

UNITED STATES
NUCLEAR WASTE TECHNICAL REVIEW BOARD
PANEL ON TRANSPORTATION & SYSTEMS PUBLIC HEARING

RED LION HOTEL
3203 QUEBEC STREET
DENVER, COLORADO 80207

AUGUST 15, 1991

PANEL MEMBERS PRESENT

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Systems, Nuclear Waste Technical Review Board

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Dr. Sherwood C. Chu, Panel on Transportation & Systems,
Senior Professional Staff

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Transportation Test Center
Pueblo, Colorado

1 selection and corrosion. We both serve on the Board on a part-time basis. Also with us
2 at the table is Dr. Sherwood Chu of the Board's senior professional staff. Dr. Chu was
3 formerly a senior manager of the hazardous materials program at the U.S. Department of
4 Transportation.

5 In carrying out its charge, the panel has been reviewing work done in the
6 transportation field. We have had discussions with the DOE and the Nuclear Regulatory
7 Commission. Since our start up, we already have identified several issues of concern.
8 We assessed these issues and developed recommendations. The Board adopted our
9 recommendations and incorporated them into its first three reports to the U.S. Congress
10 and the Secretary of Energy. In case anyone is interested, you may sign-up at the
11 registration table to receive a copy of any of these reports.

12 Two important recommendations we have made pertain to incorporating
13 the technical disciplines of system safety and human factors engineering into the DOE's
14 safety management processes. These are useful tools to predict and anticipate hazards
15 and to minimize human error as a contributor to accidents. Another important
16 recommendation addresses the importance of minimizing the handling of high-level
17 waste. Other recommendations pertain to issues of assessing potential risks and then
18 devising plans to manage those risks. The issues were selected in part because of the
19 opportunity that exists to provide input into the DOE's plan for the transportation system
20 and management processes now, while the plans are still in their early stages. The panel
21 also intends to assess other issues that are important to the safety of transportation
22 operations, such as routing, emergency preparedness, and inspection and enforcement.

23 In addition to reviewing ongoing work, the Panel on Transportation &
24 Systems wants to solicit information from the public. We have begun holding public

1 hearings in selected parts of the country to obtain the views of those who are interested in
2 issues relating to the safety of waste transport activities. We held our first public hearing
3 in Amargosa Valley, Nevada, on August 17, 1990; our second hearing was held in Reno,
4 Nevada, on November 19, 1991.

5 This is our third hearing. It will be divided into two parts. First, we will
6 hear from witnesses who have prepared and submitted testimony to us in advance.
7 Copies of their prepared testimony are available here for you to take.

8 We also are providing an opportunity for those, who were unable to
9 schedule presentations in advance, to testify later this morning on a walk-in basis. We
10 will be available this afternoon for the same purpose. This afternoon's session will begin
11 at 1:30 p.m., unless we run long this morning.

12 You may register for a five-minute presentation. The time slots are given
13 out on a first-come, first served basis. If you are interested, please fill out a walk-in
14 testimony request form and return it to the registration table. Please specify whether you
15 prefer the morning or the afternoon. For either session, your name will be called in the
16 order it is received.

17 A verbatim transcript is being made of the hearings. It will include
18 submitted texts, delivered remarks, and dialogue with the panel members. The transcript
19 will be available, as of September 5, 1991, for review by any member of the public in our
20 library in Arlington, Virginia, or on a library-loan basis.

21 Finally, we also have made provisions for written submissions. If you
22 wish to submit a written statement, please send your statement to us by November 30,
23 1991. Address it to Dr. Dennis L. Price, Chair, Panel on Transportation & Systems,
24 Nuclear Waste Technical Review Board, 1100 Wilson Boulevard, Suite 910, Arlington,

1 Virginia 22209.

2 On behalf of the Panel on Transportation & Systems, I would like to
3 welcome you and thank you for coming. We are looking forward to your presentations.
4 We want to hear you.

5 Our first presenter this morning is Mr. Adam Babich, from the
6 Environmental Defense Fund. Mr. Babich.

7 MR. BABICH: Thank you, Dr. Price.

8 On behalf of the Environmental Defense Fund, I'd like to begin by
9 thanking the Board and this Panel for inviting our testimony. The Environmental
10 Defense Fund is a non-profit organization that represents over 200,00 members
11 nationwide. The Fund focuses its attention particularly on minimization of waste, and in
12 this context, safe handling of waste. Obviously, there are a lot of issues that could be
13 addressed to this Panel; I would like to focus particularly on cask testing, the effect of
14 human error on risk management and risk assessment, cask inspections, emergency
15 response preparedness, cask design, and what we called in our written testimony waste
16 minimization, but what we really mean is minimization of the handling of this kind of
17 waste.

18 I am not going to simply read my remarks since you already have them in
19 front of you, and I am not going to go through quite as much detail as we did in writing,
20 but I would just like to hit some of the high points.

21 One of the most important issues that the Environmental Defense Fund
22 feels is testing of these casks for transportation. The first issue obviously is that there has
23 to be full-scale tests of the casks. The computer simulations, the quarter-scale
24 simulations to date, history has shown that these simulations do not provide accurate

1 predictions of what is going to happen in the real world that a simulation may tell you
2 that the cask may survive and then in a real-world test, a full-scale test, the cask fails.
3 And there are examples of that set forth in our testimony.

4 More important, my understanding is that we essentially have gotten past
5 a lot of that issue in that the Department of Energy has now conceded the need for full-
6 scale tests of these casks. A more important issue at the moment might be the kinds of
7 tests that are going to be implemented. The Department of Energy does impact tests,
8 puncture tests, thermal tests and immersion tests, but the Department has admitted that
9 the dominant effect in accidents involving truck shipments is crush; but, the crush tests at
10 this point are not a required part of this testing regime. That is certainly a tremendous
11 concern. Now there obviously could be other examples of this type of problem where
12 what in the real world may cause the stress that cause the cask to fail is not being tested
13 for. But in a situation like this where we are aware of a kind of effect that could lead to
14 failure and it is not being tested for in a full-scale test, that is something that needs to be
15 corrected.

16 A related issue is the way the tests are done. For example, when the
17 Department of Energy does thermal tests, the tests seems to be done in terms of the all
18 engulfing fire. Part of this may be based on a conclusion by the Lawrence Livermore
19 Laboratory, that well, an all engulfing fire is a more strenuous test than a torch fire. That
20 conclusion however, is rebutted by other studies, and I am referring specifically to the
21 Sandia National Laboratory study, which notes that torch fires result in great localized
22 stress that could result in failure.

23 This situation reminds me for example, of the famous Galloping Gertie
24 bridge in Tacoma, Washington, where they designed the bridge to withstand a certain

1 wind velocity, but when the wind velocity comes at a different angle it sets up a
2 resonance which ultimately destroyed the bridge. So, just that you were perhaps
3 exposing the casks to more heat in an all engulfing fire, does not mean that it is an
4 adequate test to tell you that that cask will survive in the real world.

5 Once again the example we've pulled out, which is that a torch fire cask
6 also is necessary, does not mean that that is the only possible example of the kind of test
7 needed to provide the different kind of stresses that may actually show up, but it is a good
8 example of things which don't seem to be--aren't really being looked at at this point.

9 I understand that the Board is already to a large extent understood and
10 processed the point we are making again in this written testimony about the need to
11 consider human error when doing risk assessment.

12 The Environmental Defense Fund understands that it is a very difficult
13 thing to do to adequately account for human error, but obviously if you don't account for
14 it, the predictions aren't accurate. And an example we cite in our testimony is that when
15 the Department of Energy talks about its worse case scenarios, the worse case scenario
16 includes a cask which is assumed to have been built perfectly up to design. Obviously,
17 that is not a realistic worse case scenario and needs to be accounted for in the risk
18 assessments.

19 It also needs to be accounted for in design of these casks in the first place
20 to minimize the complexity of the design and to try to minimize the room for human
21 error. One of the unfortunate truths of operations like this, is that as important as they
22 may be to protect the public health of the environment, ultimately a lot of the individual
23 steps can be very boring, and it is easy to skip steps; it's easy to make mistakes. It seems
24 to be that the government finds it easy to design things that work on paper which require

1 too much in terms of human ability to follow all the steps. A good example is the space
2 station that NASA designed and then realized that they couldn't properly maintain.

3 The Department of Energy has set forth this QA/QC, Quality Assurance,
4 Quality Control Program, as a solution to the problem. But, of course that Quality
5 Assurance, Quality Control Program is itself very complicated and subject to human
6 error, and that alone certainly cannot provide the assurances that the public needs.

7 Our main point in terms of casks inspections is the need to invite, well not
8 only to invite but to encourage actively oversight on the part of the states and inspections
9 on the part of the states. If you can divide the world up into things that the government
10 is good at and the things that the government isn't good at, one thing the government
11 seems to be great at is looking over the shoulder of other government agencies. The
12 government maybe less good at implementing its own ideas thoroughly. So, often
13 something which maybe missed in-house, a problem that inspectors within the
14 government will miss, is something that the state is going to be looking for carefully. So,
15 I think to build the department's own credibility and to build the department's--to build
16 public acceptance for this project, it is really necessary, regardless of what the bare
17 minimum legal requirements are for the Department of Energy to actively solicit state
18 inspectors, to give the public that assurance.

19 I think one example of what we are up against here is the fact that the
20 Department of Energy, regardless of what maybe going on in this particular program
21 suffers a real credibility problem. Just two days ago, the District Court of Colorado
22 entered an order finding that the Department's demonstrated attitude as a government
23 agency it does not have to comply with the Resource Conservation Recovery Act, and
24 that the government is showing an on-going disregard for certain environmental laws that

1 the Department of Energy is. Well that is at a different facility organized by a different
2 people presumably, but nonetheless it is a continuing problem, not only in terms of what
3 is going on in the real world, but in terms of public relations.

4 Just calling people about what these issues are, you need outside
5 inspections, preferably outside the federal government; preferably state governments to
6 address these issues.

7 DR. PRICE: Could I just interrupt at this point and ask a question on that point.

8 MR. BABICH: Certainly.

9 DR. PRICE: Is what you are suggesting that each state that is, for example, a
10 corridor path have a representative inspector look at the casks as they come out or is it
11 something like the CVSA, the Commercial Vehicle Safety Alliance represent the states,
12 or is there anything more firm in your concept as to how this would be implemented?

13 MR. BABICH: I think how it is implemented specifically could vary from state-
14 to-state. I think the most important thing is that the state is given the opportunity and
15 encouraged to accept the opportunity of sending inspectors out to do the work.

16 DR. PRICE: However.

17 MR. BABICH: However, right. So that ultimately I as a citizen in one of the
18 affected states, can turn to my state, my local, essentially elected officials and say, what
19 are you doing for me and how are you implementing the Department of Energy's
20 invitation to make sure that I am being protected.

21 DR. PRICE: Thank you.

22 DR. CHU: Since you are been interrupted, for the point of clarification, you are
23 referring to inspections on the road as distinguished from cask manufacture, is that
24 correct?

1 MR. BABICH: That's correct.

2 DR. CHU: Thank you.

3 MR. BABICH: A related issue is emergency response and preparedness. The
4 Board has recognized that Congress has attempted to address the need to require DOE
5 assistance for training. The Environmental Defense Fund's concern is that that assistance
6 will not, or may not go far enough. In general, many of the western states do not
7 adequately fund emergency preparedness for hazardous waste type problems. For
8 example, the emergency planning community Right To Know Act, which is an act
9 Congress created which is to create really a system for giving first responders the
10 information they need to respond without endangering their own lives is underfunded,
11 generally in the West, and is just at the very beginning becoming a workable program.
12 So far the Department of Energy appears to have only offered very one-shot deals in
13 terms of training for the states in general, affected corridor states. Really what the
14 department needs to do is to make sure that there is an ongoing program to make sure that
15 first responders are trained, that the states are ready to respond to emergencies, that
16 hospitals are prepared to deal with potential problems, all the way down the road.

17 A quick point on cask design and I don't think that this point was made
18 with ideal clarity in our written testimony, so I want to try to clarify that a little bit more.

19 We are concerned that the Department of Energy is relying solely on
20 administrative controls, essentially on avoiding human error to protect against certain
21 problems. For example, the various spent fuel which we stored in these casks, has
22 different levels of burn-up, so different levels of radiation in the waste, and, to not be
23 stored together without controls to avoid criticality problems when these weights vary in
24 terms of radioactive content. Our understanding that the Department of Energy is

1 essentially relying on their ability to keep track of serial numbers of this fuel to prevent
2 this kind of problem, to make sure that they are not storing incompatible wastes together
3 in the casks without taking adequate precautions.

4 Our question is whether or not there isn't a more--whether there isn't a
5 design solution to make it more difficult to store incompatible waste in casks, whether it
6 is changing, how the wastes look, whether it is designing the casks in a way so that it
7 would be difficult to fit incompatible waste in together. It seems that there would be a
8 solution which once again is not going to eliminate the possibility of human error, but
9 can at least minimize it and add hopefully redundant control.

10 Finally, I would like to address the issue that we've referred to as waste
11 minimization but is more accurate, obviously we are in favor with waste minimization
12 but our specific comments are directed minimization to handling. And that is we would
13 generally like to see the same casks used to store the fuel at the site as are used to
14 transport the waste to the ultimate depository, so that you are not moving the waste from
15 one cask to another along the step and essentially cut out one step. And that actually may
16 go back to cask design as well.

17 In conclusion, the Environmental Defense Fund does applaud the work
18 that this Board has done to date by way of perhaps quibbling with the Board's work
19 product. We feel that some of the recommendations presented in past reports have been
20 fairly general in nature and certainly a lot of that is inevitable, but we feel the Board
21 could be even more effective in being more specific when they can.

22 We are concerned with just the ongoing practices of the Department of
23 Energy in waste transportation planning in general. We followed the WIPP situation
24 very closely, and are concerned that the Department of Energy not be allowed to repeat

1 past mistakes at the Yucca Mountain site, and the transportation.

2 To summarize, we think that this Board could address inadequacies in
3 DOE's testing of the casks; the effective human error on DOE's risk assessments; the
4 need for independent inspections, meaning state inspections; the inadequate state of
5 emergency response and preparedness and continuing problems with design, and, not
6 only problems with present design but ways that the Department of Energy could be
7 creative in using design to minimize human error and minimize problems, and minimize
8 handling of waste.

9 Thank you.

10 DR. PRICE: Thank you very much. And some of those I think you are preaching
11 at a choir here. Dr. Verink, do you have some questions?

12 DR. VERINK: Not at the moment.

13 DR. PRICE: Woody?

14 DR. CHU: I have some questions of clarification. First on the cask testing, there
15 are--I think your testimony pointed to two issues. One is whether or not there should be
16 full-scale testing according to the current standards of the Nuclear Regulatory
17 Commission and the other is implicitly in some of the things you referred to is the
18 adequacy of the current standards themselves. In other words, when you said that the
19 current tests, even when they are full-scale, crush test is not included and that they should
20 be, that is raising a question as to whether current standard are adequate.

21 MR. BABICH: Right.

22 DR. CHU: And similarly, the absence of the torch test, vis-a-vis the all engulfing.
23 Are you then raising two questions? One, that there should be full-scale testing; and,
24 two, you are raising questions as to the adequacy of the existing standards?

1 MR. BABICH: That is correct. That full-scale testing is absolutely required, but
2 I want to be clear that no only is the Fund saying that the current standards are inadequate
3 and possibly should be improved, or certainly should be improved, but also that the
4 Department of Energy needs to go past those standards regardless of whether the
5 standards are changed, and that the Department of Energy needs to go to the next step to
6 convince this Board and to convince the public that they are doing everything they can to
7 adequately test these casks. And I've got a feeling that no matter how many times you
8 revise the standards, a smart engineer is going to think of another way to stress that cask.
9 And when the engineer thinks of that, it should be tested.

10 DR. CHU: Now, the existing standards are part of the international standards, so
11 implicitly you are advocating a change in the level of protection of the international
12 standards?

13 MR. BABICH: That is correct. But, I am not meaning to imply that the
14 Department of Energy should wait until those standards are increased. The Department
15 of Energy should go further than those standards right now.

16 DR. CHU: Okay. On the question of state participation, as far as over the road
17 transportation is concerned, whether it is nuclear materials, hazardous materials or just
18 plain ordinary materials, inspection already is a burden that is largely vested with the
19 states in the sense of highway state troopers and so on and so forth. So when you say that
20 you want the Department of Energy to encourage the states to participate in the
21 inspection process, are you advocating for a role that is greater than what the states now
22 undertake?

23 MR. BABICH: What I am advocating, and I want to make clear that I am not
24 advocating to the Department of Energy, simply pass the buck and say well we don't do

1 inspections. But I am advocating that the Department of Energy not resist and in fact
2 invite oversight and even redundancy in inspections. And for example, we cite an
3 example in our testimony where after several years of a transportation program, an
4 inspector finally noticed that valves had been loosened apparently over the road by road
5 vibrations and it was just something that nobody had thought to check before. So
6 creating a redundancy, well not really a redundancy but creating a duplication in terms of
7 the number of inspectors and the entities responsible for inspection creates an incentive
8 to look for those mistakes that somebody else might have overlooked. Everybody wants
9 to earn their paycheck and see what the other agency forgot to check for.

10 Whether--I think that the level of funding, the level of energy spent on
11 inspection state-to-state right now is going to vary. But the most important message, I
12 think, is that the Department of Energy should not be making any steps to close out the
13 states, but to be inviting their participation.

14 DR. CHU: So what you are saying is just one of--am I correct in understanding
15 that it is one of attitude and posture and so on, rather than creating an additional program
16 of state inspections?

17 MR. BABICH: You may find that some states just aren't going to do it. Or aren't
18 going to do it really adequately. And you certainly don't want to be in the position where
19 you are saying, well we are going to rely entirely on the states. But you certainly want
20 citizens to be able to turn to their states and say, why aren't you doing it? The
21 Department of Energy is inviting you to and encouraging you to.

22 DR. CHU: On emergency response, you were referring to certain DOE efforts,
23 are you thinking of the assistance programs that they have been providing so far vis-a-vis
24 WIPP?

1 MR. BABICH: Probably most of our examples and most of our testimony is
2 based on our experience with the WIPP site, because we followed that relatively closely.

3 DR. CHU: Okay. So it is not specifically the civilian program.

4 MR. BABICH: Our examples of inadequacies are less specifically aimed at the
5 program, but we are not comfortable with the extent of the training and the planning for
6 training that we have seen to date on the civilian program. And we want to make sure
7 that that is a priority with the Department of Energy, not just to provide some initial one-
8 shot training, but to take it upon itself to be sure that from year-to-year there is an
9 adequate emergency preparedness program that the states are running or the localities,
10 whoever, all the way along the program, and that that program is up to speed; it is tested;
11 they are trained; they are ready.

12 DR. CHU: I asked the question because the civilian program has yet to undertake
13 such a program in the sense that it is still being defined as directed by the Amendments
14 Act. So I take your advice to mean that the program managers of the civilian program
15 should learn from--

16 MR. BABICH: Avoid the mistakes that were made at WIPP. It's nice to be in
17 this posture where you still have the opportunity to some planning and avoid those
18 situations, which certainly don't increase public credibility when you come up with an
19 inadequate plan and it has to be--when the Department of Energy comes up with an
20 inadequate plan which has to be corrected down the road.

21 DR. CHU: Thank you.

22 DR. PRICE: With respect to the casks tests, you raise the issue of full-scale crush
23 tests and torch, and I just might make a comment. We have discussed those issues with
24 DOE in the past, and I think we as a Panel and a Board will continue to discuss those

1 issues with DOE. With respect to full-scale testing, I gained the impression from
2 something you said that you felt that this was an issue that was somewhat resolved with
3 respect to spent fuel, and I don't think it is resolved. It is one that we have to continue to
4 work with on spent fuel. Now maybe I've misunderstood what you were saying there, but
5 I think the full-scale issue is not resolved. When we are dealing with the spent fuel
6 casks, we are dealing with some very expensive casks, and in the interest of taxpayer
7 dollars, there needs to be some kind of parsimony considered when we talk about full-
8 scale tests; how far do you go? And when we mention a number of different tests and
9 continue to add to the billet of tests that need to be performed, then we run into the
10 question of how many casks are we going to impact with this, and what were the costs
11 and what would they be. Do you have any response to that concern?

12 MR. BABICH: First, I stand corrected by implying that the issue was close to
13 resolution or resolved. I shouldn't have implied that. And I should have learned by now,
14 I base my comments mainly on the Department of Energy's concession in the context of
15 WIPP that first full casks testing was necessary. I should have learned by now that a
16 concession in one form by the Department of Energy does not mean that that is going to
17 be implemented across the board.

18 I think in terms of cost benefit I guess is what we are coming down to of
19 full-cask testing, what you have to look at really is the scope of this program, the amount
20 of waste we are looking to ship, the amount of miles we are looking to ship it over, and
21 how important it is to do this correctly. The Environmental Defense Fund feels strongly
22 that this is not an area to try to shave costs and save a few dollars by not doing very full
23 cask testing across essentially every conceivable--trying to apply every conceivable
24 stress that you are going to see in the real world when inevitable accidents do occur.

1 DR. PRICE: We have had testimony brought to us for example, that indicated
2 that the drop tests should be tests to destruction. And when you consider that one issue
3 alone, drop testing to destruction, it could eat up a lot of casks when you are trying to do
4 that. In the test to destruction issue, do you have any comment on it?

5 MR. BABICH: Applying by general comment back to the test to destruction, the
6 comment would be that those tests should be done. And the reason is that ultimately the
7 Department--well obviously, the main reason is to ensure that the Department's program
8 adequately protects public health in the environment and that is an important charge.

9 And second, it is that the Department is not going to save money in the
10 long-run by leaving unanswered questions and leaving public concerns unanswered,
11 ultimately it is going to cost more trying to fix those problems after the fact, than to do
12 adequate testing in the first incidence, to make sure that the public is assured, or at least
13 as much as possible.

14 DR. PRICE: As adequate testing, do you mean test to destruction?

15 MR. BABICH: Yes.

16 DR. PRICE: You mentioned the issue of relying upon administrative processes,
17 particularly the example of the burn-up of spent fuel and then getting perhaps mixed fuel
18 in casks or different levels of burn-up in casks and blending and so forth. It seemed to
19 me that the problem as far as a design issue goes is when the fuel is fabricated its burn-up
20 is not known at that point. Burn-up is known after the process is completed, and it is
21 designed or fabricated without a knowledge of what the burn-up would be. Therefore, to
22 create a design solution which would seem to me to be a difficult thing, although there
23 may be some procedural steps after burn-up has been achieved on this--for example on
24 this marking or indicating on the rods, some sort of way specifically on the rods

1 themselves, rather than rely upon administrative storage by number or something like
2 that, the number itself though, is an indication. So I am a little bit uneasy about my
3 understanding of how that could really specifically be implemented.

4 MR. BABICH: I'll try to give you an example. Ted Zukowski who actually took
5 on the lion's share of drafting this testimony, spoke with Lindsey Audin, who is the State
6 of Nevada expert about that very issue. And I am going to paraphrase Dr. Audin's
7 remarks and try to apologize in advance if I in anyway put words in his mouth.

8 Audin suggested several design changes or possible examples. First when
9 fuel assemblies are fully spent, the assembly could be physically altered, so that those
10 attempting to place an assembly in a container could not place it near a hot assembly or
11 an incompatible assembly.

12 He suggested that there might be some sort of a hook placed on the
13 assembly or lock and key design. A design could be placed in the cask to monitor
14 conditions there including things like temperature and pressure and possibly include for
15 example a radio device to alert inspectors to a problem.

16 So our concern is--we do not have a specific design solution, but the
17 question is has it been completely looked at? Is there a way to rely on something besides
18 just keeping track of serial numbers? Is there something we can do to make it more
19 obvious and harder to make a mistake, recognizing that it is still very possible that a
20 mistake will be made?

21 DR. PRICE: Okay. You mentioned a support for the all purpose cask or a cask
22 which can be used for both storage and transportation. Do I understand that correctly?

23 MR. BABICH: Yes, you do.

24 DR. PRICE: We did have a recent workshop that DOE put on on the Engineered

1 Barrier System. This was presented at that workshop as one of the options that should be
2 looked at with respect to the Engineered Barrier System. So some of that interest is at
3 least coming to the front on this particular issue, and I thought I would just mention that.

4 Also you mentioned a little quibble, and we appreciate that. As a matter
5 of fact, that little quibble we have quibbled among ourselves as to the general and the
6 specific. How specific should we be? And I might comment that our reports to Congress
7 and to the Secretary to this point, and that may change, have addressed the more general
8 broad issues that would take care of some of, if they are properly implemented, some of
9 the detail things that we are aware of and are concerned about. But I think some of our
10 record would indicate we have brought some of these more detailed things. But, we just
11 haven't chosen at this point to make them specific issues in the reports to Congress and to
12 the Secretary.

13 But your quibble is our quibble, and we are debating that among ourselves
14 now. When are we too specific for example, for the purposes of Congress for example.
15 Or, when should we get more specific for the purpose of getting down what we need to
16 get done. So we share that quibble and anytime along the line you have input on that
17 debate to help our philosophy, we would appreciate it.

18 MR. BABICH: Thank you, Dr. Price. And thank you for pointing out the
19 Department of Energy's workshop involving the cask which are multi-purpose using
20 casks, I guess.

21 One thing I've been amazed sometimes, is that about a year ago I went to
22 the Oak Ridge National Life Sciences Symposium to speak to Department of Energy
23 employees about environmental compliance. And just between sessions of the seminar, I
24 was amazed by how many very clear thinking people I ran into who used to, before the

1 department bureaucracy had kind of processed a solution, would already have been
2 debating it among themselves and would have good answers to a lot of issues that the
3 Department as an entity was still struggling with. And I think part of the struggle of an
4 organization like this Board is to try to take and find these kernels of good ideas, which
5 often are within the Department and elevate them, so that they really do get implemented.

6 DR. PRICE: Thank you. Any other questions? We thank you very much for
7 your testimony.

8 MR. BABICH: Thank you.

9 DR. PRICE: Our second presenter is Mr. Robert C. Fransen, Esq., of the Office
10 of the Governor of the State of Wyoming.

11 MR. FRANSEN: Mr. Chairman, thank you for providing the opportunity to
12 participate in this proceeding. I am Roger Fransen with the Wyoming State Planning
13 Coordinator's office which is a section of the Governor's office. And I am appearing here
14 on behalf of the State of Wyoming.

15 Wyoming does not have facilities that generate high-level or transuranic
16 radioactive waste and only very small volumes of low-level waste are generated in
17 Wyoming. There are no large radioactive waste storage or disposal facilities in
18 Wyoming. And there is no formal scientific or technological infrastructure dedicated to
19 regulation of the use or possession of radioactive materials in Wyoming. We are not an
20 NRC agreement state.

21 We are however vitally interested in the transportation of radioactive
22 materials because of our location and unique characteristics of our state. Highway
23 transportation is particularly important and that is the subject of my remarks generally.
24 Nevertheless, shipments to Yucca Mountain might very likely travel through Wyoming

1 by rail which raises many related concerns and my remarks I think should have relevance
2 for rail transportation as well.

3 Interstate 80 which is the primary route through Wyoming and is the only
4 east/west route through southern Wyoming, crosses areas that are largely very sparsely
5 populated. Interstate 80 crosses the Laramie range of the Rocky Mountains and skirts the
6 northern flank of the Medicine Bow Range of the Laramie Mountains in southeastern
7 Wyoming. In these areas and across Wyoming generally, elevations on I-80 are in excess
8 of 6,500 feet above sea level. In fact, Interstate 80 reaches its highest elevation at 8,640
9 feet where it crosses the Laramie Range west of Cheyenne.

10 Winter weather along I-80 and particularly in these mountainous areas
11 causes extremely difficult driving conditions in the wintertime. Road closures happen
12 annually and sometimes last as long as two or three days.

13 Localized weather conditions in these areas, regularly cause hazardous
14 driving conditions, even when severe weather is neither forecast nor occurring in the area
15 generally. Wyoming Department of Transportation Statistics indicate there were on
16 average five times as many truck accidents in Carbon County, Wyoming which is where
17 I-80 skirts the Medicine Bow Mountains during the month of November than during the
18 month of May over the period 1986 to 1990. Accident rates are significantly higher in
19 the winter months despite lower traffic volumes and lessened road construction activity.

20 Distances between communities are long, accident response times
21 therefore also can be long. These long distances combined with bad weather can result in
22 response times, even for first responders, of an hour or more. And specialized teams to
23 deal with radioactive materials can be expected to take hours to reach an accident scene,
24 even under the best circumstances.

1 The point of all of this is that planning for the transportation of radioactive
2 materials and standards and practices established for transportation of radioactive
3 materials, must be responsive and must recognize local conditions if safe and uneventful
4 movement of those materials is to be routinely accomplished. Responsiveness to local
5 conditions can, I think, only be realized if states are fully involved at the earliest stages of
6 the planning process and if states are given broad latitude to implement transportation
7 practices and requirements that they believe necessary to assure safe transportation. It
8 simply is not enough to require carriers to comply with regulations that are of general
9 applicability regarding vehicle operations and materials packaging.

10 We do not feel the need to close Wyoming's borders to ensure the safety
11 of Wyoming citizens in the context of radioactive materials transportation. We do want
12 to have the ability to prevent problems from occurring and we do want to have the ability
13 to deal with them safely and effectively if they do occur.

14 Early notice of the occurrence of shipments, the ability to communicate
15 with shippers and carriers on a continuous basis during shipment, and agreed upon
16 decision-making criteria are essential to avoiding, or dealing with, problems which are
17 encountered during shipment.

18 Wyoming and other corridor states should be given the flexibility to
19 implement the programs that will ensure cooperation and communication between the
20 state, federal agencies, and private entities involved in the shipment of nuclear materials.

21 The western states, working primarily through the Western Governor's
22 Association, have effectively dealt with a number of waste management issues through
23 regional cooperative efforts. In addition to the WIPP project, 16 western states and
24 pacific territories are parties to the Western Regional agreement and dialogue on State

1 Capacity Assurance Planning for Hazardous Waste. A number of western states have
2 recently signed the Western States Regional Waste Management Protocol.

3 Planning for the transportation of waste to the WIPP project, which has
4 been funded by DOE through the Western Governor's Association, has been very
5 successful. The WIPP experience we believe can be a model for dealing with Yucca
6 Mountain shipments, but at the same time it should not be a constraint on how issues are
7 addressed or what issues are addressed.

8 Planning for Yucca Mountain shipments should not be carried out as an
9 isolated exercise with application to Yucca Mountain shipments only. Establishing a
10 generalized framework for state involvement in nuclear materials transportation can and
11 should begin immediately. A truckload of spent fuel that crosses Wyoming today raises
12 the same concerns as a truckload of spent fuel that may be bound for Yucca Mountain or
13 some other repository in the future.

14 Western Governors' by Resolution 88-001, which they first adopted in
15 1988 and which was recently re-adopted, have called upon the Department of Energy to
16 prepare and adopt a comprehensive transportation plan to guide all transportation
17 decisions under the Nuclear Waste Policy Act. The Federal government and the nuclear
18 power industry should begin immediately to fund programs that will assure the safe and
19 uneventful movement of nuclear materials. A program put in place today can have
20 benefits which will be directly applicable to the Yucca Mountain shipments. In fact
21 effective programs put in place today, and improved upon over time, should negate the
22 need for qualitatively different transportation programs when Yucca Mountain or another
23 repository becomes operational.

24 Immediate action should be taken to prepare and adopt a comprehensive

1 plan for the transportation of high-level radioactive waste, whether by highway or by rail,
2 that fully involves affected states at every stage of planning and implementation and that
3 recognizes the importance of local conditions and concerns to the safe and uneventful
4 movement of radioactive materials.

5 Thank you. I'd be glad to respond to any questions.

6 DR. PRICE: Thank you. Dr. Chu?

7 DR. CHU: You've mentioned your participation with the Western Governors'
8 Association on the planning aspects and so on of the nuclear shipments for WIPP, do you
9 participate with the Western Intrastate Energy Board on the civilian shipments?

10 MR. FRANSEN: We are a member of that Board, yes, and we do participate with
11 them.

12 DR. CHU: Okay. Thanks.

13 DR. PRICE: I think your recommendation for establishing a generalized
14 framework for state involvement and nuclear materials transportation including, I think
15 you've got all transportation whether it is WIPP or it is occasional spent fuel. Right now,
16 there is a call for a unified transportation program from the Department of Energy?

17 MR. FRANSEN: That's fair.

18 DR. PRICE: Cutting across their divisions whether it is WIPP or civilian or
19 military, or what it is. Is that a fair statement?

20 MR. FRANSEN: I think it is fair, Dr. Price. As I indicated in the testimony,
21 high-level nuclear materials are high-level nuclear materials regardless of how they are
22 categorized for administrative purposes by federal agencies. And, they raise the same
23 concerns for us at the local level.

24 DR. CHU: I should point out that the Western Governors' Association Task

1 Force did appear before the Board and spoke to us in a meeting in Albuquerque back in
2 March and they gave us a presentation on work that has been done and in fact made the
3 same point quite forcefully.

4 MR. FRANSEN: Well, I am happy to reinforce, their previous presentation.

5 DR. PRICE: Could I ask you with respect to the case you've stated about
6 localized conditions being of importance and as I understood what you are presenting,
7 you feel a need to have some kind of communication system so that if the state itself feels
8 that a section of highway, and I am trying to read into what you've said to understand it,
9 so this is a question for clarification here at this point, that you could interdict a shipment
10 by communication in some way to get to the shipper at least to warn if it is already in
11 transit that this section of highway probably should not be crossed at this particular time?
12 Is that part of what you are reaching for?

13 MR. FRANSEN: I think that is a good characterization. We have not at this
14 stage reached a conclusion that it would be necessary that the state have authority to pull
15 a shipment off the road, as it were, although that's certainly a possibility.

16 We do, though, feel very strongly that we need to be able to pass along
17 information to the carrier so that at least they are fully advised and can make a decision.

18 DR. PRICE: You would not be comfortable with the authority as to whether to
19 proceed given local conditions resting with the driver and the driver's judgment?

20 MR. FRANSEN: Probably, not. Certainly we want to have that driver fully
21 informed and would probably prefer that either the state or some other entity other than
22 the individual, the single individual driver and perhaps his companion would be in the
23 position to make that decision.

24 DR. PRICE: And you are advocating pre-notification. What about the issue of

1 continuous tracking of shipments?

2 MR. FRANSEN: We would very much like to see continuous tracking as a
3 routine matter.

4 DR. PRICE: Some states have been very concerned about their local conditions
5 with respect to the shipments of hazardous materials, and their vulnerability because of
6 this. Some states have conducted inventories of the flows of hazardous materials
7 coupling them with truck accident experience by section of highway so that they identify
8 those sections of highway usually within a mile or so then that result in higher frequency
9 of accidents and perhaps then a greater vulnerability to hazardous material accident if the
10 hazardous material flows along that section. Has Wyoming participated in any kind of an
11 inventory like this or assessments specifically directed towards hazardous materials,
12 vulnerability such as radioactive waste?

13 MR. FRANSEN: Not to my knowledge there hasn't been a formal undertaking of
14 that kind. There are sections of highway that by experience we know both the
15 professionals in the state agency and even the folks on the street who drive the highway
16 are those sections of highway that we can identify at least on that basis as posing
17 potential problems. That has not been defined and formalized.

18 DR. PRICE: At least one state has looked at given the areas that have a higher
19 potential for such accidents as you are indicating there are some in your state than the
20 placement of their response equipment such that they can with the equipment that they
21 have minimize response times toward those areas that have a higher potential. Have you
22 tried to move around your equipment or in any way tried to minimize this couple of hours
23 you talk about to get to some of those things?

24 MR. FRANSEN: I am not personally familiar with what has been done. Mr.

1 Moore, who will follow me, may be able to give you better information in that regard.
2 There has been a mobile response unit that has been built for use along I-80, and I
3 anticipate will be based in the southeastern part of the state where those sections of
4 unpredictable weather occur.

5 DR. PRICE: And the state has the option of selecting or designating routes to
6 avoid particular areas they think they need to avoid. Have you involved yourself as yet
7 in the designation process and gone through any of that debate?

8 MR. FRANSEN: We have not; but there really aren't any options.

9 DR. PRICE: Too many options, yeah. It's I-80 or die, huh?

10 MR. FRANSEN: Pardon me?

11 DR. PRICE: It's I-80 or die, right?

12 MR. FRANSEN: That's right.

13 DR. PRICE: That's about the only option you have?

14 MR. FRANSEN: It's the only 4 lane highway across souther Wyoming. And in
15 most areas the only highway at all.

16 DR. PRICE: So the options go dead; it's just I-80. I understand.

17 Thank you, very much.

18 MR. FRANSEN: Thank you.

19 DR. PRICE: The last presenter for this morning who provided their request in
20 advance is Richard C. Moore, also from the State of Wyoming.

21 MR. MOORE: Mr. Chairman, Dr. Verink, Dr. Chu, thank you for this
22 opportunity to testify.

23 My name is Rick Moore. I am a consultant to the State of Wyoming. My
24 primary responsibility has been to assist the state in the preparation of the capability to

1 respond to the demands created by the shipment of defense waste to the Waste Isolation
2 Pilot Plant in New Mexico. In that capacity, I have served as the State's representative on
3 the Western Governors' Association Technical Advisory Group for WIPP. I also
4 represent the State of Wyoming on the Western Interstate Energy Board High-level
5 Waste Committee. I am a past chair of that committee.

6 In preparing my remarks for this presentation, I was aware that you had
7 received information on the Western Governors' Association WIPP Transportation
8 Program, therefore, I did not specifically address the elements of that program. That does
9 not mean that I don't think they are important. I think it has been a highly successful
10 program and gives many lessons that can be learned and applied to the shipment of high-
11 level waste. I have attached to my testimony, for your information, the latest summary
12 report on that activity that was presented to the Western Governors' at their recent
13 meeting with the Secretary of Energy.

14 I would be happy to answer any questions or clarification you have on that
15 program with respect to Wyoming's participation. I would also note that I am the author
16 of the paper that was produced under that program for the protocols and procedures for
17 dealing with bad weather and road conditions. If you have any additional questions on
18 that, I would be happy to answer them.

19 Turning to other issues that I felt were important, there are of course a
20 myriad of issues that the states are facing in dealing with high-level waste. I tried to
21 select some that I think are pertinent at this point in time and have not been addressed
22 under the WGA Project.

23 Let me say to start with, nuclear waste transportation currently enjoys an
24 enviable safety record. But in my opinion, the number of shipments historically to date

1 are insignificant statistically to draw any conclusions based on a number of shipments
2 that we'll see in the future. So, we have a sense of complacency just because there hasn't
3 been a significant accident involving nuclear waste shipments. We have to prepare, plan
4 and deal with these shipments with the understanding that there will be a great increase in
5 the number in the future.

6 Another problem, of course, is the degree of uncertainty that exists today,
7 regarding these shipments. Although the repository has been identified as potentially
8 located at Yucca Mountain, the Department of Energy will not have that facility on-line
9 in time for their date in 1998 to start receiving spent fuel from the utilities. The current
10 plan is that the department will create a monitored retrievable storage facility with
11 shipments beginning in 1998 to that facility. I think we all recognize that is perhaps very
12 optimistic and highly dependent upon the success of Mr. Leroy, the Nuclear Waste
13 Negotiator.

14 Nevertheless, we have to recognize that there will be other shipments, or
15 could be other shipments of spent fuel prior to the opening of the repository. What this
16 does to western states in their planning decreases the planning horizon. If we go with
17 the assumption that in 1998 shipments would commence to an MRS, then there are a lot
18 of things that have to happen in the immediate future to begin to plan and prepare and it
19 creates a much shorter time horizon than if we plan only for shipments to the repository.

20 When it comes to spent fuel shipments or radioactive material shipments, I
21 think most experts in the field will agree that hazardous shipments in general pose a
22 higher degree of risk to the public than do spent fuel shipments. The public does not
23 necessarily perceive it that way, however. We have to create a sense of public trust and
24 confidence that these shipments can be conducted safely if they are going to be shipped

1 through our jurisdictions. Unfortunately, I don't believe the Department of Energy is in a
2 position today to generate that public trust and confidence, however, I do believe that the
3 states are and can work through the development of safety programs and proper planning
4 to help demonstrate to the public that these shipments can achieve the goal of the
5 Western Governors' of safe and uneventful transportation of radioactive waste.

6 In that regard regional planning plays an important role. Western states
7 are participating both in the Western Interstate Energy Board and the Western Governors'
8 Association WIPP Transport Group to plan for the shipment of transuranic waste and the
9 shipment of spent fuel and other high-level waste.

10 Again, I commend the Western Governors' Association program, as a
11 program that has developed what I believe is a very good safety program that we are
12 beginning to implement. And one of the significant things for you to look at is the
13 transfer of that program to other shipment campaigns and specifically the shipment of
14 spent fuel by the Public Service Company of Colorado from Fort St. Vrain to Idaho
15 National Engineering Laboratory in Idaho. And more recently the proposed shipments of
16 cesium capsules on the Department of Energy recall on those capsules from the IOTECH
17 facility in Denver to Hanford, Washington.

18 The State of Wyoming tends to work with the Department of Energy and
19 with Public Service Company of Colorado to implement some of the safety programs that
20 we've developed into the WIPP program to these shipment campaigns as well.

21 Just as a little aside as to Mr. Fransen's comment about the need for
22 integration of shipping program protocols, procedures, etc., to all shipments rather than
23 just WIPP shipments or spent fuel shipments. On the cesium recall campaign we were as
24 western states a little bit distressed that the initial planning for this program did not seem

1 to be taking into account the planning that had gone on for the WIPP program and the
2 lessons that had been learned under that program, even though they were right across the
3 hall, so to speak in Washington, the people responsible for the cesium program were
4 going on with their program without really conversing with the western states and
5 learning what we had learned in preparing for the WIPP shipments. Fortunately, this
6 situation was brought to our attention and we now are in the process of beginning to work
7 with the Department of Energy personnel responsible for that. But it to me demonstrates
8 the need to coordinate all shipment campaigns and try to apply uniform safety programs.

9 Turning to another issue, the Western Interstate Energy Board, a number
10 of years ago conducted a strategic planning exercise which ended up with a chart which
11 demonstrated the elements in a transportation safety program, or transportation program
12 and the approximate sequence of events and timing in order to implement the
13 transportation program. And according to the exercise that WIEB conducted, it is
14 necessary to begin a route selection process almost immediately. Our hypothesis is you
15 have to realistically limit the number of routes that are ultimately used, in order to
16 maximize the limited number of resources that are available for equipment and training,
17 and to be able to train selected emergency responders on long routes rather than training
18 every emergency responder along all interstates could potentially be affected.

19 I think this is a lesson that we learn from the WGA WIPP transportation
20 process where the Department of Energy very early on in that program identified specific
21 routes that would be used from the various defense facilities to WIPP, and also developed
22 a very specific phasing of those shipments. I think you are aware that ultimately 23
23 states will be affected by those shipments. But rather than just say, well we don't care
24 which facilities are going to ship first, the shipments were phased so that the first

1 shipments will affect only seven states between Hanford--actually only five states
2 between INEL and Rocky Flats down to WIPP and then later potentially Hanford to
3 WIPP. Later on, other western states will be brought in, California, Arizona and Nevada,
4 and then ultimately the southern states and midwest states will be affected.

5 By limiting those shipments initially to the first five and seven states, we
6 are able to involve only a limited number of states; concentrate resources and a planning
7 program and testing of the programs that were developed. So we see the development of
8 specific routes as a very important aspect that should be undertaken very soon in the
9 future.

10 We also recognize that routing could be very controversial. And what the
11 Western Interstate Energy Board High-level Waste Committee suggested was that
12 Department of Energy embark on a cooperative process with states to develop a criteria
13 by which routes could be selected. And once the criteria are developed and states and
14 other people agree that this is appropriate criteria, then the application of those criteria to
15 select specific routes would be less controversial.

16 The final point that I would like to raise in my prepared testimony is the
17 issue of legal weight trucks. DOE has embarked upon the design of casks based on the
18 assumption that they will meet the current legal weight conditions. I am very much
19 concerned that recent reports by the Department of Energy indicate that they are pushing
20 up against that limit already at this early stage in the design.

21 Our experience with the TRUPACT is that as you finalize design, start the
22 testing, implement required safety recovery procedures, etc., the only thing that is going
23 to happen is the weight is going to go up; the weight won't go down. On the WIPP
24 shipments for example in working with the states, the State of Colorado in particular

1 discovered that there was no way designed under the TRUPACT to recover it if it was
2 dislodged from a trailer. The Department of Energy then developed a recovery plan
3 which involves welding lifting lugs onto the TRUPACTS so that they can be lifted and
4 placed on a trailer and recovered.

5 Just the addition of these lifting lugs pushed them right up against the
6 maximum weight. In order to stay within the legal weight the Department of Energy is
7 going to have to do some very serious load management techniques to keep each
8 shipment in the legal weight limit. Well with transuranic waste, which has a high
9 variability and type, you can put in different weight drums in each cask and three casks
10 per shipment gives you a great deal of flexibility to still maintain that legal weight. I
11 don't think we have that flexibility with spent fuel shipments.

12 We urge you to look at that issue and try to decide whether or not the
13 casks should be designed to stay within the legal weight and avoid making compromises
14 that might affect safety to stay within that legal weight, or to take the alternative and go
15 ahead and design for overweight loads. Of course, the problem with that is that you have
16 weight requirement for each state that may or may not be allowed.

17 Specifically we have looked at it a couple of times and our regulators have
18 expressed concern to me that under current requirements for issuance of an overweight
19 permit, they have to determine that the load is non-divisible. And if you have a number
20 of fuel elements within a cask and could have shipped those in separate shipments, they
21 are concerned that they cannot reach that conclusion that it is a non-divisible load.
22 Obviously, this could present problems on optimizing the number of shipments, even on
23 the routing if some states won't issue overweight permits, it could require the shipments
24 to go different routes.

1 In closing, I would like to address just a couple of comments, questions
2 that were made to Mr. Fransen. First on the weather protocols, whether or not the
3 driver's judgment is adequate protection. I would say that on the WIPP program, we've
4 placed a great deal of emphasis on selection of qualified drivers, on training the drivers,
5 and making sure that the driver that is in that cab has good professional judgment in order
6 to make that decision. And we are going to rely heavily on the capabilities and
7 qualifications of those drivers.

8 However, the main purpose of our weather protocols is to address the
9 issue that the state people out on the highway 20 miles or 30 miles ahead of that truck
10 may become aware of a situation which would indicate that it is not prudent to continue
11 on down the road. With continuous tracking in place, our dispatcher will have a good
12 idea of where that shipment is at any given time. The dispatchers also are the ones that
13 start getting calls for wreckers when cars and trucks start going off the road. So if they
14 are aware that a shipment is coming and they are also aware that further down the road
15 there is a problem area, we believe that it is prudent that they notify that shipment and get
16 them to pull off the road when they've got a chance to pull off and find a good safe area
17 to park and wait until the road conditions improve, so that it can proceed safely.

18 We have not at this time requested or demanded authority to make that
19 decision as an absolutely State requirement that they do stop. We have worked closely
20 with the Department of Energy and believe that we have a good agreement with them that
21 if we advise them that they shouldn't continue, they will follow that advice.

22 Another question was raised regarding the placement of equipment for
23 response along the route. Unfortunately, that won't work well in Wyoming. As Roger
24 mentioned, we are not an NRC agreement state. We don't have any nuclear facilities

1 within the state. We don't even have an agency or sub-agency responsible for radioactive
2 materials. I think that is evidenced by the fact that I as a consultant serve in the role I do
3 for the State of Wyoming, there is no one in State Government that addresses these
4 issues.

5 What that means is that we don't have a lot of capability in terms of
6 personnel with the expertise to respond if there is an accident. We have a very limited
7 number of people in various agencies, some of which are just environmental type of
8 agencies that could deal with more generic type of spill control or containment and some
9 with some radiation expert in our Wyoming Emergency Management Agency.

10 So our approach to this problem of having responsibility to respond
11 without having the resources, is first to rely heavily on expert advice from the
12 Department of Energy Radiological Response Team in Idaho. We have equipped our
13 Highway Patrol officers along I-80 with detection equipment. They can go out there if
14 they have an accident, begin some initial radiation monitoring to try and determine the
15 severity of the accident, and determine whether it is likely that there has been a release or
16 not. Based upon their readings they will get in touch with the Department of Energy
17 people; ask for technical advice; say do we have a problem here or not.

18 If it does appear that there is the slightest chance that there has been a
19 release, our first mode of response quite frankly is to rely on that response team to
20 mobilize and get out there and help us.

21 As Roger mentioned, however, we also have developed an emergency
22 response unit, which is a trailer equipped with detection devices, sampling gear,
23 communications equipment, etc., which we could assemble our limited team as soon as
24 we can get them together, and trailer command post and emergency response unit out to

1 the accident site. We also designed it specifically that it could be flown in Air National
2 Guard's C-130, so that if the road is closed, we can go ahead and bypass that road closure
3 area, get it out there as quickly as we can to various remote part of the state wherever you
4 can land it. And once you land it you can pull it with any type of vehicle that is equipped
5 with a hitch.

6 I think you on the issue of route selection, adequately explored that, that
7 we don't have any alternatives. If you are going to have to go east/west across Wyoming,
8 it is I-80. There is only one potential variance on that and that is the old highway that
9 bypasses the area around Elk Mountain, and unfortunately that road is not in good
10 enough condition to encourage the use of it during adverse weather conditions.

11 Elk Mountain is a very unique area. It generates its own weather
12 conditions. And we in Wyoming like to refer to it as the "Snow Chi Min Trail". I have
13 been over that road a number of times. At the highest points there are reflector posts that
14 are about three times as closely spaced together as they are normally. And under ground
15 blizzard conditions you wander around looking for reflector posts. But on a clear
16 summer night, the reflector posts are so close together it looks like you are coming down
17 on a landing strip as they lash by you. So it is an area of concern and there is no good
18 way around it other than to develop procedures to deal with the conditions that exist out
19 there.

20 Thank you for this opportunity to testify and I'll be glad to answer any
21 questions that you might have.

22 DR. CHU: I've just been asked to do a small scale emergency response. There is
23 a blue Toyota truck, license plate Colorado 341 3AJ. It is parked in a no parking zone
24 right now and whoever, if the owner is here, you are requested to move it.

1 That reminds me of the announcement that they made at the airport
2 yesterday on no smoking on the flight and then you are not to tamper with the smoke
3 alarm in the bathroom. And if they discover that you have done it, then you will be asked
4 to leave the aircraft immediately.

5 DR. PRICE: Woody, they also said there was no smoking in Denver. I think they
6 meant in Denver airport, but they just said Denver.

7 DR. CHU: I have a question on the routing issue that you brought up. First, one
8 of clarification. When you are referring to routing decisions, you mean the choice of
9 specific routes within the system of the defined preferred routes that are defined by the
10 DOT regulations, is that correct?

11 MR. MOORE: That's correct.

12 DR. CHU: You are not referring to selection in the sense of the state's
13 designating alternates and so on?

14 MR. MOORE: That's correct. We are talking about narrowing the routes that
15 could be selected using DOT criteria from the point of origin to the plant destination to a
16 limited number of routes rather than the multiplicity of possibilities. If you strictly
17 follow DOT regs and stay on interstates or designated alternatives going from point A to
18 point B, you could get a spider web of alternatives. We would like to see that cut down to
19 one or two primary alternative routes.

20 DR. CHU: So when you say you would like to see, or, rather we would like to
21 see the DOE work with the states to develop criteria for route selection, you mean criteria
22 then within that system of preferred routes?

23 MR. MOORE: That's correct.

24 DR. CHU: To narrow it down to specific choices?

1 MR. MOORE: That's correct.

2 DR. CHU: Now in the case of Wyoming, the criteria, no matter how stated will
3 be I-80, is that probable?

4 MR. MOORE: Right.

5 DR. CHU: So, it is really one when you say you would like to know, it is really
6 one of knowing whether there will be an MRS, whether or not or to what extent IAD
7 would be used in the future for these type of shipments?

8 MR. MOORE: Correct.

9 DR. PRICE: You mentioned that the drivers would upon some kind of
10 notification at least if the kind of system you think would be effective in the State of
11 Wyoming and probably other states have similar type problems, especially those that are
12 weather involved or that the routes involve certain design problems or something like
13 that, would like to be able to keep track of the vehicle and also to be able to reach the
14 vehicle with advice.

15 You mentioned safe parking areas. Has the State of Wyoming addressed
16 safe havens or save parking?

17 MR. MOORE: We've worked with the Western Governors' WIPP project on safe
18 parking issue. And it is a complicated issue because you have the designation of "safe
19 haven", that has been used for NRC safeguard shipments. We've tried to for the WIPP
20 program to avoid talking about safe havens, but rather to talk about safe parking areas.

21 Some states have expressed an interest in finding and designating very
22 specific safe parking areas. Other states and Wyoming is one of them have rather said,
23 let's develop criteria for areas that you should avoid and criteria for things you should
24 look for for a good parking area, and let the driver use his best judgment applying those

1 criteria given where he is and the conditions ahead of him and behind him to find a good
2 place to park under those circumstances.

3 We, quite frankly think that that will work better than having a limited
4 number of sites that are designated and then potentially have a driver pushing ahead to
5 cross marginal conditions to try to reach one of those designated sites.

6 DR. PRICE: That was my follow-up on question of how you would want to
7 address that issue of if you do come up with a designated spot and you are talking about
8 20 miles ahead and that designated spot is 22 miles ahead or something.

9 MR. MOORE: I would just add for your information that Western Interstate
10 Energy Board for the Western Governors' Association, did prepare several issue papers
11 on the safe parking. At our last meeting when we discussed those, it became clear that
12 there is still some work that needs to be done, and the fool that I am, I agreed to take that
13 on as an additional activity so the State of Wyoming will be a lead in further refining the
14 safe parking issue for state's specific concerns as well as the systems type of approach.
15 So you will see more information on that in the future out of that program.

16 DR. PRICE: In order to hurry along route selection, which you say should begin
17 immediately, need to begin it immediately, is the State of Wyoming prepared to approach
18 their neighbor David Leroy and volunteer their generous hostship of the MRS so that we
19 can start really getting specific about this?

20 But, seriously, that is a problem that we run into when we talk to, we've
21 talked about the need of early route selection. And when we talk with DOE personnel
22 and others about this issue, if the states wait for DOE, DOE waits for the identification of
23 the location of the MRS in order to begin their route selection process, because the routes
24 have to flow to the MRS and then from the MRS to the repository. And, it seems

1 reasonable that that is a problem. And it is a stumbling block on initiating route
2 selection. Do you have any comment on that?

3 MR. MOORE: Yes. That is one reason why we advocate so strongly that criteria
4 for selection of route be developed and worked on together with the states, so that you
5 can at least come to some sort of concurrence on how you are going to designate those
6 routes. And then once an MRS site is identified, the criteria could be applied, and that
7 could potentially cut down on the length of time it takes to identify those routes.

8 We also know for at least right now according to the Amendments Act,
9 that Yucca Mountain is the preferred site for consideration. So we could, once those
10 those criteria are developed for longer term planning purposes begin to apply the criteria
11 to Yucca Mountain and develop those tentative routes earlier than currently planned.

12 DR. PRICE: Well, Yucca Mountain is the site selected for study.

13 DOT has published some route selection criteria for hazardous materials.
14 And I take it that you are suggesting that you need to go beyond criteria for hazardous
15 materials, specifically directed toward radioactive. Is there a reason why you think that
16 the existing route selection criteria for hazardous materials that are published by DOT
17 would not be as sufficient for radioactive materials?

18 MR. MOORE: Well, there are two reasons. One is very practical and the
19 practical reason is that if you apply the DOT criteria in my opinion you really don't cut
20 down on the number of routes. There is nothing there that would cause you to limit the
21 number of alternatives that all appear equally viable under those criteria.

22 To give you a for example, we conducted an exercise in one of their
23 meetings where we gave a location in the southeast of a reactor and Yucca Mountain is
24 the destination site, and asked everyone in the room to use highlighters and highlight

1 their route from point A to point B using the DOT criteria. And although a number of
2 people selected the same routes, virtually every interstate was marked by someone. So,
3 the DOT criteria did not limit the number of routes for those shipments at all.

4 What was interesting was that we had selected the site for the origin based
5 on the fact that they knew that it had been used for a shipment of materials from the east
6 to the west, and no one in the room actually selected the actual route all the way that was
7 used by that actual shipment. So that is the practical considerations.

8 The DOT criteria don't really limit the alternatives. The goal in
9 designating routes is to reduce the number of alternatives to concentrate resources for
10 training and equipment along a very limited number of routes. More practical concern I
11 think, or the non-practical concern is the public perception issue. Even though the
12 criteria used by DOT may be perfectly adequate for hazardous waste and radioactive
13 waste in general, I think the public is going to demand a higher degree of sophistication
14 when they are along the route that's been designated to say, why did you pick this route
15 instead of another route. If we can come up with criteria that are defensible to the public
16 to say, we've considered all these aspects and we've applied this criteria to a route
17 selection and this is what we ended up with, we can demonstrate to the public that we
18 addressed their concerns a little better than if we just say, well, we followed the DOT
19 criteria.

20 DR. CHU: Just a final remark. In the early part of your statement, you were
21 saying that most experts agreed that shipments of radioactive materials are safer relative
22 to other hazardous materials, but that the public doesn't quite see it that way, and so for
23 that reason, or at least in part for that reason, there is a need to exercise the diligence vis-
24 a-vis emergency preparedness and so on and so forth in order to enhance public

1 confidence.

2 So, you believe that basically the transport of this type of material is safe?

3 MR. MOORE: Yes. I believe basically it is safe. What we are dealing with I
4 think can be categorized as a low probability, high consequence event. That makes it
5 very difficult for states to prepare because there is very difficult training, keeping people
6 trained and their interest in learning to be trained for something that is not likely to
7 happen.

8 DR. CHU: And do you think that the safety officers of the State of Wyoming
9 believe that inherently, as long as these measures are adopted?

10 MR. MOORE: Yes. I believe that we feel that it can be made safe and will be
11 much safer than other shipments.

12 DR. CHU: Under the existing framework or regulations and so on and so forth.

13 MR. MOORE: Well, no, not under just--

14 DR. CHU: I mean in the sense of for the casks and that type of thing, if the
15 regulations are complied with? I ask that question because of some of the witnesses that
16 we heard from questioned the adequacy of these regulations.

17 MR. MOORE: I guess I really can't speak for the State of Wyoming on that. I
18 would offer a personal opinion though, that I think a human factor's issue on cask issues
19 is what I think is important rather than the existing criteria testing requirements and
20 things of that nature.

21 I think if the casks are designed and constructed and operated according to
22 the regulations that we have a high degree of confidence that they will be safe. But just
23 as a for example, I am sure that you are aware of the problem with the initial batch of
24 WIPP casks, where they were constructed without adequate consideration to maintaining

1 the wall thickness as designed. And then when the first batch of casks came out, there
2 was a smaller, thinner wall thickness than what was approved. It's things like that that
3 are going to catch us. Little things that you take for granted will not get done correctly
4 and if you are not staying on top of it it's a human factor or oversight that is going to get
5 us.

6 Again, going back to the large number of shipments, my concern is that
7 you have hundreds or thousands of shipments a year, and it starts becoming routine, that's
8 when you start perhaps getting careless.

9 DR. CHU: Thank you.

10 DR. PRICE: Thank you, Mr. Moore. We appreciate your testimony.

11 MR. MOORE: Thank you.

12 DR. PRICE: Before we have a break, I think we'll have a break shortly, I'd like to
13 give an opportunity while the testimony of this morning is fresh in the minds of members
14 of the audience, particularly of course some of the comments were directed toward the
15 Department of Energy, and if someone is here from the Department of Energy and they
16 would like to respond to any comments, we want to invite that opportunity at this time, or
17 any other free lance comments that might come from any source from the audience.

18 All right. We'll take a break. We'll come back at 11:00 a.m.

19 (Whereupon, a recess was had off the record.)

20 DR. PRICE: It's 11:03 a.m.

21 We have three persons who have indicated they would like to provide
22 testimony. We may not be able to get all three in before lunch time. They are Robert
23 Halstead, Jack Stauffer and Peter Conlon. Are all three of you going to be here this
24 afternoon? Okay, I see two, three--all three will be here.

1 So, we will just start in in order then as you filled out your request and we'll break
2 at noontime and reconvene at 1:30 for further testimony.

3 So the first on the walk-in testimony is Robert Halstead. He's
4 transportation adviser of the Nuclear Waste Project Office, State of Nevada, and has
5 provided to this panel useful testimony in the past. We appreciate it and look forward to
6 this.

7 MR. HALSTEAD: Thank you, Dr. Price. As always, it is a pleasure to be here
8 discussing transportation issues with you. Today I would like to do two things. One is to
9 give you an overview and status report on various transportation studies being conducted
10 by and for the State of Nevada, related to the Nuclear Waste Repository proposed for
11 Yucca Mountain.

12 Secondly, I would like to raise some issues focused on transportation
13 access to Yucca Mountain emphasizing the preliminary findings of our work about the
14 difficulty of both highway and rail access to Yucca Mountain and some of the
15 implications that routing choices made in Nevada, may have for transportation impacts in
16 the national system overall.

17 In addition to those two points, I would like to say at the beginning that
18 concern about transportation issues remains very high among the public in Nevada, and
19 among state and local officials in Nevada. And we would urge you in evaluation
20 locations for future meetings of the Transportation Panel that you consider coming back
21 to Nevada. This would be partly to facilitate our providing expert testimony to you
22 particularly from our consultants at the University of Nevada Transportation Research
23 Center. But it also, I think, would be useful now that several additional counties have
24 sought affected county status, official recognition from the Department of Energy that

1 they may be affected by the transportation routing to Yucca Mountain. So, I think there
2 are a number of reasons why we would urge you to consider locations in central and
3 southern Nevada in planning future meetings of the Panel.

4 Let me turn first to an update on the State of Nevada's Transportation
5 technical work. Since last I spoke with you, we have published in final form the Hoskins'
6 report on Transportation Systems issues, the Snedick report on cask testing experience,
7 the Audin critique of the NRC module study, the Nuclear Assurance Corporation
8 shipment inventory of spent fuel shipments from 1964 to '89, and also our comments on
9 the Department of Energy's preliminary design reports for the OCRWM cask program.

10 In addition to those reports, I've provided you with copies today, with our
11 most recently completed publications which includes a report prepared by the University
12 of Nevada Las Vegas Transportation Research Center on the Yucca Mountain
13 transportation routes and the copies of three topical reports on various aspects of
14 transportation risk assessment.

15 DR. PRICE: I think you are going to make sure that we spend our nights reading
16 this, it's a part-time battle huh?

17 MR. HALSTEAD: There is certainly no shortage of interesting reading material
18 here, that's for sure. Maybe I can make it easier for you Dr. Price by suggesting some of
19 things that we think are most significant in these reports and perhaps would certainly
20 guide the staff work that I know Dr. Chu will probably have to go wading through our
21 materials as well as the Department's.

22 We think in particular that it is worth a lot of wading through the technical
23 appendices as well as the introductory portion of the UNLV Transportation Research
24 Center Study, precisely because it documents the great wealth of route specific data

1 which is available for use in risk assessment and impact assessment.

2 I think often we've in the past discussed this matter of route specific
3 impact and risk assessment on the somewhat theoretical plane without a very good handle
4 on exactly what types of data; whether it is roadway conditions, population location and
5 proximity to routes, or potential location of routes near environmentally sensitive areas.
6 Even down to issues which at first may seem simple, like what type of accident rate
7 histories are available. And when you actually look at specific routes and you see both
8 the accident rate differences between routes, and then when you look at particular route
9 and you see the annual variation in accident rates or the variation between five-year
10 periods for the same route, or when you look at the distribution of the accidents among
11 the segments on a particular route, I believe that the UNLV researchers have done us a
12 great service here.

13 Even without looking at the specific conclusions that can be drawn from
14 the data, simply by giving us an example of both the types of data that are available. And
15 the great caution that must be used in deciding which data sets to employ in that analysis.

16 DR. PRICE: Can I just interrupt?

17 MR. HALSTEAD: Yes.

18 DR. PRICE: I am liable to forget this later.

19 The data that you are talking about, is it State of Nevada data or did you
20 look at other states as well?

21 MR. HALSTEAD: In this report, Dr. Price, we looked specifically at the State of
22 Nevada only. But our data has come from a broad range of sources. In the highway and
23 accident data, of course, we've used the State Department of Transportation data but, we
24 have also looked at a range of data available from the Department of Wildlife and from

1 various agencies. For example, we have looked at land use and property valued data that
2 is available from County Assessor's offices.

3 There have been a number of areas in which we have tried to develop
4 some innovative techniques for estimating where data is not readily available, for
5 example to estimate the non-resident population which might be present in downtown
6 Las Vegas and areas very close to potential highway and rail routes. There are a great
7 variety of data sources, but in this report we have strictly focused on the State of Nevada.

8 One other prominent feature, I believe, of the UNLV report is the
9 innovative use of geographic information systems applications to actually plot this data
10 geographically in a way that I think will make it very useful for people involved in the
11 comparative evaluation of transportation routes, be it the decision to choose one of
12 several existing routes or be it the decision to choose one of several potential corridors
13 for construction of new rail access.

14 I would say--it is very difficult to draw any very narrow conclusions from
15 this preliminary characterization study and indeed it has been our goal at this point not to
16 draw too many conclusions, and that is something we'll be pursuing in our next year's
17 work. But, I will say, it is clear from the data on highway access and should say that we
18 looked at four potential highway approaches; I-15 and US-95 from the east; I-15 and US-
19 95 from the west.

20 Those are the two approaches that DOE has evaluated in most of its past
21 work both in the 1986 environmental assessment and in their most recent routing studies.
22 That is the use of the interstate system and the U.S. Highway system that would be most
23 directly compatible with the USDOT regulations at HM-164. We have also looked at the
24 two potential alternative routes that were identified for the Nevada Department of

1 Transportation which, of course, under HM-164 has the right to designate reasonable
2 alternative routes. These are routes that would bypass the Las Vegas valley area by
3 entering the state to the north and to the east and using U.S. highways.

4 In evaluating those four choices, I think the bottom line is that there is no
5 apparent easy highway access to Yucca Mountain. You are either forced to choose
6 routes which go through not only the most heavily populated areas of the state at the
7 present time, but the areas where we believe there will be the greatest future population
8 increase over the next two decades. Or, you must choose between travel and long
9 stretches of two lane highways, often with steep grades and narrow road shoulders and in
10 some cases fairly sharp curves. So there are some very difficult tradeoffs to be made in
11 evaluating the comparative safety of the four most obvious highway access routes to
12 Yucca Mountain.

13 With regard to rail routes in the UNLV study, because of resource
14 limitations, we were only able to evaluate three of the ten potential rail corridors
15 identified in DOE's initial study. The only thing that I can say that stands out very
16 sharply about a particular route is that while we didn't identify anything that we could
17 call a fatal flaw in this preliminary analysis, we did find that with regarding the Jean
18 option, which is the shortest of the options under serious consideration, this is a route
19 from the Union Pacific mainline that is located to the west of Las Vegas. So it would be
20 approximately a 120 mile route north through some pretty rugged mountainous terrain
21 and into the Pahrump Valley in Nye County and then to Yucca Mountain.

22 We did find that in addition to the problem the use of that route would
23 send most of the shipments along the Union Pacific main line through downtown Las
24 Vegas, which is of course in and of itself a concern for the state that there seems to be a

1 very high degree of endangered species, habitat particularly with the desert tortoise along
2 that particular route. So this is one of those cases where the route that may look the
3 easiest in terms of distance may be no easier, perhaps more difficult than some of the
4 longer routes. Again, this is an area where we plan to do further work.

5 We hope by October 1st to have our draft report out in which we evaluate
6 the remaining seven rail routes in the same degree of specificity that we've evaluated the
7 first three.

8 DR. PRICE: When will that report come out?

9 MR. HALSTEAD: The draft report now is due at the beginning of October. I
10 would assume, Dr. Price that means by the end of the calendar year we will actually be
11 delivering to you a report comparable to the one that I've provided you today which
12 covers the first three routes. It is possible we will do it earlier, but my track record of
13 forecasting the publication dates of topical and technical reports is not very good. So,
14 you'll forgive me, the contract deadline is October 1st for completion of a reviewable
15 draft.

16 There are also three topical reports on risk assessment that we have
17 provided today and I'll just briefly describe those to you. One is an overview of human
18 and social factors in the risk assessment process itself, prepared by William Freudenberg
19 (phonetic), who is with the Department of World Sociology at the University of
20 Wisconsin, Madison, and is a prominent risk assessment person both in his academic
21 activities and his work with the AAAS and other social impact assessment organizations.

22

23 This particular report, I think, is very interesting. It is one of the few
24 items in the literature that I am aware of that tries to actually look at the individual and

1 the organizational factors that affect the risk assessment process itself. In particular he
2 looks at factors which may cause an overly optimistic bias on the part of the individuals
3 actually employed in preparing the risk assessment and he also looks with some
4 particular focus at the difficulties in assuming the perfect performance of an emergency
5 response organizations in the assumptions that one makes about risk management.

6 Attached to this report is a very interesting appendix prepared by Chip
7 Clark of Rutgers University who worked with Freudenberg on this, that is a case study of
8 the Exxon-Valdez emergency response situation and tries to identify some of the
9 organizational factors that resulted in a less than satisfactory performance of the
10 emergency response teams in that incident.

11 Second report that I have provided for you is a report prepared by Marvin
12 Resnikoff, of Radioactive Waste Management Associates in New York, which is a case
13 study of the use of RADTRAN in the 1986 environmental assessment for Yucca
14 Mountain particularly in the generic transportation risk assessment that was attached to
15 all of the 1986 EA's.

16 I think what is most significant here are the insights which can be drawn
17 about the way in which RADTRAN can be refined for future use in the program. It
18 should be pointed out that many of the specific criticisms of RADTRAN, this is the
19 version II, and there was a hybrid version before the formal version of RADTRAN III
20 came out that were actually used for those assessments.

21 Many of the specific concerns raised in this report either have been
22 addressed or in our opinion are being addressed in the RADTRAN IV version. However,
23 we think there are some important things to be learned here about the way in which a
24 draft transportation risk assessment should be circulated; the way that comments should

1 be replied to.

2 We think also that there are some important insights. Ironically, I guess
3 into the strengths of RADTRAN and its capability for example for addressing the clean-
4 up costs for accidents which might occur, one of the findings from this study was that in
5 fact information that was prepared on the potential clean-up costs following a severe
6 transportation accident could have been prepared. Certainly, the model was capable of
7 doing this and the personnel of Sandia did this but the Department of Energy for its own
8 reasons chose not to put that information into the environmental assessment.

9 A third report that we've provided you with is a report prepared primarily
10 by Dominic Golding, who at the time was a part of Roger Casper's risk assessment group
11 at Clark University at Worcester, Massachusetts. Golding is now working for Resources
12 For The Future in Washington.

13 This is a very interesting document we feel also, because it's an attempt to
14 look at transportation risk assessment based on the experience with the risk assessments
15 that have been done for fixed facilities. And I think probably the most important product
16 of this study is a checklist of guidelines if you will, on the way in which risk assessments
17 should be prepared, and the way in which they should be used in communicating risk to a
18 number of different publics.

19 I think perhaps the single most important recommendation in our opinion
20 from this study, is that the whole purpose of transportation risk assessment should be to
21 develop a risk management tool, that risk assessment should be continuously fed into the
22 design and planning and actual operation of the transportation system and that risk
23 assessment should not be used as it has unfortunately been used in the past as some type
24 of a public relations tool to try and assure the public that the risks of an activity are

1 acceptable.

2 With that let me turn, although I would be happy to answer any questions
3 on those, let me say, the Nuclear Waste Project Office would welcome the opportunity to
4 have a session with this Panel to go into detail on some of the findings of these in our
5 earlier work, and an opportunity where we could have the authors of those works present.
6 But, I certainly, to the best of my ability will answer any questions you'd have to date.

7 I'd like to briefly review the work that is ongoing that is scheduled for
8 completion in the October to December time frame of this year. We have a team of legal
9 and policy experts evaluating the new Hazardous Materials Transportation Uniform
10 Safety Act, particularly looking at the legal and policy implications for the Department of
11 Energy Civilian Nuclear Waste Management Program Transportation activities. We are do
12 the interface requirements that those utility decisions will place upon the transportation
13 system.

14 DR. CHU: Excuse me, Bob.

15 MR. HALSTEAD: Sure.

16 DR. CHU: Is that comment on the dry storage document or on the--

17 MR. HALSTEAD: Yes, Woody. This is actually going to be what we would
18 consider an independent assessment of both the commercial status of various dry storage
19 technologies and updated as of September 1st, status report on what utilities have
20 committed to which systems, and which utilities appear to be leaning towards particular
21 systems. And this is just to give us an updated report on the way that those system
22 choices may affect the others. We are certainly not trying to duplicate the near-site
23 transportation infrastructure study or the FICA study, both of which we feel are very,
24 very good efforts.

1 This is just a matter of giving us up-to-date information on utility
2 decisions that affect the transportation system.

3 We've also commissioned a critique of the use and the misuse
4 unfortunately of the Sandia cask crash test films. Very recently there is a public relations
5 video circulating in southern Nevada in which some great liberties are being taken with
6 splicing together various portions of the Sandia cask film crash test along with some
7 footage, for example from the operations smash/hit tests in Great Britain.

8 While we are certainly in support of full-scale cask testing and are
9 developing some guidelines on the way that we feel that should be done, we think it is
10 also important that the visual documentation produced in these tests are not being
11 misused.

12 We are also commissioning a short study which may not be completed
13 until the next fiscal year on an evaluation of severe accident conditions to develop some
14 alternative inputs on specific portions of the accident analysis module in RADTRAN. In
15 particular, we want to be in a position to suggest some alternative accident severity
16 categories; what the distribution of the frequency of accidents among those categories
17 should be and perhaps some alternative values on the types of release fractions that we
18 might substitute for the values that are in RADTRAN IV now.

19 The studies I've just mentioned that are currently underway, are all ones
20 that are being done by independent consultants. Then at the University Las Vegas
21 Transportation Research Center, we also have a number of projects. One is a report on
22 the capabilities of RADTRAN as it is accessible through TRANSNET which we hope
23 will feed into some of the analysis of RADTRAN that the Board has called for in its last
24 two reports.

1 We hope to do some more detailed analysis of the Caliente rail route
2 proposal, which I will speak more about in a moment. We are very near completing a
3 series of case studies, a recent experience with rail construction in difficult terrain. In
4 particular we are looking at the construction of the Powder River Basin lines which were
5 built to access the Wyoming and Montana coal fields. We feel there are some important
6 lessons there regarding right-of-way acquisition, environmental impact issues, and the
7 relationship between estimated cost and actual costs which will provide some guidance in
8 looking at the rail access to Yucca Mountain.

9 We have commissioned a preliminary human factors literature survey
10 focusing on the period from about 1988 to the present to see what literature there is that
11 we should be paying more attention to in the nuclear waste transportation area. And
12 we've also commissioned a small study of some of the specific implications of the
13 Hazardous Materials Transportation Uniform Safety Act for emergency response
14 planning and training in Nevada looking at the peculiarities of our division of jurisdiction
15 among different state and local agencies.

16 One other project that I would like to tell you about which is still in the
17 process of having the study design finalized in contracting is a project that we hope to do
18 in conjunction with Clark County. This would be a project to actually develop some
19 detailed protocols for the way that we would suggest that a truck cask for purposes of this
20 exercise were using the GA-4 truck cask that it actually could be physically tested to
21 demonstrate compliance with the existing NRC performance standards.

22 This is certainly not in any way to diminish our concern that some of those
23 performance standards, and particularly the crush and fire standards may need to be
24 revised, but simply taking those performance standards as they exist now, we would like

1 to have a detailed document of exactly how a full-scale prototype could be tested to
2 demonstrate compliance with those. And particularly, to estimate what types of costs
3 would be involved, specifying certain types of instrumentation and documentation for the
4 tests.

5 I'd like to turn to an area of some new developments in the transportation
6 access area and the way that we are responding to these at the state level and the way that
7 these raise some implications for impacts on the national transportation system.

8 First, I know that you are aware because you have been receiving inquiries
9 from these newly enfranchised counties that there are several counties in Nevada and one
10 county in California in addition to Clark, Lincoln and Nye, which have already been
11 granted formal affected county jurisdiction are going to request this Esmeralda County in
12 Nevada and Inyo County in California, of course, were the parties which filed the lawsuit
13 which resulted finally in a decision from the Department that they would do what they
14 could to facilitate inclusion of these counties in the planning process. And in addition,
15 other counties, counties which are primarily going to be affected if at all, by
16 transportation have become interested. These include Eureka, Elko, Lander and White
17 Pine County. And there are some other counties as well which might be involved if other
18 rail spur options are developed.

19 We certainly welcome the admission of these counties to full participation
20 in the nuclear waste program, so that they have an opportunity to participate and
21 influence the outcome and represent their own interests. Also, from the standpoint from
22 the state, the empowerment of those counties, particularly providing them with some
23 funding either to use technical staff people that they already employ, or to hire
24 consultants to help them with various aspects of transportation planning. That can only

1 help the state because our experience has been that there is wealth of knowledge about
2 unique local conditions among the county personnel, so we are certainly looking forward
3 to working with them and working their information for example into the data bases that
4 are being developed at the University of Nevada Las Vegas.

5 DR. PRICE: The last four were Eureka, Elko--what were the last two of those?

6 MR. HALSTEAD: Eureka, Elko, Lander and White Pine have shown a definite
7 interest. I believe it is possible that Mineral County may also have so indicated, but I am
8 not exactly sure.

9 Now in addition to this new development as I said, as a result of the
10 litigation which in turn led DOE to a policy change on inclusion of these counties, a
11 second recent development regarding route specific transportation planning was the
12 release in mid-July by DOE of a draft preliminary report on the Caliente rail route which
13 was one of the three that the Department of Energy prioritized for study a couple of years
14 ago. This report recommends a new northern Caliente route with an estimated cost of
15 about \$1.1 billion. The original southern Caliente route has now been substantially re-
16 routed and is offered as an alternative, with an estimated cost of about \$1.4 billion.

17 Without going into too much detail because we are still involved in
18 evaluating this report, I'd say my preliminary judgment is that it is a very good report on
19 a peculiarly bad route selection. This particular route was chosen, not because it had
20 particularly good technical criteria, but frankly because of the desires of Lincoln County
21 and the city of Caliente to have this route chosen for priority study. And I must say, it is
22 refreshing to pick up a DOE report and have them say, that they selected this route
23 essentially for political considerations and not because a first cut made it look either more
24 feasible, less expensive, less environmentally disruptive.

1 Of course, the original plan was to study the Jean and Carlin options in
2 short order soon after, if not concurrently with this study. Now we are told that there are
3 some difficulties with the availability of funding and it is not clear exactly what will be
4 done for further work on the Caliente route in the coming fiscal year, and that basically
5 the plans to characterize the Jean and Carlin routes are indefinite or are on hold at this
6 time. That gives us a great deal of concern because of some problems of that route that I
7 will tell you about in a moment.

8 Nonetheless, let me step back and say that there is one good thing about
9 the Caliente route, and that is that it does completely bypass the most highly populated
10 areas in Nevada. That, we believe, is a positive feature. And secondly, let me say that
11 the report itself which was primarily done by DeLeuw Cather which is a firm out of San
12 Francisco, but was also very much influenced, I believe by the efforts of key staff people
13 at the Yucca Mountain project office and at the Science Applications International
14 Corporation. I think particularly Bill Andrews and Paul Standish and Paul Seidler
15 probably get a lot of credit for the strength of this particular report, which in my
16 experience reviewing preliminary engineering and environmental reports on
17 transportation projects is a very fine report.

18 There also are some general discussions of operating considerations. Who
19 should own the railroad? Who should operate it? How will work rules determine where
20 the crew change station should be built, and so forth?

21 Really an unusual degree of insight into rail operations generally that were
22 considered in the development of this report, and I believe that probably reflects the
23 experience of one of the consultants, Nick Pritska who was previously employed by the
24 Union Pacific.

1 In particular what makes this overall report, I would say, refreshingly
2 appropriate and detailed, is that the people preparing the report seemed to have a full
3 appreciation of the technical difficulty of construction of a route of this length over
4 rugged terrain. And secondly, I believe they had an unusual degree of sensitivity to the
5 environmental impacts. I was even surprised that they found one endangered species in a
6 route corridor that we didn't come up with in our preliminary review. This is a spring
7 fish which lives in a place called Crystal Spring. I would give the report itself, as a
8 preliminary report very high marks.

9 Now, the downside of all this is that the route that is being evaluated is
10 extraordinarily difficult. It's sheer length depending on which options are chosen
11 between 360 and 400 miles certainly will make it the largest new rail construction project
12 in this country since the 1930's and possibly since World War I.

13 There are many different environmentally sensitive areas along the route
14 and because of its length and because of the peculiar geography of this part of Nevada,
15 which is characterized by high desert valleys separated from one another by very high
16 north/south mountain ranges. Mountain heights and peak heights in the 8,000 plus foot
17 range are common. And the mountain passes that the railroad will have to go through
18 are frequently in the 5,500 to 6,000 foot range.

19 But there are a large number of different distinct ecosystems which are
20 traversed by the course of the route which means that the environmental planning and the
21 preparation of the environmental impact statement is going to be an enormously
22 complicated task. I certainly envision if this route were chosen as the actual access route,
23 that a separate EIS probably with a draft EIS in the range of 1,000 or more pages would
24 have to be prepared for this particular project.

1 We also have some concerns with the cost estimates, and we will not be
2 ready to formally comment on this for a couple of months. But, we think it is possible
3 that those cost estimates are off by 50 percent or perhaps even by 100 percent. That is,
4 that the actual cost could be as much as double those that are estimated in the report.

5 DR. PRICE: I hate to interrupt, but evidently there is going to be about 400
6 people eating in the restaurant. If we don't break for lunch now, we will not precede
7 them. So maybe we had better break now for lunch and then we will meet back here at
8 1:30 if that would be all right.

9 MR. HALSTEAD: All right. I am within a few minutes of finishing of what I am
10 wanting to say and then of course would answer questions.

11 DR. PRICE: Well, perhaps you could plan to recap so we could can get back in
12 sync at 1:30 and then we'll have our questions. So, it will take a little while yet, anyway.

13 (Whereupon, a lunch recess was had off the record.)

1 report, that because the majority of lands are managed by the Bureau of Land
2 Management are the majority of lands that would be crossed by the railroad, that right-of-
3 way acquisition would not be a problem and that probably there would be no significant
4 costs incurred for right-of-way acquisitions. It is certainly possible that the cost of the
5 right-of-way acquisition will be much less than would otherwise be the case, because we
6 are talking primarily about BLM lands.

7 However, the whole issue of transfer of BLM lands as we know from the
8 previous litigation around the Yucca Mountain site itself, is by no means clear. It may
9 not be that easy for them to obtain the access to BLM lands.

10 Beyond that, there are some critical stretches of the route that go through
11 areas where private land holdings are going to be affected. So, I guess the final area of
12 problems that I wanted to indicate, had to do with right-of-way acquisition. It is also
13 interesting to me as I've been doing some personal field work on stretches of this route, it
14 appears that there have been some new mining claims staked along stretches of this route,
15 and I don't know if that is someone who sees an opportunity to cash in on filing mining
16 claims which they might relinquish for a certain sum in order to facilitate construction, or
17 there may actually be mining properties accessed to which would be opened up by the
18 rail. But it is just one more indication of the complexity of this.

19 The concern that we have now about the difficulties with the Caliente
20 route and the apparent budgetary decision either not to proceed with the Jean and Carlin
21 routes or to proceed with them at some point several years in the future, is that the entire
22 issue of the feasibility of rail access to Yucca Mountain, will now rest on this report for
23 the Caliente option. And I guess the bottom line here is as we see it, this leaves in doubt
24 the question of feasibility of rail access to the site. And if rail access is in question, it

1 means then that we have to continue to plan for a range of module mix decisions which
2 would include an all truck shipment scenario with all of the difficulties involved in large
3 scale truck shipments to a repository; issues that would involve choice of legal weight,
4 versus overweight trucks; questions which indeed might relate to the entire issue of the
5 need for desirability of a monitored retrievable storage facility or where the location of
6 that facility would be.

7 So, I guess we would feel much more comfortable with the whole rail
8 issue if we knew that the department was going to give detailed consideration to
9 alternatives to the Caliente rail approach. Again, I don't think I want to say anymore
10 until I've completed my review and I've seen the preliminary characterization of those
11 alternative reports that University of Nevada Las Vegas Transportation Research Center
12 is doing for us. But, I think that at this point there are some very serious questions about
13 the feasibility of rail access to Yucca Mountain, and it will take great deal of study to
14 resolve those.

15 This then leads me into some final comments about the way in which
16 routing decisions that will be made both by the Nevada Department of Transportation
17 regarding highway routes and decisions which will be made by the Department of
18 Energy, presumably with some input from the state on which rail spur options will be
19 chosen, will affect the larger national routing patterns. Now, when we are talking about
20 the rail spur choices, the implications for the national transportation system are perhaps
21 not that great because there are fewer options; partly as a result of geography; partly as a
22 result of the merger movement in the railroad industry; partly as a result of regional
23 abandonment of rail lines. There simply aren't that many choices for east/west rail
24 shipments.

1 Nonetheless, among the first three spurs that DOE had identified for study,
2 the Jean, Carlin and Caliente route, you would certainly find a significant choice between
3 whether the mainline that the spur would hook up with would be the Union Pacific line,
4 the Southern Union Pacific mainline which in Nevada runs from the Utah line through--it
5 is basically a Salt Lake City to Los Angeles mainline. Or, whether you would connect
6 with the Northern Union Pacific line which is basically Salt Lake City to San Francisco
7 in the Bay Area plus there is a Southern Pacific line that could also be accessed by the
8 Carlin route. In fact, there are a couple of instances in which the choice of the rail access
9 corridor will dictate some important operating decisions. For example, whether you have
10 access to one or more than one national rail carrier, which in turn could have some very
11 important implications for the life cycle cost of the transportation component of the
12 system. That is, do you have an opportunity to ask the railroads to engage in some
13 competitive pricing. Presumably, we are going to be talking about long-term rail
14 contracts if we have rail access.

15 So, there are a number of issues that have to do with cost and the actual
16 location of impacts depending upon the rail spur choice in Nevada. I might also just add
17 as an observation, that it seems to us that the Department of Energy has informally
18 determined that they have a preference for connecting with the Union Pacific railroad.
19 The other primary option would be the Southern Pacific Railroad. I think the Union
20 Pacific railroad has an acknowledged fine record in the way that it has handled hazardous
21 materials, and is also well respected in the industry for the way that it has centralized its
22 systems control in the new Omaha dispatch center. So there certainly are some
23 arguments that could be made in terms of having a preference for the carrier that one
24 connects with. Nonetheless, that has not been stated publicly and it may indeed be a

1 factor in DOE's thinking as to which of the spurs they want to pursue.

2 Now in the highway area, there is a much more direct impact between
3 choices made in Nevada and the routes that will be traveled nationally. For example, if
4 we assume that there isn't any rail access and that all the shipments would be coming to
5 Yucca Mountain by truck. Let's further complicate that by assuming that there isn't an
6 MRS in the system. So essentially, we are talking about shipments from reactors to the
7 repository and shipments from federal facilities to the repository.

8 You would expect as you move from east to west a certain funneling
9 effect to occur with the confluence of routes along the interstate system. Now, if the
10 Nevada Department of Transportation were to designate a US-93, the route that comes up
11 from Arizona across the dam at Lake Mead and then connects with US-95, a choice I
12 would say is highly unlikely, but we will consider it in theory. If that particular route
13 were designated as a alternative to the I-15, US-95 approach that DOE has premised, then
14 the funneling effect of the east/west shipments would occur somewhere on Interstate 40,
15 somewhere in the Arizona, New Mexico, Texas area.

16 Now if the Nevada Department of Transportation did not designate an
17 alternative route and the I-15, US-95 linkage were used, then that funneling effect on the
18 interstate system would occur most likely to the north and possibly along I-70. Possibly
19 along I-70 here in Colorado going through Denver. Then again, if the Nevada
20 Department of Transportation were to designate one of the two alternate routes that they
21 are currently considering for other shipments, and remember we are so far ahead in time
22 for a start date for Yucca Mountain shipments, that the current route designation process
23 in Nevada is focusing on utility through shipments and the exit shipments of transuranic
24 waste from the test site which would go to WIPP. And the routes which are currently

1 being considered are ones which would link up with I-80, and Wendover, at the Utah and
2 Nevada border.

3 But, we presume that absent major changes in the location of population
4 and physical infrastructure, those would be the same alternative routes that would likely
5 be considered for shipments to Yucca Mountain from the east. And that would then
6 probably move the heaviest corridor of interstate traffic north along I-80 into Utah and
7 Wyoming.

8 I guess the point I would just like to make for the record and is something
9 to be considered in the Panel's further deliberations on this issue of routing, particularly
10 as we look at some of these issues like the timing of designation of routes on the part of
11 the Department of Energy. I think one of the points we need to make is that if the
12 Department of Energy doesn't make early route designation, we are possibly facing a
13 situation in which state route designations will be the driving factor in determining the
14 geographic location of transportation impacts, and therefore risks in the national
15 transportation system.

16 One of the things that we will be looking at hopefully in the next year in
17 the routing analyses that we are planning to do at UNLV will be to look at exactly some
18 of these questions. What are the system impacts perhaps measured in some crude
19 measure like total system miles of an all truck transportation scenario in which the point
20 of entry to Nevada is at Wendover on I-80 as opposed to being at Mesquite on I-15. So,
21 hopefully, we will be able to shed some light on what the impacts of some of these
22 decisions will be over the next year.

23 I think it is an important aspect of the routing for people outside of
24 Nevada to keep in mind that decisions that are made about local access to Yucca

1 Mountain, will potentially have profound impacts if we have a heavy use of truck
2 shipments to Yucca Mountain on the rest of the system.

3 That concludes the things that I wanted to say today. I very much
4 appreciate having the opportunity without advance notice to share some of these things
5 with you.

6 DR. CHU: I just have one question. That statement near the end on the routing
7 issue on impact, you were saying that--I probably didn't understand you right. You said
8 that if the DOE doesn't designate then the State of Nevada will then do it on its own. Did
9 I understand that?

10 MR. HALSTEAD: Well, it is not just the State of Nevada, Woody. Remember,
11 we are not talking about Nevada at this point designating routes specifically for Yucca
12 Mountain shipments. What we are talking about is a Nevada route designation process
13 for WIPP shipments which in our opinion is going to set a precedent for the Yucca
14 Mountain shipments.

15 DR. CHU: The only thing I want to clarify is that, in terms of designating
16 physical roadways which can become part of the preferred system, the Department of
17 Energy doesn't have that prerogative. So that is why I say, my understanding is only the
18 State of Nevada and its neighbors have that prerogative.

19 MR. HALSTEAD: That's right.

20 Although, the position that we have taken in the past is that there are some
21 options available to the Department and they--they are difficult because they involve the
22 relationship between shippers and carriers, and they involve the kinds of protocols that
23 the drivers actually follow on a particular shipment as to which routes they can take. For
24 example, if there is a weather problem or a repair problem on the preferred route, there is

1 an extent to which they can deviate from a designated route.

2 Our position has been that the Department needs to explore with DOT the
3 extent to which they are constraints on the Department picking those preferred routes, so
4 that we can get on with some of the other issues, like planning our emergency response
5 programs. Also, fairly allowing the states which are likely to be affected by the Yucca
6 Mountain shipments to receive technical assistance under Section 180(c) of the Waste
7 Policy Amendments Act, that would in turn allow them to develop some technical
8 expertise. For example, if they want to be involved in the cask development program or
9 if there are other aspects of this program that they feel their early involvement in would
10 help make those shipments safer and more acceptable to them at a later date.

11 On the other hand, other developments are occurring. And as I say, in this
12 case, the State of Nevada is in the situation by legislative mandate evaluating routes
13 which are used for utility through shipments and for the transuranic waste shipments to
14 WIPP. Just my personal opinion on this is I find it very unlikely that routes other than
15 those designated for the WIPP shipments would be used for the Yucca Mountain
16 shipments.

17 In other words, if the Nevada Department of Transportation decides that
18 the WIPP shipments should avoid the highly populated Las Vegas Valley and travel
19 through the central and northern part of the state and exit the state at I-80, I would
20 presume that that would likely be the decision that a future Nevada Department of
21 Transportation would make on routing shipments unless there are some major new
22 developments, new routes built or major changes in population, none of which seem
23 likely.

24 DR. CHU: The motivation for my question was very simple. I merely wanted to

1 distinguish the difference between designation of routes which can be part of the
2 preferred system, which is the state's prerogative, and then the choice within that system
3 which then is where the Department of Energy can participate. And I didn't know
4 whether I understood you correctly. But the choice still remains with the State of Nevada
5 as to what routes to designate as permissible roadways for shipments to take place.

6 MR. HALSTEAD: Within the guidelines of HM-164. Our current reading is that
7 the new Hazardous Materials Uniform Transportation Safety Act is basically
8 grandfathered in.

9 DR. CHU: I congratulate you for saying the whole thing in one sentence.

10 MR. HALSTEAD: And the other thing I should say is that the Department of
11 Energy has been on record saying that they plan to follow the state designated routes. So
12 I have assumed that in my discussion of that point.

13 DR. PRICE: I am wondering if perhaps before we move to the next witness if
14 there is anyone in the audience who feels a need to ask a question before we ask Bob
15 Halstead to step down?

16 If not, we thank you very much. We appreciate it once again. Thank you.

17 MR. HALSTEAD: Thank you.

18 DR. PRICE: Very good.

19 Our next witness is Jack Stauffer, Director of Test Engineering for the
20 Association of American Railroads Transportation Test Center in Pueblo.

21 Mr. Stauffer.

22 MR. STAUFFER: Good afternoon. Thank you, Dr. Price and the Panel for
23 allowing us the opportunity to make some of our comments available for the record.

24 My comments this afternoon will be much less specific perhaps, than the

1 previous speaker's but they are ones that are based on 25 years that I spent in the nuclear
2 industry and 15 years that I have spent with the railroads. And, I find that there are a
3 number of issues that at least concern me professionally and personally, that I find
4 difficult to determine the basis of decisions that have been made and upon which a lot of
5 studies are now taking place.

6 What I am going to try to bring up fall into four categories. The first is the
7 adequacy of the NRC standards to which casks are designed. The fact that contemporary
8 rail cars and my interests are primarily with the railroads as opposed to highways that
9 contemporary rail cars were never designed with safety of shipment as a prime criteria,
10 while its consideration, design parameters used for most rail cars do not explicitly dictate
11 or talk to safety.

12 The apparent, to me, failure of the government in all of the concerned
13 departments to recognize the subtleties of the fact that railroads are private industries as
14 opposed to public properties upon which transportation will take place, and a probably
15 minor, but nevertheless, influencing some decisions being made in confusions in the
16 regulations that exist in CFR 10 versus CFR 49.

17 To elaborate a little on that, I was a participant in the design of the rail
18 cars to be used to ship spent nuclear fuel done by the Idaho National Engineering
19 Laboratory and its contractors and was amazed to find the concentration of design
20 emphasis going into the cask the way the cask was attached to a rail car and the fact that
21 the rail car was essentially a common flat car already used in industry very commonly.

22 As specific to that, if one were to try to design an inherently stable
23 vehicle, they would have chosen any other truck center distance than the one they did,
24 because, as it comes out that car will be a notorious hunter, as they call it in the railroad

1 industry. The reason for that is the truck spacing is approximately 42 feet and the length
2 of bolted rail in this country is about 39 feet and it tends to be an excitation source to
3 cause dynamic problems with rail cars.

4 In other words, there could have been better criteria used, but we could
5 never find the basis upon which the chosen design was made other than it was made "off
6 the shelf".

7 DR. PRICE: Is your feeling that the car will be unstable in the terms of
8 oscillations?

9 MR. STAUFFER: Let's put it this way; rail cars do not have an inherently good
10 record of stability. It has been in perhaps the last ten years that we have from an
11 analytical standpoint understood why rail cars that performed very adequately for 150
12 years and then no longer perform as adequately as we would like. And there is a lot of
13 dynamics work that has been done very recently that begins to lend an understanding as
14 to why rail cars run the way they do and why they mis-perform or mal-perform under
15 certain conditions.

16 DR. PRICE: If you don't mind my interruptions.

17 MR. STAUFFER: Questions are fine.

18 DR. PRICE: You mentioned 39 foot rail section as a factor. Is train handling a
19 factor as well?

20 MR. STAUFFER: Train handling is a factor, but it is influenced a lot by what the
21 dynamics of the cars are doing. In other words, train handling pretty much controls the
22 longitudinal inputs to the train, but the vertical and lateral come from the track itself.
23 And those are under control of the track maintenance. One thing that is probably not
24 well understood is even with welded rail, continuous welded rail as it is known in the

1 trade, if it was laid on a roadbed that previously had bolted rail on it and it has a memory
2 of that bolted rail and indeed does have dips almost precisely where the previous rail
3 joints appeared.

4 The reason that it is a source of poor excitation is in this country we use
5 staggered rail joints as a way of constructing railroads which means it emphasizes the
6 rolling of the car because you have your perturbations alternately at roughly 17 or 18 or
7 19 foot centers of low on one side and then low on the opposite side. So a rolling car is
8 usually influenced by previous bolted rail installations.

9 DR. PRICE: The memory effect exists in spite of re-tamping of beds?

10 MR. STAUFFER: That's correct. It's still there, unfortunately.

11 The emphasis obviously a lot of what had previously been a maximum
12 deviation is minimized but it is still there. Even with all the work done on soils and
13 everything else.

14 DR. PRICE: Do you have an ideal length?

15 MR. STAUFFER: Well there is no such thing as an ideal length that can make up
16 for what was historically installed. In other words, today rail is probably put in in 1400
17 foot sections and then welded in place.

18 DR. PRICE: But I meant length of car. Given the fact that you can't do much
19 about the memory and so forth.

20 MR. STAUFFER: Something to prevent or remove the source of excitation
21 where the cars module frequency is resonate with those rail joints. In other words either
22 longer cars or shorter cars, but not that length car.

23 DR. CHU: These comments about rail car stability and dynamics that you are
24 making are applied to rail cars in general?

1 MR. STAUFFER: That's correct. That's correct.

2 Without dwelling on these, these are concerns without specific answers.
3 This is part of my problem is trying to find who does one talk to or who does the DOE or
4 government or whomever it might be, talk to, to begin to allow these opinions to come
5 into the design of the equipment that is going to be used.

6 DR. PRICE: To what extent, and I'm sorry to keep interrupting, but it's a very
7 interesting area that you are touching upon. To what extent does a suspension system of
8 the rail car ameliorate this problem of length?

9 MR. STAUFFER: You can design a suspension for a rail car that will
10 accommodate almost any discontinuity in the roadbed. As an example, the three piece
11 freight car truck which has been around for a hundred or more years almost looking today
12 like it looked when it was originally designed is the chosen suspension system for the
13 two rail cars that I have seen that end up under casks. Whether that is weapon shipments,
14 whether that is DOD shipments of spent submarine or marine reactor fuel, or whether it
15 is civilian reactor fuel, the car itself has very little novelty or new design features in it. It
16 is basically off the shelf equipment.

17 The passenger car truck as an example is one that is built to accommodate
18 with good stability all of the discontinuities that can appear in a railroad, in an average
19 railroad.

20 DR. PRICE: So, as I understand your answer, the suspension that is presently
21 being used is not necessarily optimum?

22 MR. STAUFFER: It is far from it.

23 Going to the second topic and certainly we can go back and ask or you can
24 ask questions of any of the things I might want to bring up. These are more categories

1 than they are anything else. The inadequacy of the NRC standards to us are exhibited by
2 the fact that the 30 foot drop test to which the casks are subjected equates almost
3 identically to 35 mile an hour momentum equivalence horizontally on the railroad.

4 Most trains in the west will travel at least at 60 miles an hour, some as
5 much as 80 miles an hour. Often on dual tracks where you can have an opposing train
6 moving at the same speed, saying that the momentum that you should be able to absorb is
7 much greater than what you would achieve in a 30 foot drop. And also the 30 foot drop
8 occurs once. In most railroad incidents the impacts are multiple because you have all the
9 trailing cars in a train piling into whatever the so-called immovable object or
10 discontinuity might be in the train itself. Piles of cars end up as high as three cars high.
11 I've seen pieces of rail cars buried twelve or thirteen feet in the ground by the expenditure
12 of all of that momentum as it is absorbed in an accident.

13 So then emphasis that I am sure you have heard many times on dedicated
14 trains is only a way for the railroads to say we would like to be able to control these
15 trains out of normal revenue service and run them slow enough that the momentum
16 buildup doesn't exceed the NRC standards. In one railroad that will be used, it is Union
17 Pacific, that ships a number of shipments today, they are contesting what is essentially a
18 Board of Directors of the AAR or its operating committee's recommendations not to
19 exceed 35 miles an hour. The Union Pacific finds on its railroads that a slow train is
20 actually a greater safety problem than if it was moving at a speed of the rest of the
21 transportation. So, they alone would like to see that removed, and their concern is if they
22 don't have it removed they obviously are running in violation of a recommendation made
23 by the association. And obviously, to their disadvantage.

24 Going on the testing of scale models, I've spent 40 years of my life in

1 doing tests and find that often the similitude that is offered by scale models, regardless of
2 how close to full-scale they come is very difficult to replicate as far as producing the
3 same results we have in full-scale tests. And I also along with some of the other speakers
4 would advocate that that be done. And I have not seen that that has been a commitment
5 as yet.

6 A third or fourth area is in emergency response. For the last five years I
7 have tried to find from the so-called RAD teams who are the people that will respond to a
8 railroad accident? It is quite well-defined; the public officials or the public entities that
9 may respond to highway accidents but when you are on private property, not necessarily
10 accessible by roadway, who can we expect to see arrive when we have an accident on the
11 railroads we don't know personally how to deal with. And in one example, it was that
12 there would be DOE team of experts there aided by a construction company's heavy
13 equipment, not known as to how that equipment would arrive on the site except by rail
14 and in some instances there is no other way. And when you want to talk to the people to
15 see what their level knowledge of the railroads is, there is no one to talk to; no names.
16 No specifics can ever be given.

17 DR. PRICE: So when you ask this question of DOE, in essence you are saying
18 they are unable to give you specific responses?

19 MR. STAUFFER: That's correct. In the specific case from the Idaho Falls office,
20 they have Morrison-Knutson under contract, simply because Morrison-Knutson does
21 have heavy equipment. It certainly is transportable. And by highway I have no problem
22 in getting it on the scene. By rail I have a lot of problems that I can foresee in getting
23 that equipment there.

24 The railroad's incentives which don't seem to be clear is that railroad is the

1 lifeline of the company. And its incentive, if you have ever watched any other kind of
2 accident that they have hazardous materials being somewhat moderated by that, they
3 want to clear that main line so that they can run trains, and then they will pick up the
4 results of the malfunction afterwards. And that is something I suspect in this case
5 bureaucratically won't happen as easily as they think it will.

6 Another feature in the cask design; the basket upon which the fuel
7 elements reside is an untested item and there are certainly consequences in which I can
8 see increases at least in criticality from having those baskets malform or actually destroy
9 themselves inside the casks. I don't know how much attention has been paid to that, and I
10 can't find any answers there either.

11 The one that is perhaps only an anomaly to me, we designed or at least
12 approved the design of a rail car to ship submarine fuel in which the cask was vertical on
13 the car, and integral to the car - it couldn't be disconnected from it. Going to the civilian
14 reactor fuel the cask is designed to break away from the car in an incident. And in either
15 case we think there is one set of circumstances that may say, one or the other is safer and
16 therefore there shouldn't be two designs. We don't understand why there is not
17 coordination between the civilian material and the weapons material.

18 Beyond that, I only have question. I'd like to emphasize a little of what
19 the previous speaker brought up on the DeLeuw Cather design from Caliente. I listened
20 to that presentation in Las Vegas at the High-level Waste Conference, either early this
21 year or late last. I lose track of dates. And I found that the design criteria for that
22 railroad included maximum degrees of curvature of what are known as five degrees.
23 That's approximately in the range of a 1,000 meter radius. That feature alone, which
24 there is no reason, other than they were told not to exceed five degrees by someone,

1 complicates that design immensely, and a billion dollar, four hundred mile railroad is
2 extremely expensive to any railroader I have ever talked to. Normally track in this
3 country is laid at somewhere between \$300,000 and \$500,000 a mile. So this is a
4 tremendous expense.

5 One of the missing features after two years of design was the effect of
6 movement of alluvial fans, and I can only tell you there are probably 160,000 miles of
7 railroad laid in this country that never knew what an alluvial fan was. And therefore, is
8 not a great worry, and yet that was a great concentration in that study.

9 Those are kind of indicative of the types of things that the railroads
10 concern themselves with. When I look at all of the shipments, it appears to me at least 50
11 percent of this material, maybe as much as 75 will move by rail one way or another at
12 someplace along its route. And all but that one line will be on common carrier railroads
13 in whatever they design.

14 The typical rail car will negotiate easily a ten degree curve with some
15 difficulty as much as 15 degree curves and there are as much as 20 degree curves on
16 some railroads. So the design restriction seems to me to be unusually prohibitive.

17 When I asked the designer why they hadn't looked at going up the Nevada
18 Bombing and Gunnery Range or the Nellis Gunnery Range, whichever it is, the answer
19 was the Air Force didn't want it on their property. And I would think that a casual
20 answer like that would deserve a little bit more justification because there is already land
21 under federal control that could very easily accommodate the old railroad that existed
22 there before World War II, and it goes very close to Yucca Mountain, if that is a problem.

23

24 Yucca Mountain to me is certainly not something that has been

1 determined, but I think that the access problems to it from what I know of the area are
2 exaggerated from what I would see as a railroader. That pretty well summarizes the
3 concerns that I had. My real dilemma is who do we talk to?

4 DR. CHU: I've got a question. Earlier I interrupted you when you were talking
5 about rail dynamics as your comments applied to rail cars in general, and you said yes.

6 MR. STAUFFER: Yes.

7 DR. CHU: And then the point after that you then went on to the adequacy of the
8 Nuclear Regulatory Commission standards, vis-a-vis casks. And you were concerned
9 about that because the 30 foot drop equates to the momentum in a 35 mile per hour--

10 MR. STAUFFER: Approximately.

11 DR. CHU: --approximate train speed. Trains move faster than that and therefore
12 that is an argument for dedicated trains.

13 MR. STAUFFER: Not necessarily. It has been. I don't believe it is a justifiable
14 one, but that was the basis for the railroad's stand for dedicated trains because they can be
15 run at a specific speed.

16 DR. CHU: But you are concerned then about safety if trains carrying casks were
17 faster than 35 miles per hour?

18 MR. STAUFFER: I personally am, yes, because I don't believe the cask has been
19 analyzed in the types of accidents that can occur on railroads.

20 DR. CHU: Are you similarly concerned about the safety of other kinds of rail
21 cars traveling at speeds in excess of 35 miles per hour?

22 MR. STAUFFER: Very definitely.

23 DR. CHU: Thank you.

24 DR. PRICE: In that same vein, could I ask if in the research that has been done

1 on rail accidents, if incidents of encounter G forces exist? How many Gs are seen in
2 accidents?

3 MR. STAUFFER: Well that obviously is very dependent upon what the vehicles
4 are in the accidents. As an example, if a rail vehicle strikes with say a highway vehicle,
5 it is not unusual to see the highway vehicle accelerated 50 Gs. So, this is over a fair
6 duration. Not over milliseconds, but over fractions of seconds. That type of thing is not
7 common. In other words, it is really saying that it all depends on what you've got in the
8 train with you and the weight of the train. It is not uncommon to have trains in the west
9 that will weigh 15,000 tons moving at 70 miles per hour.

10 DR. PRICE: It appears to me that one way to examine the drop test versus the
11 experience that might occur would be some record of the history of G forces that similar
12 types of cargo have encountered. That is what was behind the question. I was wondering
13 if there is any kind of history or--

14 MR. STAUFFER: I don't think there is any data simply because that type of test
15 is one that rarely is funded. It has usually so little practical value after the fact that it
16 hasn't been done. I had understood earlier this year that there might be such a test funded
17 to find out what the forces in a train precisely were. But, I have since heard that that has
18 been dropped from any possible program.

19 DR. PRICE: Another question which isn't directly related to your comments has
20 to do again with G forces and the use of peak uses, average Gs for tie down and structural
21 characteristics of the cask mounting. Do you have any comments or any ideas about--I
22 know some peak counting can be done that may be of such a short duration that they have
23 no energy.

24 MR. STAUFFER: No energy, right. I think that is where the case is here. You

1 have such tremendous masses that it takes a long while to slow it down and yet you are
2 slowing it down by literally deforming whatever is in front of it. And those peaks maybe
3 very high, but the sustained Gs maybe relatively low, but I would almost bet that there
4 are ten or more.

5 Now the philosophy we were given was that the NRC wants the cask to
6 break loose so that it is not subjected to those additional enforcement, and this was why
7 the attachment points were being welded on to find a way to actually retrieve a cask. The
8 railroad would prefer to retrieve the whole car cask intact. And the Westinghouse cars
9 designed for the submarine fuel are exactly that. That cask will stay with the car.

10 DR. PRICE: You feel it is easier to grapple a car and cask than to try to get hold
11 of one of these casks?

12 MR. STAUFFER: Definitely with the equipment that we have at had today,
13 unless there is something specialized. If you have ever seen them, the typical accident
14 responders will come along with D-9 caterpillar tractors with what they call sidewinder
15 booms, and they will literally put a cable on it and either pull it off the track or pull it
16 back up onto the right-of-way. But they will grab anything that they can get a hook into.
17 And those hooks are fairly substantial.

18 We had a rather unfortunate derailment on our test center in December of
19 last year in which we put 23 so-called 125 ton cars onto the ground. Now they actually
20 weigh 315,000 pounds and I watched the hooks on these sidewinders straighten out when
21 they tried to pull those cars out of the ground. Literally eight inch hooks pulled straight.

22 I had one other thing that I had forgotten to mention in that cask test, one
23 of which I also have never been able to get a satisfactory answer. The typical respondent
24 to a rail accident will determine that he can get close enough, if he can, and if there is a

1 fire, and frequently there is, the normal way is to cool it down using water. And I have
2 often wondered whether the cask which is subjected to the pool fire for a period of time
3 then allowed to cool and then immersed in three feet of water would have the same
4 effects if it were quenched with water while it was in the pool fire.

5 DR. PRICE: That question has been raised before.

6 MR. STAUFFER: I would think it might be.

7 DR. PRICE: All right. You made the comment that access to Yucca Mountain is
8 not as great a problem as it appears to you as it has generally been presented, you feel.
9 That access to Yucca Mountain by rail should be something that can be accomplished?

10 MR. STAUFFER: Well I base that on the fact that the railroad which I don't
11 remember the name of, but pre World War II until they needed the iron for the war effort
12 existed from Las Vegas to Beatty. And it went right through Lathrop Wells or very close
13 to that which is certainly as accessible to Yucca as you can probably get.

14 DR. PRICE: Is that right-of-way still in existence?

15 MR. STAUFFER: The right-of-way is on the bombing and gunnery range now.

16 DR. PRICE: I see.

17 MR. STAUFFER: It basically paralleled US-95 going up out of Las Vegas.

18 DR. PRICE: I have no more questions. I appreciate very much your providing
19 your testimony to us.

20 MR. STAUFFER: Well, I thank you for the opportunity to do it. I have certainly
21 been frustrated in trying to find answers. Thank you very much.

22 DR. PRICE: Thank you. We'll look at some of this.

23 Now also from the Association of American Railroads Transportation Test
24 Center, Peter Conlon.

1 MR. CONLON: I too, thank you for the opportunity to speak this afternoon. I'll
2 be very brief. I want to restrict my comments to one area, and that is cask testing. My
3 background has been in environmental and hazardous material research. And the recent
4 accident at Dunsmere, California involving a tank car full of a non-regulated material has
5 given rise to a number of question regarding the adequacy of regulations concerning
6 containers and the types of products or the hazards that they compose to the environment.

7 As you know, or may know, tank cars historically have not been designed
8 to withstand accidents. They were designed to contain products shipped in their normal
9 state. And the DOT rules for the most part have not taken into account environmental
10 consequences of releases of products in accidents. And the accident at Dunsmere has
11 brought very quickly to light the issue of the adequacy of those regulations. I think as a
12 consequence the regulations are likely to change. Parallel activity within the railroad
13 industry and within the chemical industry, jointly we've been working on a program to
14 assess and manage the risks of hazardous material transportation.

15 Within that program a number of voluntary standards have been
16 established within the railroad industry in particular, most notably for environmentally
17 sensitive materials which are in transportation now and in the railroad's opinion are not in
18 the best of containers again relating to the situation at Dunsmere. And one of the
19 outcomes of this have been recommendations that the railroad industry had adopted
20 concerning key routes and key trains which contained these environmentally sensitive
21 materials. These operating practices are now in effect and have been endorsed by all the
22 major carriers in the country.

23 I would really simply like to point out this whole issue is very much
24 related in my view to the safety concerns and questions surrounding the cask adequacy in

1 accidents. I am not going to reiterate Jack's comments, but I think it is important for the
2 DOE to recognize that the public at large is not going to be satisfied with a cask design
3 that leaves open the question of is it really adequate.

4 I think full-scale testing of all types of conditions that can be imagined
5 ought to be done. And, I think it out to be done prior to wholesale movement of these
6 products or these waste materials.

7 That is really the only point that I wanted to make today.

8 DR. PRICE: Mr. Conlon, let me ask you a question. I kind of relates to the
9 testimony that went before and then to your mentioning of the release of this pesticide
10 and so forth that occurred and its relationship to our topic of the day. One of
11 the problems is the remoteness capability for an accident in a remote area difficult to get
12 to. When we did a study for the State of Virginia, we observed that railroad beds often
13 go along beside riverbeds and there is some obvious reasons for that. And at that time
14 we recommended to the State of Virginia that they look into very carefully a requirement
15 upon the railroads that they have on board equipment when they have potentially
16 environmentally sensitive releases that would enable the containment of such releases if
17 an accident occurred along a riverbed. For example, that is to carry booms and other
18 things perhaps.

19 Well you can imagine that that is very rather controversial recommendation and there
20 was a lot of discussion about it.

21 With respect to the transportation of radioactive materials like this, there
22 might at least be some similar considerations for on board equipment, although I guess I
23 would have to think long and hard about what that equipment might from any practical
24 sense might be. Do you have any thoughts along those lines putting together your

1 comments about the containment problems of environmentally sensitive hazardous
2 materials in general, and I'll try to make the conversion over into the radioactive area.

3 MR. CONLON: I think the thing that leaps to mind when you mention this is that
4 who is going to actually do something. And you are talking about a train crew. And a
5 train crew these days may be as few as two people. And assuming that they are not
6 injured or in some way incapacitated by the train accident, then you would be expecting
7 the train crew to be able to operate detection equipment.

8 First of all to be able to assess the accident that they are observing; to
9 assess it to determine what the damages would be or what the damages are; what the
10 possible risks are that are present; to use the detection equipment to determine whether
11 there is a radiation leak; and, then actually implement some sort of response measure.

12 I think at this stage of the game, that the whole issue of training and
13 people's capability to do something in the event of an accident or a release is so unknown
14 that I guess that it is almost impossible for me to imagine what you are suggesting to ever
15 be the case.

16 DR. PRICE: Well in the case of the truck driver, there has been a lot of
17 discussion about the screening of truck drivers, the training of truck drivers, the skills of
18 the truck drivers with respect to this particular duty. And I am wondering for example, in
19 the case of dedicated trains if that is that unreasonable? That is, to require in the case of
20 dedicated trains there to be sufficient crew.

21 MR. CONLON: I was thinking not in terms of dedicated trains but in regular
22 train service. In the case of dedicated trains, I would certainly leave open the option for
23 carrying along a crew that could be prepared and could in fact do something in the event
24 of an accident.

1 DR. PRICE: You choose your words carefully.

2 MR. CONLON: Anything is possible.

3 DR. PRICE: Yes.

4 MR. CONLON: But I think the issue of training and assignment of
5 responsibilities is a very key question to your idea and one that needs to be evaluated in
6 any case.

7 DR. PRICE: Okay.

8 DR. CHU: You were referring to, when you expressed your concern about the
9 integrity of cars in general, not just casks but for carrying chemicals as well, that perhaps
10 the safety protection standards were not adequate. So the railroad industry, and this was
11 the part that I was trying to understand, that the railroad industry has been working with
12 the chemical industry to develop some standard operating procedures, is that correct.

13 MR. CONLON: Yes.

14 DR. CHU: These are in effect already?

15 MR. CONLON: Yes. It is part of a program called the inter-industry task force
16 on the hazardous material transportation. The long-term objective of the task force is to
17 develop a risk management system for transporting hazardous materials, which takes into
18 account all the variables that can be controlled in the transportation system, starting from
19 assignment of cars or car types for products, how they are secured, how they are handled
20 in transportation; who is prepared to respond to incidents involving them and ultimately
21 the proper unloading of the cars. So a model is under development now, funded by the
22 AAR, the Chemical Manufacturer's Association and the Railway Progress Institute by
23 Arthur D. Little, to address this issue.

24 One piece of that, well it was actually three pieces of it have already been

1 implemented. The first is railroad industry operating practices that I referred to which
2 include identification of the key routes and establishment of some training standards for
3 railway personnel on those routes. And operating trains over those routes with these so-
4 called environmentally sensitive materials which was one of the other work products
5 actually identifying those materials. And in that case they were primarily chlorinated
6 solvents. When they are spilled, they are very expensive to clean up.

7 And the third work product that has been developed and implemented is
8 standardized train lists or paperwork as you might call it which are consistent from
9 railroad to railroad and emergency response personnel can be trained to use and they'll
10 always be the same no matter where you are in the country. These too have been
11 developed.

12 But the long-term goal of establishing an integrated risk management
13 model and having it implemented is still some years away from being completed, I
14 suspect.

15 DR. CHU: So, it is fair to characterize these procedures as taking greater care in
16 knowing what it is that you are shipping and kind of keeping track of what they are,
17 where they are, but they do not restrict these materials from traveling in general freight
18 service. Is that correct?

19 MR. CONLON: That's correct. They impose additional requirements if these
20 materials are in general freight service in certain quantities.

21 DR. CHU: Right. And there are no speed limitations.

22 MR. CONLON: Yes, there are speed limitations.

23 DR. CHU: Oh, there are speed limitations?

24 MR. CONLON: Yes. For key trains, I am sorry I don't know off-hand what the

1 speed limit is. I believe it is 55.

2 DR. CHU: 55?

3 MR. CONLON: I can get you that information, Dr. Chu.

4 DR. CHU: Greater than 35?

5 MR. CONLON: Yes, it is greater than 35. But it does involve certain restrictions
6 on meets and passing trains and so forth. That information I can supply to you if you are
7 interested.

8 DR. CHU: Okay. But, there are restrictions on meets and so on?

9 MR. CONLON: Yes.

10 DR. CHU: Restrictions pertaining to priority?

11 MR. CONLON: Well, I think the way it goes is if you have got more than some
12 number of cars of these environmentally sensitive materials in the train, you've got a key
13 train, I think it is ten cars. It does then require that certain trains stop when these key
14 trains are passing.

15 DR. PRICE: All right. The testimony with respect to the 35 mile per hour
16 horizontal counterpart to the 30 foot drop test has not gone unnoticed by the Panel. We
17 have received that testimony from people interested in the railroads in the past. I want
18 you to know we have heard it. We know it is of concern and have heard the expression
19 and are chewing on it.

20 Are there any questions that might be relative to the last two speakers that
21 would like to come from the floor?

22 Bob Halstead.

23 MR. HALSTEAD: Thank you, Dr. Price. I just wanted to make a follow-up
24 comment to the point that Mr. Stauffer raised about the availability of other alternative

1 rail access routes and he is of course exactly right. There are some alternatives that are
2 much shorter than the ones that are currently under study.

3 When the Department of Energy published its preliminary rail access
4 report in January of 1990, there were two options. The valley siting and the dike siting
5 options which are both basically lines which would exit the Union Pacific just before it
6 enters the Las Vegas Valley, and then they would swing up to the north and west and
7 within about 30 or 40 miles, they would be following the old rail route, which of course
8 parallels US-95. So in fact, the Department was aware of those.

9 We never were presented with a detailed rationale for why those routes
10 were screened out in the process of picking the three that were prioritized for study. The
11 Department of Energy argued that there were some important land use conflicts
12 particularly with planned industrial commercial uses near Las Vegas, but to us those did
13 not appear to be any more difficult than the types of land use conflicts that will be
14 involved with the routes that they chose.

15 It appears that the conflict with the Air Force appears to be the major
16 reason why the Department walked away from what would certainly have been shorter
17 and in many people's opinions much easier, less expensive rail access.

18 The question remains whether they will reconsider those options. It is
19 worth noting that in the original 1986 transportation studies for Yucca Mountain that
20 were published with the 1986 Environmental Assessment, in fact, the Department
21 assumed that they would use one of those easier, shorter rail access routes.

22 I suspect that if the Department had said to the Congress in 1987, we want
23 to pick a site for a repository that requires building 400 miles of new rail spur, they might
24 very well have gotten a much less enthusiastic response than they did with the approach

1 they took which was to argue that the line would be one of the shorter ones following an
2 alignment that had been used in the past.

3 Thank you.

4 DR. PRICE: Any other?

5 MR. STAUFFER: My name is Jack Stauffer, and just an additional comment that
6 might bear with Peter's testimony. In the railroad industry it is a market-driven affair.
7 And the number of shipments of fuel or waste to the railroads is a very minimal market.
8 There aren't that many trains when you get down to it.

9 When you try to equate that with the chemical industry and the hazardous
10 materials shipped by the chemical manufacturers, it is minuscule. So the cooperation that
11 Peter is talking about is one that is developed because of the revenues that the railroads
12 receive from that.

13 Just to emphasize how we'll call it cost sensitive, the Babcock-Wilcox car,
14 when I asked about that, why they didn't pay more attention to designing a "better
15 performing car", was assumed that it would first go over the so-called 100 tons which
16 would take it out of interchange service, free interchange service.

17 The only reason anybody wants free interchange is to be able to get so-
18 called ICC type rate structure rather than dedicated trains. So a lot of emphasis was
19 going on what would be the cost of transportation at the expense of safety of
20 transportation just to keep that transportation cost down. And that was one of the reasons
21 the market just isn't there to the railroads.

22 If you shipped all of it you are probably not talking about 3,000 trains and
23 that is nothing to a rail run.

24 MR. CONLON: Just to amplify that, the chemical industry business represents

1 somewhere around 10 percent of our total gross revenue.

2 DR. PRICE: All right. Any other comments on these last two speakers?

3 We thank you very much for your testimony this afternoon.

4 MR. CONLON: Thank you for the opportunity.

5 DR. PRICE: Last, the rear of the room, if we have received any other walk-on
6 testimony requests?

7 Well, if not, I'll say at 2:40 p.m. we stand in recess and we'll be waiting for
8 any others. We are going to be available for testimony until 5:00 this afternoon. And
9 we'll just stand by.

10 To express in case I don't have another chance, my appreciation both to
11 these who have presented thus far, and then to those who have made the room available,
12 and to Linda Hyatt, Joanne Donnelly and Helen Einerson. We appreciate the staff's help
13 in the many provisions that were necessary. And again, thanks, to the speakers.

14 (Whereupon, the meeting was concluded at 2:40 p.m. on August 15, 1991.

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