantities of radioactive materials
16 that you might find being transported in the U.S.
17 Spent fuel falls in a very, has a lot of
18 radioactive material and falls into the so-called
19 type B category. Some medical isotopes and
20 things of that nature fall in the type A
21 category. Again, my point is for those type of
22 packages I require full scale testing. However,

1 for the type B packages, I think full scale
2 testing is one method of getting to the answer
3 that you need or get to the answer that I need to
4 certify a package.

5 I generally rely on engineering analyses
6 to help me understand whether the package will
7 meet the regulatory requirements. The use of the
8 engineer analysis means I use analytical tools
9 for any confirmatory analysis. These tools
10 facilitate my review especially on large
11 packages. What these analytical codes allow me
12 to do is to look at multiple scenarios that one
13 can't do with drop tests.

14 A drop tests generally can do at least
15 one scenario. Let me back up. I wouldn't even
16 call them scenarios. I'm looking for data
17 points. The drop test can be used to get you --
18 we have some data points. Engineering analyses
19 will let you run a series of analyses to see how
20 the codes will tell you that package would
21 perform under various scenarios.

22 Now being part of the Office of

1 Environmental Management that appeals to me
2 because using computer codes means I don't have
3 to worry about any environmental impacts from
4 having to deal with fires or even some impacts.
5 So the engineering analyses gets me some of the
6 answers that I need.

7 Where I find testing would be more
8 helpful to me is if the testing was done to give
9 me data points to insure that my analytical codes
10 do what they say that they're supposed to do. A
11 drop test, for example, at the regulatory test
12 doesn't really -- it's one point. It doesn't
13 tell me how my code is going to perform either
14 beyond that range or within that range. I'd like
15 to know what my margins of safety are. The
16 analytical codes can help me determine what those
17 margins of safety would be.

18 If Sandia is going to be testing, what I
19 would rather see is that the testing be used to
20 support validation of the computer code or
21 computer codes that we all use in this business
22 to try to insure the performance of these large

1 packages.

2 MR. CAMERON: Thanks, Mike, for that
3 comment. Earl Easton has a comment on that.

4 MR. EASTON: I couldn't resist. Having
5 been around long enough I happen to have been the
6 project manager for true pack two certifications
7 for the NRC and very instrumental in the decision
8 to go ahead with the full scale test. The reason
9 we did so for true pack two was because we did
10 not have faith in the existing computer codes to
11 model that type of closure. That type of closure
12 was radically different than what we had seen,
13 for example, in spent fuel where you had a bolted
14 lid and we felt that that was well understood and
15 that we could rely on analytical tools.

16 True pack two had a large lid that had a
17 closure around the outside much like an aspirin
18 bottle. We had an absolutely no confidence that
19 we could really model that by computer. So I
20 agree with Mr. Wangler from DOE. One of the good
21 uses of testing is to validate tools. Because
22 when you do tests you can usually only afford to

1 do full scale testing in one or two different
2 orientations. Whereas, if you have some sort of
3 reliable code, like Mike said, do very different
4 tests and perhaps get a better insight where the
5 real safety points are on that cask.

6 I just wanted to make that comment based
7 on the experience why it was that we did choose
8 true pack two as a candidate for full scale
9 testing.

10 MR. CAMERON: It confirms what Mike
11 Wangler was suggesting then. Let's go to Bob
12 Fronczak and then we'll come over to Amy. Bob, I
13 don't know if you have something else to say?
14 Let's go to Bob Fronczak.

15 MR. FRONCZAK: Unlike Bob Halstead, I
16 didn't have cappuccino so I'm wearing out. I'll
17 be very brief.

18 MR. CAMERON: He's a strategic thinker.
19 The rest of us failed.

20 MR. FRONCZAK: All I have to say is the
21 computing capability has increased since the
22 study was done and I'm sure you are going to

1 incorporate that in the work that you are going
2 to do. There is all kinds of things you can
3 model that we have already discussed. I'll
4 follow-up with some written comments.

5 MS. SHOLLENBERGER: I have a question.
6 My question is, if I understand it correctly, and
7 this question is sort of directed at Mr. Edlow
8 because I think he'll know the answer, if I
9 understand it correctly there is a possibility
10 that the transportation cask can be used more
11 than once to transport fuel rods. You know, come
12 from the reactor to the repository and go back,
13 and if that's true I'm wondering if the study is
14 in any way planning to take into account sort of
15 normal wear and tear on a cask and look at how
16 many times can a cask be used before it gets to a
17 certain level or if the cask has been used say
18 five times and bounced around on a train, does
19 that have any effect, for instance, on the bolts
20 and how tight they are.

21 MR. CAMERON: Those are good questions
22 are the casks used multiple time us and is that

1 something that should be factored into the study.

2 JEFFREY: The transportation casks are
3 designed to be used multiple times. Part of the
4 certification process is a review of the
5 in-service inspection program that must be
6 developed for each cask where all the components
7 are routinely inspected before the cask can be
8 either on a periodic basis or a time scheduled
9 basis or on a per shipment basis so that each
10 time the thing goes out, it goes out in
11 acceptable condition; in condition that's up to
12 compliance with the certificate.

13 MR. CAMERON: Did we get to the point
14 about whether that should be considered in the
15 new study? All right. Good.

16 I think Bob Halstead is correct in the
17 sense that we have been at this for a while and
18 it's been pretty intense and I think maybe we
19 should switch gears a little bit and talk about
20 process.

21 One of the things that Dr. Shankman, Rob
22 Lewis, a number of people have talked about is

1 how does NRC keep people involved in this
2 process, this study update? And of course there
3 is going to be many different milestones along
4 the way and we've heard peer review mentioned.
5 That's one aspect.

6 I just wanted to open it up to people
7 around the table to see if there is any
8 suggestions about how the NRC should keep the
9 public involved through the course of this study
10 and at what points that should occur an how.
11 Does anybody have any suggestions to start us off
12 with? Heather?

13 MS. WESTRA: Just a question regarding
14 tribes. How do you anticipate involving Indian
15 tribes beyond this meeting? I understand you
16 have the meeting out in Nevada and I anticipate
17 that more tribes would be at that one, but often
18 times tribes are kind of left out of the loop and
19 don't have access to the internet, federal
20 register, all these other publications. So that
21 piece is also lacking.

22 MR. CAMERON: Thank you. I don't know

1 if we have any answers to that at this point but
2 we need to consider that. Does anybody from the
3 NRC want to say anything?

4 MR. LEWIS: One thing we can say we will
5 have the mailing list in addition to the
6 website. Both have very similar functions and if
7 you could help us identify names for the mailing
8 list that would be very useful.

9 SPEAKER: Be glad to.

10 MR. CAMERON: I guess there were some
11 other ideas. Susan?

12 MS. SHANKMAN: We've spoken about the
13 fact that once we have phase one of this project
14 completed by Sandia, they have given us the
15 recommendation about the scope of the study and
16 potential methodology and we've also talked about
17 the fact that that point the Sandia contractor
18 report will be issued on 0170 with its peer
19 review by Lawrence Livermore. And so we're
20 planning on having another series of meetings.
21 What I would like is if somebody could speak to
22 whether this format would be useful and whether

1 the sites that we choose for those meetings,
2 particularly in response to what you are saying,
3 perhaps we should be in -- thought about Atlanta,
4 we thought about Chicago, Minneapolis. There are
5 other places that we could hold the meetings.

6 The NRC has been holding meetings in
7 Nevada because it is an area where there are a
8 lot of concerns about this, if that's
9 appropriate. The meeting in Washington allows
10 people who are involved in the policy setting to
11 also be part of it, but we're open to other
12 venues and other formats.

13 MR. CAMERON: Let me just make sure that
14 we all understand. The phase one
15 recommendations -- in other words, Sandia is
16 going to and the NRC are going to take the
17 comments that come out of this meeting and the
18 meetings in Nevada, as well as any written
19 comments we have, and they're going to put
20 together a recommendation for how to proceed.
21 Will that be the subject? Is that what you are
22 referring, to the subject of future meetings?

1 Future public comments?

2 MS. SHANKMAN: Yeah, along with having
3 the information that is coming out of the
4 contractor report that we have been talking
5 about, the update of the assumptions in 0170. So
6 you will have two new pieces of information
7 before we go ahead and contract or spend more
8 money in this area because we don't want to say
9 okay we've heard you, we're going to design a
10 study and we're going to do it. We want to have
11 another point where we get public comment and
12 that will be after the study and designed but
13 before we do it.

14 MR. CAMERON: Does that perhaps explain
15 the relationship between the 0170 study and this
16 study is that they will be both looked at
17 together. I'm going to go to Robert Holden now
18 before we come over to this side to Bob
19 Halstead. Robert?

20 MR. HOLDEN: I just want to go back for
21 a second to a point Heather brought up and I
22 guess from a policy standpoint Nevada is

1 microcosm of this national meeting here and
2 that's that tribes in that area have very little
3 resources to come to Washington, DC. Even Las
4 Vegas can be a burden. We have held meetings in
5 Reno and we have held meetings, there is a town
6 halfway in between Vegas -- I can't remember what
7 the name of it is -- but there are several
8 options there and there are several tribes that
9 will be impacted by rail shipments up in the
10 northern part and you might even touch base with
11 Bob Halstead because he's quite familiar with the
12 area and the tribes and the locations as well.
13 But that also, to pick up on a policy point,
14 that's some of the things I plan to be doing,
15 talking with commissioners in terms of the
16 outreach that NRC does on notice, on consultation
17 as well as the technical assistance that you have
18 to offer in terms of breaking the issues down and
19 providing that type of technical assistance to
20 help them better understand that that's part of
21 NRC's duty as the tribes see it as those
22 governments see it.

1 MR. CAMERON: Thank you, Robert.
2 Susan?

3 MS. SHANKMAN: I was just going to say
4 we'll be glad to work with you and we'll talk
5 afterwards. I'm sure you are familiar with the
6 staff and our office and I agree that the
7 outreach may need to be different and we are
8 willing to work with you.

9 MR. HOLDEN: That changes from time to
10 time. I'm not sure whose is on first at this
11 point.

12 MR. CAMERON: Bob Halstead.

13 MR. HALSTEAD: On the issue of Nevada
14 Indian tribe participation representation, that's
15 a very difficult issue as Robert said. First of
16 all, the distances involved; travel just within
17 our state is very difficult. And secondly, as
18 many of you know there is both an income and a
19 telephone connection issue in internet connection
20 and this is now a larger issue of isolation of
21 many people on the reservation.

22 Without belaboring the point you are

1 going to have to make special efforts to get the
2 Nevada tribes involved and frankly you are also
3 going to have to struggle as I have and many
4 people working for the State of Nevada struggled
5 with to develop a sufficient cultural sensitivity
6 to know that when tribal representatives come to
7 a meeting and they may be spiritual leaders, may
8 be political leaders, they may be both, they may
9 not feel comfortable fitting themselves in to the
10 tightly scripted meeting agenda which I think has
11 worked very well in this meeting, but may be
12 considered offensive by many of them.

13 We don't need to belabor, but there are
14 a number of things you can do and I appreciate
15 your expressing sensitivity. I don't want to bog
16 us down on that issue it's very important, but I
17 don't think we can resolve it around this table.
18 I do think you have to show the same type of
19 sensitivity you're showing today in dealing with
20 the counties in Nevada who have a very peculiar
21 legal status because of their effective county
22 status under the NWPAA and the litigation that

1 enforced that.

2 And again I've spoken with many of the
3 county representatives and most of them know Chip
4 by name and you'll probably see most of them
5 involved in Henderson. So I ask that in addition
6 to your continued sensitivity to the tribal
7 participation issue, that you keep in mind the
8 nine Nevada California counties that are
9 involved.

10 I don't want to belabor this issue
11 again, but I will raise two points. I think at
12 the end of this meeting or the next meeting you
13 have some serious stakeholders who will be
14 following the peer review issue as well as the
15 conduct of the study. One of the lessons learned
16 from the modal study and some of the other
17 studies that have been done over the last 20
18 years the practice is that the peer review has
19 not always been very impressive, to put it
20 bluntly, and as a stakeholder I don't believe at
21 least involved in reviewing what's going on in
22 peer review.

1 Secondly, while there are a number of
2 mechanisms you have used and other agencies have
3 used to continue participation by those
4 stakeholders who will choose to be deeply
5 involved, one mechanism might be a standard
6 advisory group on the study in addition to
7 whatever public meetings you might want to have
8 to take input from the general public, but I'm
9 sure there are a number of us around this table
10 who are intimately interested in this.

11 I imagine the modal study two being as
12 central to discussions of container safety as the
13 modal safety one has been, or the last 13, 14
14 years, and so I even though that three year time
15 period is something that makes a lot of us gulp,
16 I know half of Nevada would like to be involved
17 in an ongoing way. Thank you.

18 MR. CAMERON: Thank you, Bob. I would
19 ask you if there were standing advisory committee
20 on this, I suppose the standing advisory
21 committee could sponsor public meetings, also.
22 Thank you.

1 Let's go to Felix and Amy and I want to
2 make sure that I get Marvin's input on some of
3 these issues particularly the review of the peer
4 review that you brought up, Bob and advisory
5 committee. Felix?

6 MR. KILLAR: I think the NRC has done an
7 exceptional job of getting the information out to
8 people making them aware of the meetings. I've
9 been involved with the NRC for 25 years and I
10 feel that the last five to eight years the NRC
11 has bent over backwards to try to get information
12 out.

13 Now being a governed bureaucracy is hard
14 because sometimes understand how the public works
15 versus not everybody reads the Federal Register
16 over their coffee in the morning. I think the
17 idea they go on through with the idea of the
18 postcards, the mailing lists, the internet,
19 things on that line, I think the NRC needs to be
20 applauded for their efforts.

21 The NRC is now having a tendency to beat
22 up itself because it doesn't feel it's doing

1 enough. I think there is only so much the NRC
2 can do in order to get the word out.

3 I think it's incumbent for people around
4 this table -- I know that Sierra Club does it and
5 I'm sure the Indian Federations do it as well and
6 we certainly do it because we put information out
7 on our internet, our members' website. We also
8 put information out on our publications and stuff
9 about upcoming NRC meetings, location, contacts,
10 things along that line. You have got to rely on
11 word of mouth to some extent because you can't
12 rely on every system there is because you will
13 never be able to reach everybody.

14 MR. CAMERON: Okay. Thank you very
15 much. Amy?

16 MS. SHOLLENBERGER: First, I think the
17 advisory committee is a great idea. I think that
18 would probably allow you to reach a broader
19 ripple effect of people because people sitting at
20 this table represent a lot more people behind
21 them so I think that would be a good idea.

22 Second, I'm glad to hear there is a

1 mailing list because I think the tendency with
2 all federal agencies now is to rely on their
3 websites a lot and I think that's very
4 dangerous. Native Americans are mentioned as
5 people who don't have access to internet and I
6 think that lots of people don't have access to
7 the internet.

8 I was at a meeting last week where I was
9 told you can just go to the library and then you
10 will have access which is true in most
11 communities. However, I have printed this modal
12 study out at work where we have a really nice big
13 server and dedicated printer that's a really nice
14 printer and it took me two days. It's a huge PF
15 file and PF files take a long time to print and
16 you can't do that at a library plus the cost is a
17 whole new factor. So I just caution you to look
18 for ways other than the web. I fully enforce
19 using the web.

20 Lastly, I would just like to say I think
21 it's really great following up on what Felix
22 said. I think it's great that you are making

1 this effort. You know, definitely you are doing
2 better than you have in the past.

3 I think the number one way that you can
4 encourage public participation is to show that it
5 has an effect and I think that really what you
6 could do is you could take the comments that are
7 here today and comments that you will receive in
8 the future, and you can do a modal study that
9 addresses the public's concerns. Then you can
10 take that modal study and do meetings like this.
11 I think if we had to choose between Washington
12 and Chicago that would be great, but if we could
13 have it in both Washington and Chicago that would
14 be wonderful.

15 I think one more thing would really show
16 in a big way that you are really committed and
17 that is this summary is nice, it's a good summary
18 and then I read the summary and I read the study
19 and I felt like the summary did a pretty good job
20 of summarizing the study. However, this is still
21 written to a certain level of education and
22 certain level of knowledge about high level waste

1 and transportation.

2 I think you need to go one step further
3 if you really want the general public to
4 participate. Either you can do another study. I
5 think there are technical communicators out there
6 that could write a summary from this one that
7 would still be technically accurate.

8 I think also a week before the hearing,
9 two weeks before the hearing you could have or
10 whatever you are calling this round table
11 discussion, you could have a work sheet where
12 schedule it in the evening, two or three hours,
13 people can come and you do a presentation and you
14 say here is what the study says. Here's what we
15 did. Here's what the results were now you have
16 two weeks or a week or however long to think
17 about it. Here are the questions we'd like you
18 to address. Please come back in two weeks and
19 talk to us. So that people aren't walking in,
20 picked this up when they walked in today. I was
21 lucky. Mailed it to me a couple weeks ago. A
22 lot of people only get it when they come to a

1 meeting and to try and sit there and listen to
2 the discussion, figure out what an irradiated
3 cladding is and have a comment that's at all
4 worthwhile is really difficult.

5 MR. CAMERON: Thank you very much for
6 those thoughtful comments.

7 I want to allow Dr. Shankman, the top
8 manager from the NRC today to just close the
9 meeting for us. Marvin, how about process
10 issues?

11 MR. RESNIKOFF: I want to say a word
12 about this advisory committee suggestion. You
13 stay around these issues long enough everything
14 comes around again and I was involved in one of
15 these advisory committees between 1978 and 1980
16 when the Regulatory Commission had Sandia do this
17 TRUE study, Transportation of Radionuclides
18 through Urban Environments advisory committee for
19 that. And from that I have a couple of
20 suggestions that may be helpful.

21 You get out of the advisory committee as
22 much information as you give them. So the better

1 advice you'll get is if you give the advisory
2 committee a lot of information and then they can
3 give you better advice. If you give the advisory
4 committee nothing, you get nothing back. It
5 would be a useless committee.

6 Secondly, it would be important to have
7 the advisory committee write up their own report
8 and have that attached to the modal study
9 report. And furthermore that advisory committee
10 report should allow for minority opinions not
11 just have a majority review.

12 MR. CAMERON: Thanks, Marvin. I should
13 mention in this regard that any on the advisory
14 committee, the NRC as well as any other federal
15 agency that wants to establish an advisory
16 committee must meet the requirements the federal
17 advisory committee act, which are all good
18 requirements in terms of open meetings and
19 minutes of the meetings and although it doesn't
20 specifically flow from the Act, reports, minority
21 reports, all of this, the one requirement that
22 sometimes can be daunting but not insurmountable

1 is the fact that the committee needs to be
2 chartered and the charter has to be approved by,
3 I think, GAO as well as O and B, which doesn't
4 mean that it's an impossibility by any means, but
5 it just means that there is a certain amount of
6 time involved in that and I'm not trying to
7 spread any skepticism about that, I just wanted
8 people to understand what the regulatory
9 framework was for that. Thank you for those
10 comments on the advisory committee.

11 Eileen, do you have a comment?

12 MS. SUPKO: I just wanted to follow-up
13 on what Amy said. I think that in putting
14 together the modal study obviously there were
15 different audiences for different documents. The
16 audience for this is probably a technical
17 audience. This was written for more of a
18 nontechnical audience, but probably could be
19 worded a bit better and one of the things that I
20 found talking about nuclear waste transportation
21 to the general public, there is not a good
22 understanding, for example, the hypothetical

1 accident tests that are done. What do they mean
2 physically? What is a 30-foot drop to an
3 unyielding surface? I think there's not a good
4 understanding of what an unyielding surface is.

5 And to the extent, not necessarily in
6 the updated modal study itself, but maybe a
7 public document to try to put some of those
8 things in perspective.

9 Also use of cask testing and computer
10 simulation. Mr. Wangler mentioned earlier the
11 benefits that he sees from being able to use
12 computer simulation in certifying the package and
13 I think that the general public would probably
14 benefit from understanding what those benefits
15 are. Keep all those things in mind and who your
16 audience is for the different products that you
17 put together.

18 MR. CAMERON: Thank you very much,
19 Eileen. Bob Fronczak?

20 MR. FRONCZAK: This is a real good
21 opportunity to discuss the issues. The question
22 is is Henderson -- you asked me if I would

1 participate. Are we going to try to recreate
2 what we did here today or do you want to address
3 all new questions in Henderson?

4 MR. CAMERON: Maybe I should leap into
5 that one and be corrected by the staff if
6 necessary.

7 The idea was is that we would put
8 together a similar format for one of the meetings
9 in Henderson all day format and that we would
10 have mostly different people around the table in
11 order to get their take on these same agenda
12 items. It may be that the take we got here is
13 going to be the same that we get in Henderson
14 particularly if some of the people are similar.

15 But we also wanted to allow the people
16 of Nevada the opportunity to see an exchange
17 among knowledgeable people in the area on this
18 issue including their county representative,
19 their state representative, their tribal
20 representatives. So there is going to be that
21 same format.

22 We're also going to do a nighttime

1 public meeting after the round table that will be
2 a simpler format in terms of the information
3 that's presented by the NRC and an open question
4 and comment period from the public. We're also
5 going to do that same type of meeting on December
6 9th from 10 to 12 which is more information than
7 you needed, I think.

8 But, yeah, we were going to do this same
9 format for a couple of different reasons in
10 Nevada. Susan, do you want to add anything to
11 that?

12 MS. SHANKMAN: Not a great deal just
13 that the idea was to have a different mix of
14 people, some of the same because of, because
15 they're unique or they represent a particular
16 organization that doesn't have a representative
17 in Nevada, but to expand and have a significantly
18 different group that could speak to the issues
19 and maybe have different issues.

20 As Chip said the idea was to recreate
21 this same format in the all day meeting which I
22 think we'll have to shorten the NRC talking a

1 little and make that a briefer introduction and
2 so we'll have more time to talk about the
3 issues. We were already thinking about that, so
4 we are learning from this. The other meetings
5 will be more informational and less round table.

6 MR. CAMERON: Susan highlighted an
7 extremely important point which is that although
8 we use this same format for one of the meetings
9 in Nevada, we do want to learn from what happened
10 here. And we know that, for example, Bob
11 Halstead has already told us that he will have
12 some more detailed information on a couple of
13 topics for discussion there. So I think we're
14 going to hear different types of information and
15 we need to plan for that also and how we do the
16 agenda. Bob?

17 MR. HALSTEAD: A couple of things.
18 First of all, without at all being critical of
19 the people who gave the opening presentations,
20 who I think did a nice job, I think if you can
21 shorten those to no more than 20 and preferably
22 shoot for 15 minutes and have handouts for people

1 and handle some of that information in question
2 and answer thing you will be well served by
3 that.

4 Secondly, I think you should inform all
5 of us who are participants today if you don't
6 expect us to be at the table, at that meeting
7 very shortly. I made a commitment to be at this
8 meeting because I think this is absolutely
9 critical, but, for example, that means I will not
10 be providing technical assistance to people in
11 the central part of the state the day before when
12 there is Department of Energy all day EIS hearing
13 in Austin and that's caused some people to be
14 angry. Why did you have to schedule? I
15 understand. I'm not trying to beat you up. I'm
16 just trying to explain while you were in the
17 southern part of the state, on the 7th DOE has a
18 major all-day meeting in Austin, and the 9th a
19 major all-day meeting in Crescent Valley both of
20 which are on a high priority rail corridor and
21 also are the areas that people of the northern
22 part of the state would go to and concerned about

1 truck transportation. You just need to know that
2 for purposes. I have to go to the airport and
3 I'm sorry I can't stay.

4 I would like to thank you for the way
5 this meeting was organized and conducted. It's a
6 particularly important thing for me personally
7 and for the State of Nevada generally that you
8 have approached this the way you have. Because
9 as I said I don't want to belabor the negative,
10 there has been a lot of bad feeling in the State
11 of Nevada over the way another part of the NRC
12 handled the transportation issue; such bad
13 feeling that there has been lots of talk about
14 litigation and so I'm not saying this completely
15 eases the situation, but it's a very important
16 thing for you to demonstrate to people in Nevada
17 who rightly or wrongly feel themselves more
18 affected by this issue than all the other folks
19 that are affected by it.

20 And so I appreciate the way you set up
21 the table. At first I couldn't imagine this
22 agenda was going to work and the way you set the

1 agenda was good. I want to thank you Susan
2 because I know the way the federal system works
3 that people take some political risks to even get
4 involved in meetings like this. Particularly Mr.
5 Massey, I don't think I have ever seen anybody
6 who had technical responsibilities to do as good
7 a job of standing in and dealing with technical
8 and nontechnical fire from all directions.

9 While many people deserve
10 congratulations on this meeting, you have
11 certainly handled yourself today in a way that
12 enhances the credibility of the study. With that
13 said, I hope nobody will succumb to the atrophy
14 of organizational vigilance, because the way you
15 dealt with things today is the way we have to
16 deal with things for the rest of us. I'm very
17 sorry I can't stay. Thank you very much.

18 MR. CAMERON: Thank you, Bob, for your
19 comments and participation and I have already
20 talked to a number of people about the issue you
21 raised about Nevada and I will be in touch with
22 all. Amy, do you have one more?

1 MS. SHOLLENBERGER: It's a procedural
2 question. We check the box if we wanted a hard
3 copy of the meeting transcript from this
4 meeting. I'm just wondering will we also receive
5 transcripts December 8 and 9th meetings since
6 most of us will not be at those meetings?

7 MR. LEWIS: Yes.

8 MR. CAMERON: That was the longest yes I
9 ever heard. Let me just ask if anything in the
10 audience has a comment on process?

11 MR. HOLDEN: If I could I just want to
12 revisit one particular point and ordinarily there
13 are some things you say you don't want to belabor
14 but I find myself having to belabor, belabor,
15 belabor this particular point. I appreciate that
16 suggestions, you know, that the word of mouth is
17 going to get things out to Indian country which
18 we do and we do what we can to provide that type
19 of outreach, but I guess the point is that not
20 everyone may be, totally understand, maybe not
21 giving everyone their due credit, not everyone
22 may understand this tribal federal relationship.

1 And what the basis of that is and what's required
2 in that context and that's to do that government
3 to government protocol outreach. It's
4 mandatory. It's something that is incumbent upon
5 them and it has to be done regardless of how many
6 numbers there are out there, how many tribes
7 there are, regardless of how much it costs them,
8 that's what is requisite, long standing and
9 that's also the reason why Department of Defense
10 has developed an Indian policy, which this
11 organizational board helped with. That's why
12 FEMA developed their Indian policy. That's why
13 in almost every major, almost every agency under
14 the administration has developed an Indian
15 policy. NRC is the exception. They have not
16 gone the distance on that matter yet, but
17 something I think they will embark on and that's
18 why the organization I work with is redeveloping,
19 reviewing, revisiting the DUE policy. So there
20 is a basis for this and it's quite important. I
21 don't think anyone was trying to belittle it but,
22 I'm just trying to clarify what I was trying to

1 say a while ago.

2 MR. CAMERON: Thank you, Robert. That's
3 a significant specific item to achieve what you
4 are talking about.

5 Charles, can you talk to this and then
6 we'll see if there is anything on this as well as
7 this bounding issue and then have give, see if we
8 can give people an opportunity to have final
9 comment.

10 DR. MASSEY: There are a few things we
11 just wanted to use as discussion stimulators if
12 they hadn't come up during the meeting today.
13 Nuclear criticality was brought up a couple times
14 by Amy. That was something that we were
15 considering for including as suggested areas for
16 inclusion in the performance study.

17 What happens after these collisions and
18 thermal environments, how does that impact
19 criticality of considerations and also get into
20 an area that really hasn't been explored that
21 well in the previous studies, look at sensitivity
22 of results of the analyses so we'd have some idea

1 of the thermal conditions were a little different
2 than what we looked at, how much of a difference
3 does that make? What's the impact? Sort of go
4 through the analysis that we will conduct and
5 look at the sensitivity of the results to the
6 different scenarios and parameters that we would
7 put into that analysis.

8 With that I just want to stress if you
9 do have other thoughts on this or other issues
10 either now or after the meeting, if you want to
11 put them on the card or e-mail them or write into
12 Rob or Dr. Shankman, please do that.

13 MR. CAMERON: Thanks, Charles. I wanted
14 to do give everybody a chance to respond on these
15 issues, but we talked in a number of segments
16 today about what some call bounding; what Eileen
17 called best bang for your buck point. Amy
18 mentioned conservatism.

19 I just want to do give Mike Wangler and
20 Mark Holt a chance to say a few words on that so
21 that people can understand what that's all about,
22 because there's been a lot of I credibly good

1 suggestions that have come out of this meeting.
2 But when the NRC and Sandia go to integrate that
3 and consider it, there may come a point where not
4 all things can be done. So how do you work with
5 this?

6 Mike you had a comment that you made.
7 You keep pointing at Mark Holt, but we're not
8 going to let you do that. Mike, how about a
9 comment on the issue of bounding? We'll go to
10 Mark Holt and then open it up for everybody else
11 to comment on bounding or these issues.

12 MR. WANGLER: I'm not sure I remember
13 any more what I was thinking about whenever I
14 made the comment.

15 I guess reminds me a little bit of a
16 story. When I started out in this business as a
17 health physicist some 28 years ago ICRP2 was the
18 predominant publication on the, that provided
19 those conversion factors that relate to various
20 environmental or radioactive pollutants as it got
21 into the body converted that quantity into dose.

22 Some years later ended up with ICRP2 26

1 and 30 where we made some changes but what we
2 generally got was more decimal places behind the
3 numbers that we already had. Then five years
4 ago, six years ago, we ended up with the ICRP 50
5 and 51 which basically just reaffirmed everything
6 that has been done for the last 30 years. There
7 were some changes in that one kind of went, kind
8 of overturned what was done in ICRP 26 and went
9 back to ICRP 2.

10 It's not really related to bounding per
11 se. What I want to express a concern about is
12 that we have the NUREG 0170, we have the Lawrence
13 Livermore NCR Modal Study. We have some good
14 information there that I hope we don't throw out
15 for the sake of a new study. I suspect that what
16 we're going to find is that we've sharpened our
17 pencil. We've taken out our data which is going
18 to go from four decimal places. We can now take
19 that out to eight or ten decimal places and find
20 out we're probably in the same ballpark and here
21 we've just spent a lot of effort to reaffirm what
22 we've already done.

1 What concerned me about the Livermore
2 report concerns me about this one. Someone
3 brought it up a little bit earlier was the
4 uncertainty in the data that's used to generate
5 our final numbers. The Livermore report had
6 three significant figures. Had one plus I think
7 three decimal places, had three significant
8 figures probably with data that was no better
9 than one significant digit. Yet there were no
10 error bars, no uncertainties that were identified
11 in the report as showing where that number fit.
12 Was that number good to five percent, 10 percent?
13 I suspect it's was probably good maybe 100
14 percent, but there was no analysis that was
15 done. I'm hoping that perhaps in this report we
16 can get a little better sense of where these
17 numbers fit. And in that sense I will use the
18 term bounding, in that if we know where the
19 number is plus the margins that we have on either
20 side, we kind of know where our number lies. We
21 can have a little bit more -- we I guess in the
22 scientific field can have a little bit more

1 confidence in the numbers that we get.

2 I realize that probably the general
3 public likes a single number that they can work
4 with. Unfortunately when you have systems with
5 significant uncertainties and data, it's hard to
6 rely on just a single number.

7 I like the idea of looking at numbers
8 that are risk informed so that you can kind of
9 figure out where you want to be. You can do
10 screening methods much like Livermore did in
11 their report to kind of say we've considered
12 these numbers but they fall outside of where we
13 think they should be. We're going to consider
14 this subset.

15 It's still not clear to me from
16 listening to the Sandia discussion how their
17 going to actually present the data. I realize
18 there is some criticism in the way Livermore did
19 their number of looking at strain at a certain
20 point and temperature at a certain point. But in
21 that regime they came up with a grid that had a,
22 had some logic to it.

1 With the discussions that have been done
2 here, we talk about using analytical models and
3 we can do some precise calculations on the
4 responsive things, but it's not clear to me how
5 we're going to put this thing in an order so that
6 we can determine where the bounds are that we
7 want to, we want to look at the transportation of
8 spent nuclear fuel. Thank you, Chip.

9 MR. CAMERON: Thank you, Mike. Mark,
10 let's go to you for some comments. Mark, in case
11 we didn't mention it earlier, is the author of
12 the congressional research service report on
13 spent fuel transportation which I think was very
14 helpful to a lot of people in terms of putting
15 this into an understandable perspective.

16 MR. HOLT: From my perspective is
17 certainly the perspective of trying to help
18 inform the congressional debates. This has been
19 a very useful exercise, particularly because I
20 would presume a lot of the issues were raised
21 today, if not all of them, would be issues that
22 you would see when the nuclear waste bills come

1 to the floors of the House and the Senate
2 probably next session. So I would I wouldn't
3 expect to see a lot of results from the study in
4 time for that, but certainly for my own purposes
5 and for purposes of Congressional policy makers,
6 the more answers to these questions we can get or
7 at least the more analysis you can see, everybody
8 will accept the answers would be very valuable.
9 But, of course, as was mentioned can every one of
10 these issues be fully analyzed in the study and
11 should there be some rebounding on some of them?
12 Obviously you got to make the decision on how
13 much time and money you have available to do
14 that, but the more you can do the better it would
15 be in my opinion.

16 MR. CAMERON: Thank you very much for
17 that. Bob, do you have a comment on this?

18 MR. FRONCZAK: We can throw a lot of
19 money at it and we're trying to figure out what
20 really makes a difference before we decide where
21 to throw our money, so we encourage that.

22 MR. CAMERON: Okay. Thank you. I see

1 Halstead's cappuccino is still working. His name
2 tent is still up with us.

3 Why don't we start Rick Boyle and I want
4 to give all of you an opportunity who want to,
5 you are not required to, to offer any final
6 thoughts for us before we close. Rick?

7 MR. BOYLE: Thank you. The one comment
8 I'd make and it is a little bit on the bounding
9 issue, I will be interested either off-line or
10 later on on a comment that I would submit to the
11 NRC, but it may be to Sandia, we have had a lot
12 of ideas in today but at what point do they
13 become such low probability events or the
14 sequence becomes such low probability that, I
15 don't want to say they're discarded, they have
16 been studied and they've been determined to be
17 such low consequence that they're discarded.
18 Will we go in before we even start and stay if
19 they are one in a million or less in probability
20 they would be discarded? Should we do that up
21 front and possibly with public input or will we
22 do this after the fact and say we can only do the

1 top 10, so our probability becomes maybe 50
2 percent.

3 I wonder what the thought of both Sandia
4 and the NRC are on such, where do you draw that
5 cut off and do you do it before you start the
6 study or as you get into it and do it based on
7 your funding? Thank you.

8 MR. CAMERON: I think that's an
9 important point to consider and maybe that will
10 be something that's in the phase one
11 recommendations and analysis.

12 Mike, do want to say anything more than
13 you already have?

14 MR. WANGLER: I want to support Rick on
15 his comment on looking at low probability
16 sequences. I guess the parting comment I would
17 like to make is that in the study we need to be
18 very careful that the studies don't do anything
19 to undermine the regulations that we currently
20 have.

21 We are operating under 30, 40 years of
22 excellence, excellent transportation under very

1 similar regulations. I'd hate to see that we'd
2 have to revisit everything that we have done in
3 those regulations. Some of the impacts that
4 would have is these regulations are worked
5 through with the international community.
6 Congress even binds the U.S. to be generally
7 compatible with international regulations so that
8 we can insure commerce and be able to move things
9 back and forth between the countries.

10 Along those lines it troubles me a bit I
11 think that Jack Edlow made the comment earlier
12 about Sandia looking at a thousand degree C fire
13 for the duration of one hour. This is certainly
14 extra regulatory and it makes one wonder that if
15 we pass that, are we now going to ratchet the
16 regulations toward a different number and if we
17 fail that are we going to have to look at higher
18 numbers? So I think we need to be very careful
19 in what we look at and officially propose for
20 these studies. Thanks.

21 MR. CAMERON: Thanks, mike. Tracy?

22 MS. MUSTIN: I'd would like to thank you

1 for including me an a learning experience. I
2 thought it was very valuable. I think I agreed
3 to what Rick and Mike said. I think the real
4 challenge is going to be over the next few months
5 perhaps in the next series of meetings, how all
6 this input, there was a lot of interesting and
7 valuable input provided today, but how this input
8 is sort of collated and then a study is proposed
9 that allows us to, whether the right term is
10 address in a bounding way all the things that
11 were said, all the input that was provided today,
12 suggestions that were made. I think we all have
13 a vested interest in the study and the results
14 will be used for years to come.

15 We'll see that the study does validate a
16 system and a process that is conservative, and
17 has provided safe transport for years. But it's
18 also a tool that we can use, hopefully help build
19 confidence.

20 The suggestions that were made about
21 taking the opportunity to explain to the public
22 what some of these things mean and what the

1 system is about is going to be very useful.

2 MR. CAMERON: Thanks. I think we should
3 all pay attention to the fact just what the
4 importance of this particular study is.

5 Dwight, do you want to say something?

6 MR. SHELOR: I certainly agree that
7 there are, there is a cutoff on the low
8 probability of that. Need look at very
9 carefully. It would save you a lot of money when
10 you scope it.

11 I commend NRC, particularly Susan for
12 starting this effort and getting involved in it.
13 I personally believe that as Tracy said we will
14 use this for years to come, but the real value in
15 this study is going to be the public involvement
16 and personally I encourage you to go all over the
17 country and talk to everyone because for the
18 general public and those that are particularly
19 interested to understand the safety case is
20 really important. That's our biggest struggle
21 when we talk to the public and we want to
22 convince them this is safe enough. You have the

1 burden and I think you are doing a great job.

2 MR. CAMERON: Thank you very much. Jack
3 Edlow?

4 MR. EDLOW: Three points. First of all,
5 I'd like to thank the Regulatory Commission for
6 the really superb job they've done today.
7 There's a sense of openness in this meeting and
8 the sense of decorum, and I think the term
9 decorum is appropriate because I have been to
10 many hearings and I've been subjected to many
11 hearings in the past and things where decorum was
12 certainly not the issue. I want to applaud
13 everybody for the way they worked on this today.
14 I hope that it can continue especially at
15 Henderson. That's the first point.

16 The second point is I would like to
17 thank the Nuclear Regulatory Commission for their
18 statement of confidence they made this morning in
19 the existing regulatory framework. I think it's
20 very important that the public continue to get
21 that sense from you and I hope that you will
22 continue to make that point everywhere you go.

1 Things are good and this is just a question of
2 continuing your analysis of the circumstances.

3 Thirdly, I would like to make the point
4 that many people are saying let's keep it real,
5 deal with issues that can be dealt with and
6 should be dealt with. Let's try to do scenarios
7 that are meaningful and not get hooked into all
8 the what ifs that you can get into because even
9 though Chuck would like to spend your money in
10 looking at all those things, I don't think the
11 taxpayers should have to fund so many things that
12 are on the outside bounds. Thank you very much.
13 On to you.

14 MR. CAMERON: Marvin Resnikoff.

15 MR. RESNIKOFF: I would also like to
16 thank the NRC for doing this and for your
17 openness. I want to think about the question
18 that Susan Shankman asked. This happened so long
19 ago this morning which was why should we do an
20 environmental impact statement? I'm going to
21 think about that question because I'm comfortable
22 with these technical issues and technical

1 proceedings, but I'm a little uncomfortable in
2 sort of excluding the public in holding sort of
3 these what I think of as more back room meetings
4 involving a much larger constituency out there
5 and the EIS allows certain legal safeguards which
6 we don't really have sort of in this kind of
7 setting. And also allows more political element
8 to enter and this is, after all is a democracy,
9 it's not being run by technical people in the
10 back room. It's being run by people who are
11 elected. So I have some concern about this
12 aspect of it. And so I'm going to think about
13 why an EIS -- the question you asked -- and I
14 will send you a letter about that.

15 MR. CAMERON: Thank you very much,
16 Marvin. Let's go to Bob Fronczak.

17 MR. FRONCZAK: I think NRC did a great
18 job. Chip, I thought you handled the meeting
19 real well.

20 MR. CAMERON: Thank you.

21 MR. FRONCZAK: One thing I would like to
22 follow-up on Mike's comments is that I think you

1 said that the regulations that we have now are
2 good. We all believe that. The only thing I
3 would change about that is if something in the
4 analysis, let us look to a point where the
5 regulations needed to be changed, and I think
6 that ought to be done.

7 MR. CAMERON: Thank you, Bob. Ed
8 Pritchard.

9 MR. PRITCHARD: Thank you, Chip. I also
10 want to thank the NRC. I echo what's been said
11 by the other speakers here. I would also like to
12 again make the Federal Railroad Administration
13 available to you and I hope you do utilize us and
14 our concerns about fire tests, crashes and what
15 have you. We will start gathering information on
16 some of the more serious accidents as of
17 tomorrow. So I again thank you.

18 MR. CAMERON: Thank you, Ed, and thank
19 you for that offer of assistance too. Kevin.

20 MR. KAMPS: I would just like to thank
21 you for the invitation to be here today. I would
22 just like to echo the importance of an

1 environmental impact statement process to give
2 the public meaningful and legally binding part in
3 the decision making process. It's ironic that
4 the spokesman from the Department of Energy, Mr.
5 Shelor, said that these meetings should happen
6 all over the country because there is growing,
7 there is a growing feeling along the
8 transportation routes that they have not had,
9 well, they're not getting public hearings along
10 major transport routes in the draft environmental
11 impact statement process.

12 For the Yucca Mountain repository places
13 like Chicago, do not have a public hearing and so
14 there is efforts on the grass roots level to try
15 to get public hearings on the draft environmental
16 impact statement from DOE. So I fully support
17 that idea that the NRC should take this to the
18 places that are most impacted by the study.
19 Thank you.

20 MR. CAMERON: Thanks, Kevin. We're
21 going to come back to Susan for last words. So
22 we're going to go over to Mark Holt. Mark?

1 MR. HOLT: Thanks again for inviting me
2 today. I think this will definitely be helpful
3 for me in helping to inform the Congressional
4 Debate.

5 I just once again I'd reiterate that
6 these issues that were raised today will be
7 issues in the debate and any analysis that can be
8 directed at them will be extremely valuable.

9 MR. CAMERON: Okay. Thank you. Do you
10 want do say something since you are the project
11 manager? I think you probably should.

12 MR. LEWIS: I just want to say that
13 these discussions have been very useful to me
14 same thing and I think those from Sandia will say
15 the same thing. For this issue report that we're
16 going to produce next May or so, what I have
17 learned today is we need to be very clear in our
18 message and in particular regarding whether we
19 want to use bounding, but still representative
20 assumptions in approach or whether we want to use
21 these more realistic assumptions and for both of
22 those cases we need to think about how we're

1 going to use sensitivity analysis to support
2 these approaches.

3 We need to be very clear in this issues
4 report about how we will use testing in this
5 project and what we intend the testing to show.
6 I think we need to be very clear in this issues
7 report regarding whether or not we want to use
8 some sort of risk to address lower probability
9 accidents below some probability threshold where
10 the consequences may be great but the risk is
11 small because probability is so small.

12 MR. CAMERON: Thank you much, Rob.
13 Rick?

14 RICK: . Well, it's always good to see
15 the regulators are vigilant and interested in
16 continuing to evaluate the level of performance.
17 This is provided by compliance with the
18 regulations. I think that's been going on since
19 1961 when the first regulations were set up and
20 it's something that needs to continue because
21 every year we get smarter concerning accidents
22 that have happened and understanding frequencies

1 and forces involved in accidents and keeping that
2 sort of information up to date is a necessary
3 part of being rigorous regulators.

4 On another point, what I think really it
5 comes down to is an explanation to all involved
6 of the system performance of the spent fuel
7 cask. It has contents inside of it, a lot of
8 details about the pins, pallets, the cladding,
9 cask, the seals, impact limiters.

10 In the end it's a system that performs
11 and understanding how that performs in a
12 deterministic sense where the regulations have
13 said you must be able to withstand an accident up
14 to this particular point, I think explains to
15 people what they can expect, the level of safety
16 they should be confident in each and every cask
17 having.

18 The next step then is the performance
19 when it exceeds the regulatory requirements and
20 in some cases it's been called graceful failure
21 and other cases it's the so-called graceful
22 failure depending on how you view what the cask

1 is going to do when it exceeds what it was
2 designed to do. If the study can explain how the
3 system performs in the deterministic range and
4 problemistic range, up to the point where you
5 have drawn the bounds of it on a basis of
6 probability perhaps, then that in the end will
7 help everyone, I think, leave with a better and
8 more comfortable understanding of just what the
9 safety is and transport spent fuel.

10 MR. CAMERON: Thank you very much,
11 Rick. Amy Shollenberger.

12 MS. SHOLLENBERGER: Thank you for having
13 this meeting and I particularly appreciate it
14 because it's not often that I get to ask
15 questions and have request access to the people
16 who actually know the answers to those
17 questions.

18 I think it's one thing being a member of
19 the public as opposed to the industry. That's a
20 real handicap because it's hard to get the
21 answers to questions. I appreciate a forum where
22 I can get those answers. I would also just like

1 to follow-up on a couple things and just add my
2 two cents.

3 First, I would like to thank Eileen for
4 asking you to consider your audience, I think
5 that was a really good point and I'm glad to
6 agree with you. I think it's really crucial that
7 you consider your audience and you think about
8 how to explain this stuff to people who are going
9 to be watching the cask driving by their houses
10 every day. And so I just like to say I would
11 also like to follow-up on what Kevin said and I
12 was going to bring up the same point of I thought
13 it was very ironic that the DOE was encouraging
14 the NRC to hold meetings like this all across the
15 nations when the DOE is refusing to do the same
16 thing, even though we are requesting it. We
17 being American citizens, taxpayers.

18 So I'd like to urge the NRC to encourage
19 the DOE to do the same thing being partners and
20 all. And just one last comment that I would like
21 to make, and I hate to end on this kind of a
22 note, one thing that kind of made me sad in the

1 meeting is several people said we all agreed that
2 the regulations are good enough and I'm not sure
3 that's true. I think that, I know public
4 citizens -- the regulations aren't good enough
5 until they say zero release is acceptable.
6 Thanks for having us.

7 MR. CAMERON: Thank you, Amy. Felix, go
8 ahead.

9 MR. KILLAR: I would be remiss if I
10 didn't thank the NRC because everybody else did.
11 But I do, I think these are helpful for the
12 industry to also hear the issues that people who
13 obviously share our view of perspectives have and
14 help us understand this perspective so that we
15 can help provide additional information and maybe
16 address some of those concerns and certainly make
17 changes where changes are needed.

18 The one issue that wasn't discussed, the
19 one issue that's near and dear to our hearts is
20 that this program is basically funded from our
21 fees we pay the NRC. I know this morning Susan
22 mentioned that she wants to do this thing

1 effective and efficiently and we certainly
2 endorse that. There are limited resources out
3 there and there are limited resources at the NRC
4 and so I think one of the things is very
5 incumbent upon the study is to find out where are
6 the big issues? What are the issue that need to
7 be studied in-depth and what have you, and spend
8 the resources where you get the most benefit
9 because you do have limited resources and it's
10 our resources you're spending and we want you to
11 spend them wisely.

12 MR. CAMERON: Thanks, Felix. Eileen
13 Supko.

14 MS. SUPKO: I think building on what
15 Felix just said would be beneficial for the NRC
16 and Sandia to focus on what's new and what's
17 changed since the last modal study. Talk about
18 some of the things that have changed. Cask
19 designs have changed, some of the accident
20 statistics have changed. They may have improved
21 or degraded. Also put in place the process such
22 that the study doesn't necessarily get redone

1 every 10 years just because 10 years have passed,
2 but because something new that's significant has
3 occurred. I think that's an important thing to
4 keep in mind and also the fact that you have
5 enhanced analytical capability now and how does
6 that factor in.

7 One of the things that I think everybody
8 in this room agrees is that spent fuel
9 transportation is an issue more important both to
10 nuclear industry, to members of the public, to
11 different groups and this type of a meeting where
12 you get everybody's opinions and perspectives, I
13 think is very important. This has been less
14 painful than I thought it was going to be
15 spending the whole day here. The last comment is
16 is I would love to know what they're doing next
17 door.

18 HEATHER: Thank you, Chip, and members
19 of the NRC staff for organizing this meeting. As
20 usual I got a lot out of it. Like many tribal
21 environmental or technical staff, I deal with
22 many issues, not just this one. I appreciate all

1 I heard today and take that information back and
2 help the people that I'm here to represent.
3 Thanks.

4 MR. CAMERON: Thanks, Heather. Robert
5 Holden.

6 MR. HOLDEN: Thanks to the NRC staff and
7 Chip Springer for ramrodding the session, and
8 keeping us all awake. But just in closing just
9 to say that, you know, the folks I represent
10 they're impacted by a lot of things in this
11 program area. The cask integrity can be
12 important to cultural integrity. In the event of
13 an accident consequences are great, probability
14 is small. However, that one consequence is,
15 it's -- do tremendous, harmful everlasting damage
16 to tribal lands and some of those folks live in
17 areas where there is cultural sensitive matters
18 where the things that set them apart and distinct
19 from other folks, this being their homelands, is
20 an integral to their culture. These same
21 scientist who have worked in these areas have a
22 tendency to dispute the fact that there may exist

1 phenomenon, that there may exist spiritual beings
2 that exist there in which those native peoples
3 communicate with.

4 It's my understanding that scientists
5 aren't supposed to disprove anything or they
6 can't disprove they can eliminate certain
7 possibilities. However, you know, they discredit
8 and discount many of the things that tribal
9 people try to share with them.

10 In terms of sharing this information and
11 developing the outreach materials, remember that
12 a lot of these folks may be second generation
13 English speaking people so this is entirely a
14 foreign language to them, not the mention the
15 technical jargon that they will be hearing. Just
16 quite difficult for them to comprehend
17 particularly when -- and to understand that this
18 material that's traveling through their
19 homelands, which they have no place else to go if
20 something happens there, that they set up these
21 lands in reserve for them a long time ago in
22 exchange for other lands.

1 Not only that, the resources that --
2 this uranium came from their lands, extracted
3 from their lands and those places were not
4 cleaned up in that mining and so forth and now
5 it's coming back through their corridors and
6 homelands, so be mindful of that and be
7 respectful of that and I'm sure they will be
8 respectful as you go down this path. Thank you.

9 MR. CAMERON: Thank you very much,
10 Robert.

11 Before I turn it over to Susan for
12 closing, I would just like to thank the group.
13 You have been a very thoughtful group and
14 constructive and courteous. Thank you very
15 much. Susan I will give it to you to close.

16 MS. SHANKMAN: I want to thank you all
17 for being here, for your patience, for your
18 perseverance and I'm not going to get into any
19 issues. We're going to look at the transcript.
20 When we go to Nevada I'm sure we will get other
21 comments.

22 The one thing I wanted to say is that we

1 brought all the staff who are working on this
2 project with us. People from Sandia, people from
3 my office. Janet came who is with the division
4 of waste management.

5 The reason we are here is because we
6 sincerely wanted to do this -- I won't say
7 right -- because we can all define it
8 differently. But we certainly want to do it in a
9 in which people with different issues are fully
10 considered and fully explored. I told at the
11 beginning of the meeting we will do that.

12 We will come back with the design for
13 our study. We will get other comments. I thank
14 you very much. I imagine we all want to go home
15 and if you have any ideas, I get my best ideas
16 when I'm driving home. Please send them in to
17 us. There is a lot of information we talked
18 about today. I hope maybe you don't go away with
19 the sense we have any answers, but I hope you
20 have a feeling that we have listened to the
21 questions. Thank you.

22 (Whereupon, at 6:15 p.m., the conference

1 was concluded.)

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1 CERTIFICATE OF REPORTER

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3 I hereby certify that the foregoing is a
4 true and accurate transcript of the proceedings
5 in the aforementioned matter this ____ day of
6 ____.

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