UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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MEETING WITH THE ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

WEDNESDAY, DECEMBER 18, 2002

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ROCKVILLE, MARYLAND

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The Commission met in the Commissioners' Conference Room, Nuclear Regulatory Commission, 11555 Rockville Pike, Rockville, Maryland, at 9:30 a.m., Richard Meserve, Chairman, presiding.

COMMISSION MEMBERS PRESENT:

RICHARD A. MESERVE, Chairman of the Commission

NILS J. DIAZ, Member of the Commission

EDWARD McGAFFIGAN, JR., Member of the Commission

JEFFREY S. MERRIFIELD, Member of the Commission

(This transcript was produced from electronic caption media and audio and video media provided by the Nuclear Regulatory Commission.)

ALSO PRESENT:

GEORGE M. HORNBERGER, ACNW Chairman

B. JOHN GARRICK, ACNW Member

MILTON LEVENSON, ACNW Member

RAYMOND G. WYMER, ACNW Vic-Chairman

STEPHEN G. BURNS, Deputy General Counsel

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9:30 a.m.

CHAIRMAN MESERVE: Thank you, Madam Secretary.

Commissioner Dicus has asked me to express her regrets, that something came up this morning and so she's unable to attend this morning's meeting.

We are here this morning to hear from the Advisory Committee on Nuclear Waste on the status of the committee's activities over the course of the last several months. I believe we last met with the group in March of this year. I know from the correspondence we've received that you have been very active and including a lot of activity related to the commission's focus on Yucca Mountain, and I believe our presentations this morning will be focusing on that matter. And so we very much appreciate hearing from you.

With that, why don't we get underway. Dr. Hornberger?

DR. HORNBERGER: Thank you, Chairman Meserve.

As you indicated, my -- I will just briefly go through an introductory, a few slides here pointing out the things that we have done and a few of the things that you will be hearing about today.

If we go to the second slide, some of the recent activities of the ACNW, we looked at the 10 CFR Part 63 Amendments and we looked at the Yucca Mountain Review Plan. And, in fact, I will do a brief presentation on the results of our look at the YMRP and the staff's response.

We investigated the key technical issue resolution process that the staff is engaged in and we also had a look at waste-related research, both in the office of research and in NMSS as it relates to their work primarily through the Center for Nuclear Waste Regulatory Analysis.

We did in September have a meeting in Nevada. That's -- typically we have a meeting in Nevada in the autumn. And we held a public meeting at Parump and heard presentations or heard about concerns of members of the public in Nevada.

On slide three, we also in October traveled

to Europe. We attended the Quadripartite meeting in Europe. This was the first time that the Quadripartite meeting had a session on the last day on waste-related issues. And, in fact, we met with members of the advisory groups and regulators in the other countries to discuss some issues of common interest.

We also made a trip to Sweden. We visited some of the Swedish waste management facilities. And, in fact, as I think anyone who visits these facilities in Sweden were very impressed with the efficient and immaculate storage facilities they have.

We also observed that in Sweden, and as I mentioned to Commissioner Dicus when we met with her the last time we were here, probably because Sweden is more uniform and certainly a smaller country, but they seem to have an agenda to which everyone agrees. That is, they don't agree on necessarily the details, but everyone agrees that there is a problem and that the waste problem should be solved and that it really should be through geological disposal,

which is impressive that they have that uniformity of 7 opinion.

Slide number four, we have looked at issues dealing with spent fuel transportation. And, in fact, we held a workshop last month on issues about -- related to spent fuel transportation. I got a letter from Mr. Robert Loux from Nevada. Mr. Loux was -- had some concerns that we had missed certain things in our meeting. We have corresponded with Mr. Loux and invited Nevada to present technical information to us in the future and, of course, pointed out that this is just a -- it's an ongoing issue and we recognize that the ACNW will continue to look at the issue and to advise the commission as appropriate when we see fit. We will have a report later on spent fuel transportation.

We also looked at the issue of orphan sources and the whole notion of how one might track and keep track of some of these sources that are out there.

So, slide 5, today's topics, we will talk about the staff's high-level waste risk insight

initiatives. We'll talk about the Yucca Mountain review plan, spent fuel transportation, igneous activity and have an update on the container life and source term KTI. And so our first presentation, I don't think that it's appropriate to have questions after this just introductory remarks, but we'll proceed right to our first presentation and John Garrick will discuss the high-level waste risk insights initiative.

John?

DR. GARRICK: Thank you, George.

Slide 6, the committee first heard about a high-level waste risk insight initiative earlier this year and we received a briefing in April on an exercise that was performed by the staff to -- for the purpose of developing the initiative and wrote a letter responding to that exercise in July and received the EDO response in August. The committee has always been eager to see the staff move forward proactively with respect to using risk concepts to inform the analyses that are performed and assist the whole process of assigning priorities, et cetera.

It's interesting, but when you start talking about risk insights and risk insights initiatives to ask the question, well, what do we mean by risk insights? And of course it's also important to look around and see what documentation exists within the agency that might answer that question, and of course there is a document. The document that is very explicit about what is meant by risk insights is the Commission White Paper that was published in, I believe, March of 1999. A White Paper that was for the purpose of adding some clarification on the meaning of some of the terms that had become frequently used in this transition to a more risk informed regulatory process.

And the comment there was that what we mean by risk insights is in reference to results and findings that come from risk assessments on slide 7.

Now, that White Paper, I thought was extremely valuable in this whole exercise of trying to figure out the best way to utilize the risk informed performance-based way of thinking. Because it not only addressed the question of risk insights,

it addressed the question of what do we mean by risk, what do we mean by risk assessment, what do we mean by performance-based and defense in-depth.

The distinction between being risk informed and the risk-based concept, all those concepts were very well articulated and have proven to be very valuable to those of us who have been in a role of trying to offer advice on how to implement.

Now, as far as in slide 8, we talk about what are risk insights, but here we are really talking about what's the risk insights initiative. And the staff had indicated that the initiative is based on information that comes from the DOE safety case, that is obviously linked to the Part 63 Requirements and is based on performance assessments. So there is a little difference there because they are talking about risk insight initiative rather than just risk insights.

Now, why would you want to have a risk initiative, a risk insight initiative? The reasons that were given by the staff are on slide 9 and this is a direct replication of the staff's comment on

that question and it is to document -- to provide documentation of the risk insights and make some -- make the connection to the resolution of the agreements, the agreements that have come out of the issue resolution process with the Department of Energy in relation to the key technical issues.

As you know, there is some 300 agreements, 292 or some number approximating that that resulted from those -- from the technical exchanges between the NRC and the DOE. And, for example, there is some 58 agreements associated with one key technical issue, namely, the container life and source term, and we'll be hearing more about that later from Ray Wymer.

The idea here is to have an initiative that assists the process of deciding which of these agreements ought to receive the greatest amount of attention and how to allocate resources.

The reasons for the risk initiative that were given by the staff besides documenting results were to carry forward the concept that has its roots in the probabilistic risk assessment policy

statement, that is, to reduce regulatory burden, to improve communication and integration, to implement risk insights into issue -- into the resolution process.

The committee was very impressed with what they were able to do in the communication and integration goal. It's clear that the exercise that they went through of trying to do some degree of importance ranking of the agreements that fall out of the issue resolution of the key technical issue, it's clear that the communication part of that exercise was extremely successful. Extremely successful in terms of getting the key technical issue people to interact and work more closely with performance assessment people, for example.

The fourth bullet here given for -- the reason for having the initiative was implement risk insights into issue resolution process. While we gave them very good grades on the third bullet of improving communication and average grades on the first two having to do with documentation and reducing regulatory burden, we didn't give them such

good grades on the fourth bullet, namely, of implementing risk insights into issue resolution process and we'll come to reasons for that in a minute.

So what we pretty much observed here was that the whole process, the exercise seem to be extremely successful in terms of creating good interaction between the important groups here, but there was an absence of what we would call visible risk assessment, risk assessments and the result in keeping with the definition offered by the Commission White Paper and now I'm talking about slide 10.

Slide 11, continuing with our observations, it became clear to the committee that while there was a ranking that was developed as a result of this exercise, the ranking was not really on the basis of risk. The rating process that was employed lacked rigor. It was very qualitative, not quantitative. But, again, it's not to say that it wasn't a valuable exercise because it was.

And the other thing that's important here is that we learned from the EDO response letter that

the path forward here is an aggressive one with respect to the concerns of the committee, that they do plan to repeat the exercise, they do plan to utilize risk assessment methods for -- in a more explicit and rigorous manner to organize the agreements and so we were -- we're very encouraged with what we are reading in the response as to what the path forward is.

So our conclusions are really that this was very successful for internal communication and documentation. And as all of us know in work of this nature, that's probably the most important thing, is to get the important parties to interact with each other and exchange notions and ideas about what they believe to be important and have the full benefit of that information in making decisions about the scope of effort required to resolve the agreement.

On the other hand, we saw in this initial exercise a lack of use of risk assessment methods and therefore we consider this kind of a diminished role of risk in the process based on the first, the first effort.

So what do we recommend? Well, we recommend that they repeat the exercise and adopting the interpretation on the White Paper on the meaning of risk insights and we also recommend that there be a more visible use of the performance assessments in prioritizing the agreements. The committee has, for many months and even years, been pushing the notion of having the sub-issues to the key technical issues mapped in some sort of prioritized fashion, such that one can see the relationship between the results of the performance assessment and the results that have evolved from the activities surrounding the key technical issue resolution process.

Thank you.

CHAIRMAN MESERVE: Thank you.

Why don't we proceed and go through the briefings and then we'll come back and do the questions and do it all in one loop, okay?

DR. HORNBERGER: You want to suffer through the whole thing first, huh? Okay.

So I'm up next, and I'll give you a little bit of information on our review of the Yucca

Mountain review plan. 16

On slide 15, I just wanted to indicate to you some of our procedures. We actually started pretty early on in this process, well before the document was publicly available. We interacted as individuals, not as a committee, but several of us met individually with the NRC staff. We provided informal comments on some of -- to them on some of their ideas and basically worked iteratively and this process seemed to work pretty well, and as we got some early inklings, at least as individuals, although we didn't discuss it as a committee, but we had some feeling about how things were proceeding and they also got the benefit of comments from several of us as individuals.

On slide 16, I'll just go through a few of the comments that we made in our letter to you and also discuss -- on the same slide, you'll see the staff -- an abbreviation of the staff's response so that we know where we are.

I think it was at the March meeting, and if I'm not mistaken, it was Commissioner McGaffigan who

posed a question to us and that we should pay attention to when we looked at the Yucca Mountain review plan and that was why we needed a thick volume when it seemed that other regulatory guidance could be much smaller.

And, in fact, we -- in looking through the document, we came to the conclusion that it really is very repetitive. The staff took that approach, I think, to be complete within each individual subsection. But it does make the document pretty tiresome to read cover to cover and we suggested that --

COMMISSIONER McGAFFIGAN: A human being actually succeeded at doing that?

DR. HORNBERGER: I'm choosing my words carefully obviously.

And we suggested that one way that they might find a way to reduce the monotony in the document was to use tables, charts, graphics to try to improve the readability.

The staff responded and said that they would in fact, and when they did their revision to

look for opportunities to economize on the repetition and to reduce the length.

Slide 17 --

COMMISSIONER MERRIFIELD: Mr. Chairman, I would just say I would compliment on this initiative as it is consistent with the agency's direction on plain English, for making the documents more approachable.

DR. HORNBERGER: The second comment that we offered was that -- again, because not only the applicant, the Department of Energy, but there would be I think many other stakeholders interested in the Yucca Mountain review plan and the question that arises is, well, all right, how will in fact the guidance be used in a risk-informed setting? And we suggested that it might be very useful if they could have an appendix with an example about how the review plan would actually be used.

The staff in their response, I think, agreed with us that this would be useful, but they also recognize that they have to be very careful obviously in producing such an example and they have

to consider whether they even could do it because of the -- they couldn't give an impression that there had been any decision reached.

Our third comment on page 18, the Yucca Mountain review plan had suggested that a lot of the effort in the review, the depth of the review would be concentrated on the Department of Energy's principal factors that they would come forward with in any license application, which I think makes sense. But we also then recommended to the staff that they not confine the depth of their review or the decisions on the depth of the review, just to the Department's presentation and that they should use their own risk insights to determine depth of review in certain aspects. And the staff's response was that in fact they did fully intend to build on their own risk insights.

On slide 19, our fourth comment, we noted in certain parts of the YMRP -- the Yucca Mountain Review Pan that there appeared to be carry-over from guidance that was pertinent for reactors and we questioned whether this was appropriate, that there

may be inappropriate guidance in there that was in a carry-over from reactor and we questioned whether there would be relevance to a waste disposal issue. The staff again responded that they will go back and they would ensure that they would -- that the review areas are appropriate for high-level waste.

On slide 20, future actions, I will say that we were -- that the ACNW was very pleased with our interactions with the staff on this. Jeff Ciocco, the team lead, was extraordinarily helpful in our interactions as well as Bill Reamer and all of the other people. I shouldn't single out anyone. The team was very good. So we don't have any plan to re-review the next release of the Yucca Mountain review plan unless the commission, of course, asks that we do so.

We do intend to watch as the key technical issues are integrated into the sub-issues that are part of the basis for the Yucca Mountain review plan and, of course, we will review the integrated issue resolution status report.

Slide 21, our approach has been and we

intend that it would continue to be that we would 21
focus on selected key technical issues. For example,
we think that the total system performance assessment
is very critical as we move forward, as is the
container life and source term issues, so we would
continue to focus on things that we thought are most
important.

In the spirit of moving right through, the
next topic is spent fuel transportation and Milt
Levenson will handle that topic.

MR. LEVENSON: Good morning. Spent fuel
transportation is an issue of public concern
encompassing both technical and nontechnical matters.
While it's very complex, the primary responsibility
of NRC is somewhat limited primarily to licensing the
transportation cask.

To review the status of this
responsibility, the ACNW held a one-and-a-half day
workshop on cask design and testing and on experience
and the shipping of spent fuel. Workshop did not
address any socioeconomic or other nontechnical
issues. A letter to the commission summarizing the

workshop is being prepared and the workshop proceedings will be issued as a NUREG.

Slide 23, we define the objectives of the workshop which were to examine the technical aspects of spent fuel transportation package design analysis and testing to determine if sufficient evidence exists to substantiate that spent fuel can be transported safely or is additional evidence or information required; to examine spent fuel and high-level waste transportation safety experience in the U.S. and worldwide as we could obtain it.

What was omitted from the experience-base was -- and it's a very large part of the shipment question, is the shipment of nuclear weapons which goes on quite often all around the country, that was not included.

The invited participants included people from the Association of American Railroads, COGEMA for foreign plans, utility for private shipment, various national labs, cask vendors, industry groups, representatives with Nuclear Regulatory Commission. Department of Energy had three participants, one to

cover WIPP experience, the imports of foreign fuel from research reactors and one on navy fuel. And from the Department of Transportation there were two participants, one covering their experience on rail shipments of spent fuel and one covering truck shipments.

On slide 24 is the highlights from the workshop which are there have been no in-service failures and no public health and safety consequences and the database as reported by the people at the meeting, the participants, the Department of Transportation numbers are 1.6 million miles, total of eight accidents, no release of contents in any case. Four of those accidents involved empty shipping containers.

There's over 40 years of experience shipping spent navy fuel around the country with no releases. International experience is 30 years of shipments, over millions of miles by truck rail and ship with no release of radioactive contents; that the Sandia demonstration test in 1977 and the British operation called Smash Hit performed in 1984 were

full-scale tests. 24

The workshop indicated that advantage should be taken of currently available enhanced analytical capabilities. I think most of us were somewhat surprised at the advanced simulation capability that's been developed as part of the weapons simulation. And people from Livermore presented application of that advance technology to some other major things like dam failures and so forth. It was very impressive and indicates some very advanced capability available.

There were assessments of some current news items such as the Baltimore tunnel fire. The workshop presenters were in almost complete agreement that multiple-scale bottle tests provide significantly more information than a single-scale test. And the Department of Transportation representatives pointed out that while Yucca Mountain would lead to a significant increase in the shipments of spent fuel, that even at the maximum proposed rates, it represented an insignificant fraction of the total shipments that DOT classifies as hazardous.

For slide 24, this is a slightly separate subject from the workshop. The ACNW had reviewed the proposed test protocols for shipping casks and there is a letter to the commission back in June. We recommended realistic tests to validate models and increase public confidence. The testing cask to failure when tests conditions significantly exceed accident conditions, provides little benefit and assessing risk associated with such shipments. And the ACNW recommendations we believe were substantiated during the workshop.

Testing to validate codes should be performed not because we think there is any need for the present cask, but primarily to prepare for new or unique cask designs so that we need to be prepared for that. But the proposed program is not necessarily the most cost effective way to do so.

To increase public confidence, a demonstration similar to the Sandia test performed in 1977 might be useful in lieu of a cask drop onto an unyielding surface. These comments I have just made are relevant to the draft protocols we reviewed.

We know that the protocols are new being revised and will be sent out for public comment, after which we will review them again.

DR. HORNBERGER: Thank you, Milt.

Our next topic is again another item that has commanded some attention relative to Yucca Mountain and I wanted to give you an update on some of the information, the latest information that we have accumulated having to do with igneous activity, the potential for igneous activity at Yucca Mountain.

On slide 27, the first bullet indicates that igneous activity is certainly a low probability and I would like to insert the word "potentially" high-consequence event, that some of the issues related to the discussions, current discussions at Yucca Mountain have to do with exactly what the consequences might be.

I should point out that the ACNW has always -- we have been consistent in suggesting that it's not really appropriate to separate the probability and the consequences because one can have some misleading interpretations. We obviously have -- we

separate them in the sense that they are different things, but the risk we know is really a convolution of the two and a potential of a very high-consequence event; like a boleite impact on the earth. We recognize that we shouldn't really assess potential mitigation strategies without considering the low probability.

But for this presentation, I will discuss some things having to do with the probability of disruption and also the second part of the consequence analysis and that is how Magma might interact with canisters in a drift.

Slide 28, the Department of Energy in 1995 had an expert elicitation that for the most part followed the guidance provided by the Nuclear Regulatory Commission. They actually did it before the NUREG was issued, but they were almost totally consistent with the NUREG.

They issued in 1996 their probabilistic volcanic hazards analysis and approximately the expert -- the said probabilities of an intersection of a dike with a drift between ten to the minus ninth

and ten to the minus seventh per year. 28

The U.S. geological survey did a geophysical survey in the late 1990s and those data became available -- I guess actually it was in 2000. I don't have the exact date. And this was an aeromagnetic study and so the aeromagnetic study produces anomalies. These anomalies are interpreted by geophysicists as being potential centers of volcanic activities. There is room for interpretation in these data. Certainly the new aeromagnetic survey had previously undetected anomalies. As I said, there are -- there is room for different scientific interpretations of these data. But nevertheless, there are new anomalies.

On slide 29, the potential effects of volcanism on the repository, as we all know, are a very complex set of physical phenomena, quite difficult to model correctly, quite difficult to find analogs in the natural environment.

In, I think it was the year 2000, this shock-wave theory was introduced and in fact again at our March meeting. The commission asked us what the

ACNW thought about the nuclear waste technical review board. They had consultants look at the shock-wave theory and they had made comments and we were not prepared at that time to answer the commission on that because we hadn't read the material. But we did, in fact, follow up on the commission request.

On slide 30, the summary, the very short summary of the National Waste Technical Review Board consultant comments, they were critical of the shock-wave model that had been produced by an NRC-sponsored study, as being -- well, I guess simply overly conservative, too highly idealized if you will.

On slide 31, in June of 2002, we held a working group session. We invited the Technical Review Board consultants, the experts to share with us their analysis of the shock-wave theory. We also invited two experts, independent experts to advise us, to listen to the presentations, to give us their insights as well. And the focus of the workshop -- the working group was on this consequence analysis. In particular, the interaction between Magma and

canisters and the drift. But there were some comments made on the probability aspects as well.

On slide 32, let me just say that the experts, from what we heard, they did not think that the probability estimates would be likely to change significantly as a result of these new aeromagnetic data. That was their belief.

Nevertheless, it's clear that everybody recognizes that it's still incumbent upon the Department of Energy to examine these data and basically take this into consideration as to how they want to -- whether they want to revise their probabilistic volcanic hazards analysis or whether they in fact believe that the probability estimates that they have are valid.

On slide 33, in terms of consequences, one of our experts simply did not think that the volcanic system in southern Nevada would be capable of producing the purported shock-wave effects. And the other experts all certainly agree that the highly idealized analysis that had been produced perfectly cylindrical drifts with, I guess shiny in-walls so

that we would get reflections of soft shock waves and build up very high pressures. They simply didn't believe that that was a realistic analysis at all. Everybody agreed that there was a need for improved modeling of these potential consequences.

Page 34, we wrote a report, a letter report to the commission and this slide summarizes our observations. We believe that the range of DOE estimated probabilities are reasonable. We don't see any reason that the ten to the minus ninth, the ten to the minus seventh per year estimated probabilities are unreasonable. We agree with the experts that the shock-wave analysis that had produced in the NRC-sponsored research was really too idealized to be of direct use. We recognized that it certainly served a purpose of raising the issue to -- pointing out the need for improved consequence modeling. And we think that the key technical issue agreements provide a reasonable basis for the evaluation for the licensed application. That is, the agreements that the NRC staff has in place with the Department provide a reasonable basis for evaluation of a

potential license application. 32

And our next topic will be container life and source term, and Raymond Wymer will do that.

DR. WYMER: This will be a short presentation. There haven't been any new revelations that would change any of our opinions about the container life and source term issue, key technical issue. I'll remind you on number view graph number 36 that the principal issues involved with the container life and with the source term are the amount and the chemistry of the water that contacts the waste packages and that chemistry isn't -- the water is not distilled water. The water is water that contains things that have leached out of the grout and the rock as it goes down through the overburden and gets into the drifts.

The second issue is, of course, the key issue, the corrosion of the waste package which relies heavily on a particular alloy ... corrosion resistance and the possibility of drift collapse and mechanical disruption to waste packages, breaking them open in some way.

And then finally, most important through the analysis of those finally at the site boundary is radio nuclide release rates and solubility limits. That is, the source term for radioactivity.

These three issues taken together suggest to some of us that the extraordinary complexity of the system with respect to container life and source term and also the importance of coupled processes because each of these -- each of these issues feeds into the next issue, that is, the quality of water, effects of corrosion, the corrosion affects the release and all these things are interactive. And so the coupled processes, as we call them, are very important.

Some of these issues, some of the sub-issues related to these issues will not be resolved at the time of the license application, but the -- DOE and the NRC have certainly agreed on a path forward for the resolution of these in a timely way in time for the NRC to make a finding on the suitability of the repository.

Slide 37 relates to how you confirm or

establish the performance that's indicated in these performance analyses in order to assure yourself that you have -- can have confidence in going ahead with the decision-making process. And in this connection, the performance of Alloy 22 is one of the critical issues, so it's a corrosion issue primarily.

The next view graph or slide 38 addresses something which is a little new from things you heard before and that is what is DOE expecting to do in its performance confirmation of the issues related to the container life and source term.

DOE is redoing their performance confirmation plan, but in conversations with them they did state that the -- they do expect to address the container life and source term issue in their performance confirmation program as it would be very important. And in particular they have included in their repository a drift, an underground drift right in the repository where they will do performance confirmation and that will almost certainly include testing of waste package materials under realistic repository conditions and they'll be able to do this

up until the time of repository closure. So that's a very important addition that they have recently made to their performance confirmation activities. 35

And finally on recommendations, in our August letter, August of this year letter on this issue, we stated that the agreements between the NRC and DOE should be prioritized based on importance of risk and the risk initiative. The risk insights initiative that John Garrick reported on is dealing with this in part and it's important that we establish the risk in a prioritized manner because the NRC will place the most emphasis and require the most supporting information for those issues which are -- which bear most on the repository performance and on the importance of the barriers, so that prioritization is important.

Finally, we suggested that the NRC continue to incorporate simplified models of the repository, in particular, the container life and source term area. That will accomplish a couple of things.

One, it will enhance the notion of risk

communication because you will more clearly understand where the risks are from a simplified model and it will also provide a common-sense check on the much more elaborate and sophisticated total system performance analysis by NRC and the total performance analysis by the NRC.

That's it.

DR. HORNBERGER: Thank you, Raymond, mercifully for you -- we now come to a brief summary.

Let me point out that I don't intend to go through the very last slides here, but I think that everybody does have them as an appendix. We did provide definitions of initialisms that we use and hope that people can -- have been able to track our presentation.

So where is the ACNW headed in the future, in the near term? We certainly intend to focus on priority issues identified in our action plan. We have in the planning stage two working groups. In the ACNW we derive great value from these working sessions that we convene to really get down into the

technical information that we would like to have. 37

But we are planning two working groups. One on performance assessment, to look at both the TSPA and the TPA and some of the similarities and differences. And in particular, to look at some of the contributing portions of each of these analyses.

And a second workshop we plan is to look at this whole issue of performance confirmation that Raymond alluded to. This has just, I think, recently been an activity in the Department of Energy and I think it's something that the NRC staff does need to keep abreast of as we move forward because it's one of the requirements, that a performance confirmation plan be in place.

Slide 42, long-term activities, obviously we hope as a committee, as an advisory committee to support the commission with our independent views on the potential DOE license application if a license application does come in and we would hope to support the commission with technical advice. And obviously to undertake other review activities consistent with our action plan.

And that concludes our presentation today. 38

CHAIRMAN MESERVE: I would like to thank you for a very helpful presentation. In fact, it was -- you did this so swiftly and capably that I have just very few questions.

Mr. Levenson, on your slide 25, you have a statement that the result of the workshop, your views are even -- your views of having a realistic testing protocol for the transportation system if anything has become even stronger.

I did notice that in the staff's response to the ACNW letter, they provided an analysis that attempted to justify the protocol that had originally come out -- and I understand this is all very much influx now.

MR. LEVENSON: Right.

CHAIRMAN MESERVE: But it would be helpful to understand if you are trying to tell us that -- I would like to know what your response is to the staff letter. The staff, in their response, tried to explain what they -- the probabilistic basis for the protocol that they had proposed. And if you have

some criticism on that, it would be useful to hear it 39 because we are all going to be confronted with a revised protocol soon.

MR. LEVENSON: Well, I'm not sure I care to criticize since they are in the process of changing it. But I tell you the opinion as to why we were critical of it in the first place and that is that -- there are really sort of two issues. One is that if you do full-scale tests, the number you can afford to do are very limited. So you have very few data points. And for some of us who are engineers and have made decisions based on experimental data, we get very nervous if there's only one point.

If you have a number of tests, then you get more confidence in what you are going ahead with and that you just can't get multiple full-scale tests.

The other things -- the other part of it that we were concerned about was if you do unrealistic tests, no matter how heavily instrumented it is and if you say at the end of the day, yes, we tested this at a hundred times what is realistic, we did the equivalent of a truck going four hundred

miles an hour. But from the data, we can back calculate what's realistic; that's true in a purely technical sense. But for public discussions, the only thing that is obvious is that the cask did fail. That fact that it failed under very unrealistic conditions is not very helpful. And in fact, does not necessarily give you good data for validating your model because you want to validate your model with data collected in the range in which you are going to use it.

We have all had problems with extrapolating data, interpolating data. And I, for one, feel much more comfortable when data has been acquired for real cases.

CHAIRMAN MESERVE: Let me express just my own view on this. I'm sure the other commissioners can also -- they have their own view.

We have been licensing casks for a long period of time. We have been comfortable with the kind of engineering analysis and testing that's been done and it's -- as you have discussed, it's been highly successful, that we have not had any problems

with the casks. But part of the concern about the cask is that you have never -- haven't done a full-scale one. And there are obviously concerns that some have, that they might be some lack of realism in the scaling models.

And since the public concern is so intense with regard to the transportation issues, I think that there was -- at least my conclusion, that we should support the kind of testing, that we were getting some public pressure quite frankly to do, to demonstrate that, well, we're very confident about our engineering, but nonetheless we are prepared to do a full-scale test to demonstrate that that confidence is fully justified.

On the second point about the lack of realism for the test, the staff tried in their letter to explain why they thought that their testing protocol was realistic at the probability range of which they think they are going to have to evaluate the casks and obviously it -- and I appreciate your comment that the testing should be done in the regime in which you are interested in the data as being

something that you have some bench mark against in the data to support the information that you are trying to glean from the test about what the real world performance is and I take your comment is that's the concern you have.

MR. LEVENSON: Yeah, well, there are really two comments. One is the statement was made that they tested in the regime that probability indicated was realistic, but I for one don't think that the original test protocols followed through on that. They are being revised until -- and I think that may get fixed.

Also, we did not object to a full-scale test. We say if you're going to do a full-scale test, it should be realistic and you should not include artifacts that come from some other program in that if you do a drop test as a simulation for being hit by a locomotive, you may raise as many questions about how you analyzed -- how you abstracted that to do the test conditions, so that -- so I think we feel if you are interested in a truck cask, you put a cask on a truck and crash it into a

solid concrete wall or whatever you want. But that you not confuse the issue by saying a truck accident going 70 miles an hour results in the following drop test on to some nonexistent target because now you are introducing all kinds of things which can raise questions again. 43

If you want to do a demonstration test, it ought to be a real one. Not only for speeds, but for conditions. One of the things you see that drives that comment is that in both the British test and the early Sandia test, regardless of what you think about the details, they both clearly demonstrated that very important factors, the energy absorption by the vehicles. So that if you say a truck is going 90 miles an hour, but then you take a -- the cask is not in free flight. It's mounted on a truck and that's the sorts of things that are very difficult to convince somebody that you know how to model and that's why we think the test should be that kind of a test.

We don't object at all to a full-scale test. We are just saying that for the validation and

there again I hope I have said, I'm not sure what I say in a presentation, that this is primarily the reason we think we need some validation of colleges primarily for new and advanced at what might be unique cask designs. We don't think it's necessary to validate any of the existing casks.

CHAIRMAN MESERVE: It seems to me that you're -- there may be conflicting objectives if your purpose is to demonstrate that the cask can survive a real world accident, having a simulation that involves a truck running into a concrete barrier may be the way to demonstrate that.

If your purpose, on the other hand, is to validate the codes, then you want to have a controlled experiment where rather than having to do the difficult job of modeling the energy absorption that's occurring in the truck before you get to the energy in the cask, you know, you have got a very complicated problem to figure out your results.

And so doing a controlled experiment where you have got the variables all constrained is a way that you can, with a full-scale test, validate the

application of codes to that cask. It may not serve the public demonstration purpose that you want because of the then issues that get raised about, well, gee, if you applied this correctly when you think about the real world situation is. But it does seem to me that there is a conflicting objective in these tests and we need to think about it.

MR. LEVENSON: I agree completely. It's our perception though that, excuse me, the highly instrumented work to validate the codes can be done on models, scale models and significantly cheaper and done in multiples there. We recognize two separate objectives.

CHAIRMAN MESERVE: Dr. Hornberger, I must admit I'm a little bit perplexed myself in understanding the -- understanding shock-wave theory and I don't understand how you get the shock wave. I mean, is this the idea that you have some instantaneous temperature pulse when there is an intrusion of the magma into the drift or how do you generate a shock wave in a situation?

DR. HORNBERGER: So I won't pretend that

I'm going to lead you through all of the physics and mathematics, but in an arm waving sense, yes, so you have an intersection of a dike with the drift and the magma begins to flow down the drift and so you have a thermal pulse and you also have a compression --

CHAIRMAN MESERVE: Assumed to be a pulse?

DR. HORNBERGER: Pardon?

CHAIRMAN MESERVE: It's assumed to be a pulse?

DR. HORNBERGER: Yeah, it's a pulse, but the magma in the model, the magma continues to move down the drift, okay, and this is another part of the idealization in the model that doesn't seem to be quite right because as one of our consultants pointed out, this -- the magma is bound to be near its solidest. It's likely to be at a temperature where it's going to solidify pretty quickly and in contact with nada frock and in contact with canisters that are cold, you would very rapidly solidify.

But nevertheless, the analysis was of a magma proceeding down the drift. You have a thermal pulse, you have a pressure pulse generated by the

compression of the piston effect and that pressure wave would move down to the end of the drift, be reflected off the drift, come back, hit the oncoming magma front and just continued to be reflected back and forth in this perfect reflector.

CHAIRMAN MESERVE: With a resonating oscillator?

DR. HORNBERGER: You have a resonate -- there you go. That's -- and so that's an arm waving explanation.

CHAIRMAN MESERVE: All right. You have concluded, this is an implausible scenario.

DR. HORNBERGER: This is an implausible scenario. I think everybody agrees.

CHAIRMAN MESERVE: I'll take reasonable --

DR. HORNBERGER: In fact, the people who -- in fairness, the staff and the --

COMMISSIONER McGAFFIGAN: It's calculable.

DR. HORNBERGER: That's correct. That is correct. In fact, somebody pointed out that this is precisely one of the reasons why it's done because it can be calculated and the people who did the

calculation knew it was --

COMMISSIONER McGAFFIGAN: Were these physicists doing this or --

DR. HORNBERGER: Were these what?

COMMISSIONER McGAFFIGAN: Were these physicists --

DR. HORNBERGER: I think I'll decline to answer that one.

CHAIRMAN MESERVE: Let me step back. There is a common theme -- this will be my last question. There is a common theme in many of the letters that were written over the years including in your presentations here today, particularly your last one, about the need for the staff to develop simplified models and the need to do that so you understand what the important contributors to risks are and understand how they contribute to risk the ability to do the cross checks of the more complicated models and also of course that facilitates communication. This has been recurrent theme of what you have been telling us and telling the staff over and over again.

Do you have a sense that we are moving in

the right direction in achieving that objective? 49

DR. HORNBERGER: We definitely do. Maybe, John, you could answer that one because -- we just had a presentation yesterday on the continuing risk initiative.

DR. GARRICK: Yeah, I've been sort of a pain in the neck on that issue. And unfortunately I took enough physics to develop a high appreciation for simplified models in understanding phenomena and being able to apply it in other sets of boundary conditions and developing a sense of margins of safety and margins of performance and find it extremely valuable.

We have, as a committee, been pushing the NRC to -- and having NRC push DOE to address some of the performance assessment issues, such that the very complicated models could be abstracted into something that would have a greater physical meaning and be reduced to a set of parameters and conditions that would be more understandable and we can report to you that the NRC staff has clearly got this message and back -- reports the feedback that we have been

getting in the last several months has been very encouraging. 50

For example, we have suggested that there's all kinds of conditions that exist that lend themselves to simplified models in the case of the repository. Obviously, there's hundreds of radio nuclides that are involved, but there is a very small handful that dominate the risk.

One clear example of a simplified model would be to track two or three of these radio nuclides from waste mobilization through the unsaturated zone, to the saturated zone, to the biosphere, to the biological uptake.

In fact, these exercises are now being done and I think they are very impressive in terms of turning up the microscope on just what is important in the performance of the repository and also in signaling where the uncertainties are and where there needs to be greater attention.

So we are really just talking about taking a complex model and representing that with a simpler, but more physically interpretable model and as such

that that can be exercised in different ways and also be used as a means of communicating better to people what in fact is going on in the repository.

DR. HORNBERGER: I might add -- this might be a good place to add this. One of the areas that we think we need to look at a little more in-depth has to do with the actual dose calculation and we really think that, for example, some of the simplifying assumptions there really bear looking into to at least understand exactly what conservatisms may be introduced and of course we are very happy that Michael Ryan has joined us as a member and he is going to be leading some of that effort for the committee.

CHAIRMAN MESERVE: Good. Thank you very much.

Commissioner Diaz?

COMMISSIONER DIAZ: I was going to start with something different. But I believe it is so important that when people take a nine-dimensional problem and make it one dimensional, that at least that one dimension be the right one.

DR. WYMER: I was going to make the observation, Mr. Diaz, that you can't do the simplified model until you have done the complex model and understand what it is that you should simplify. 52

COMMISSIONER DIAZ: That is very important. That is very important. Thank you, sir.

I believe that, you know, from my viewpoint, the commission is looking at your advice at two different levels. One is the specifics of what's happened with this issue. But once in a while I would personally like for you to stand back and take a look at the whole thing and make sure that nobody is missing something that is important to the potential licensing of a high-level waste repository. Have you done that? Did you do that? It's -- you take a step back and look and say is everything being accounted for that the commission is going to have to really maybe make the decision on?

DR. HORNBERGER: We're sensitive to that. We really are. And, in fact, I know probably four, five years ago, we really tried to push on the staff

because when they had put forth their key technical issues and their list of key technical issues, we raised precisely that question.

I was sure that the key technical issues cover everything. And so we were sensitive to that issue. We tried to do it and we particularly will try to do it in terms of, for example, our upcoming workshops. That's one of the things that we will be looking at. Now having said that, just like everyone else, we tend to be consumed by issues that get put on our plate that tend to be much more specific than reflective. But we're sensitive to that and we try to do as good of a job as we can.

DR. GARRICK: In fact, we have even had discussions about backing off further than what you're suggesting. You're suggesting we back off and look at the total high-level waste or the total Yucca Mountain problem. We're talking about -- well, what we may be willing to do is to have a workshop that addresses the whole issue of radioactive waste management and what are considered to be a more subtle, but potentially future problems that we need

to consider.

The working group sessions have been extremely valuable in nurturing our understanding and being able to put these issues in context and so why wouldn't we want to apply that to the whole issue?

Well, let's reflect on where we are in the nuclear waste management field right now and ask ourselves and ask our outside experts and anybody else that has ideas on this, what are considered the most important issues downstream. Because there might be some sleeping giants there. There are people who think that low-level waste is a sleeping giant, and that we cannot allow ourselves to become so preoccupied with any single project that we don't realize that maybe there's some other issues out there that need some attention.

COMMISSIONER DIAZ: That's very true. Well, we certainly look forward to you to continue to look at the big picture and make us aware of any details. I used to have a technician that worked for me that every time I get very much into an issue he will come and whisper to me, have you thought about a

transporlator, which I don't know what a transporlator is, but he always kept me on my toes. He knew I did not know what a transporlator was.

Going to the next level, and we talk about the nine key technical issues, as these issues develop, you obviously must be aware or trying to be aware or cognizant of any sub-issues that come, anything that is coming that -- you know, any of the technical issues that might have generated an offspring as a sub-technical issue that is important.

DR. HORNBERGER: Again, not to get too detailed, but one thing that comes to mind is of course -- and this is again an issue that the committee has tried to push on for years and the whole issue is one of coupled processes. And one of the concerns is of course when you put things in bins like key technical issues, do you potentially miss out on interactions. And again, yes, we're keeping our eyes open on this. There are a few things that are being investigated. We try to keep up to date on issues that arise. In terms of do we see anything

that is going to likely to pop up in the near future 56 that is a real surprise. No, we don't see anything right now.

COMMISSIONER DIAZ: That's good. I know and I think we all have been concerned about the integration, just following on that question.

Do you have any additional recommendations that we should consider regarding how we improve the integration? Because I know that issue is vital to all of us. Is there anything that is not being done regarding the way the staff approaches the issue?

DR. HORNBERGER: I think that as John pointed out in his presentation on this risk insights initiative, that that was one of the things that we were really impressed with, favorably impressed with, was the fact that they had managed to get the technical people within each KTI in communication with the people who are doing performance assessment and they really had some very good communications. I got the impression that some of the communications were probably pretty active at one time or another so that people weren't really holding back.

I think that also with the Yucca Mountain

review plan, the integrated issues and sub-issues, I 57
think that the staff really is on the right path.
But again, we continue to be -- encourage that.
COMMISSIONER DIAZ: Dr. Garrick, I do
appreciate the, let me call it the stubborn and continuous and
systematic insistence on maintaining risk insights and I do
appreciate that. I think that's very valuable.
Provide some stability on the processes.
DR. GARRICK: I'm glad somebody does.
COMMISSIONER DIAZ: It's not easy.
I know that -- I'm noticed in the last bullet
on slide 9 that you are concerned or think that the
implementation of risk insights into the resolution process
needed some upgrade in it. And the recommendation is
there. I believe the staff is very agreeable to it.
But when you look at it again, taking a step back,
why do think that happened? What led to this
missing, this importance of the implementation.
DR. GARRICK: Yeah that's a good question.
I think that the truth is that probably what they did
achieve was as a first step maybe the most important
thing to do and that was to get the different groups

to work with each other, to hear out the opinions of the people, for example, that have been living with the KTI process from its beginning, long before the risk perspective was emphasized. To hear out what the performance assessment people are finding out and to search for how you map from one to the other. And of course, one of the things we've learned is that you don't map at the KTI level. That you do that at the sub-issue and even the sub-sub-issue level. But I think that the big step has been taken to break down some of the natural barriers that create when groups are very intentionally involved in work and trying to solve problems by getting those groups to work together. And I think now what we are beginning to see, especially with respect to the use of results from the PRA, some a genuine effort to connect the two. To connect the results of the PRA to the sub-issues in the agreements. So I think that is happening.

DR. WYMER: I'd like to add to that. My understanding of what happened was they put the group together to look at the risk initiatives and they

didn't establish at the outset a common basis of what they were looking at. They didn't define what the risks were that they were addressing and it was maybe premature to do that. But each person actually took his own view of what risk he was addressing and put that into the pot and so there was a whole spectrum of risk and there was not a common basis of which to go forward. And I think now that step two is to modify that and everybody start at an agreed upon common basis.

COMMISSIONER DIAZ: But it's probably good lessons learned from that exercise. Okay. Thank you.

Let's see. Milt, I know we talk with the Chairman quite a bit about the full-scale, the multiple tests and I think I -- you know, I have a little bit of an understanding of the modeling capabilities. I'd be interested in some time may be you can send us some of those workshop things. I'd be fascinated by seeing the capabilities that apparently are better than what you thought they were and apparently better than what I thought they are,

because I thought that was in many ways a full-scale test. It to me is vital not only for the credibility of the larger test. But if we can do -- significantly improve or obtain significantly improved results from small scale testings, that should be in addition to the full-scale test. Would you agree with that?

MR. LEVENSON: Yes, I think they're two separate objectives, as the Chairman mentioned. And we'd certainly make available to you the information. It's just kind of incredible with those of us that are sometimes associated with calculations as to the step forward that has occurred and one of the charts used by the Livermore people to show where they stand in their computation capability measured in flops, which is a unit irrelevant for the average user of a computer and word processing. It's only for floating desk point calculations pointing out that a current Mackintosh with a pentium processor is equivalent to, for that type of calculation, to -- the second generation of Cray, the Cray YMRP. Unbelievable and they're way beyond that. And they

have also -- they have applied as I mentioned I think 61 to other things like dams. And I think what -- if we take decisions or evaluations made by other people, people have decided that this simulation is adequate to make sure that the bombs that are on railroad cars or trucks going all around this country are safe and they won't prematurely detonate. And at the same time that they detonate when called upon by the military. That's so much more a public safety issue, that that advanced computational ability we think ought to be looked into.

COMMISSIONER DIAZ: Thank you, sir.

Dr. Hornberger, very quickly on -- you seem to imply that when you talk about aeromagnetic anomalies and the igneous activity issue, that they're different interpretations. Are you trying to say that it could be interpreted that there is really no significant likelihood of volcanic activity?

DR. HORNBERGER: No. What I wanted to say was that there is a possibility that there would be no significant change to our estimates of a probability of volcanic activity.

COMMISSIONER DIAZ: Okay. All right.

And I know you've been trying to be very political using repeatedly the word idealized models, you mean unrealistic or you simply mean nonphysical?

DR. HORNBERGER: I think one has to be a little careful because we know that there are no frictionless pendulums. And yet these tend to be of use in teaching basic physics, as we all know, right? And I think that the -- perhaps if I could put a good spin on it, I think that the intent of the NRC-sponsored research was that. It was to say, okay, if we make all these idealizations, what are the potential consequences. And it was more to raise a flag than to say -- they really didn't put this forward as a realistic calculation. They knew it was not a realistic calculation. So it was both idealized and unrealistic, but it was known to be so and it was, I think, put forward as an example calculation. And, again, I think as Commissioner McGaffigan said, it was done because it could be done.

COMMISSIONER DIAZ: That's dangerous.

Dr. Wymer, in your presentation you talk about long-term tests. Could you define what long terms should be for this commission?

DR. WYMER: I probably can't do as good a job as you can. Long term as far as testing is concerned really has to go up until the time of closure for the repository. After that, you have no real opportunity to perform realistic test in the repository. You can still continue to run things like corrosion tests on the waste package material beyond the closure time. But those would just really be to provide assurance that the statements that were made by DOE and that were accepted, if they were by NRC for the license, were in fact still holding, that the calculations were still to be believable. So long term in one sense is closure of the repository. But some things could go on beyond that and will.

COMMISSIONER DIAZ: Okay. Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Commissioner McGaffigan?

COMMISSIONER McGAFFIGAN: Thank you, Mr. Chairman. There's a procedural issue I'm going to start with that bears on where the chairman was talking with you. I read your correspondence with Mr. Loux about the November workshop. And I'll tell you, I didn't find your answer totally persuasive. You know, Mr. Garrick and I have had a lot of experience with WIPP over the years, and my recollection is that the academy never had meetings without the EEG getting invited to present their view, Bob Neill, whoever. There was a technical group in the case of New Mexico. It was established as a result of a consent agreement entered into, I believe, in '81 or '82. And Nevada doesn't have an EEG, although it has a coterie of what they believe to be, solid technical experts who are going to espouse their view. And so I think it's a bit of a mistake to not involve them routinely in your meetings, and in particular, in this transportation meeting and I'd just be interested in your reaction to the procedural point. As I said, I read your letter, but I believe

you made a bit of a mistake in not having Nevada people there and as a matter of going forward, I think you'd be well suited sort of each time you had a meeting, call up Mr. Loux and say do you have experts that you want to put before us? They may be outside the mainstream, but that doesn't mean that their point of view isn't going to be heard by important stakeholders. And for you all, part of your function I think is to hear all the different points of view because certainly part of our function is to hear all the different points of view.

So what's your reaction?

MR. HORNBERGER: We will take your point to heart. I think that we probably did learn something from this in terms of particularly contentious issues that we do have to be -- to exercise great care, just as you said and I think that we will take your advice in the future.

DR. GARRICK: I think one thing that's important to observe is that we seldom have had a meeting where, especially in Nevada where there wasn't representation from the state of Nevada and we

have been very enthusiastic when we've met with them and inviting them to our other meetings and what have you. So there has been a presence in a great number of our meetings and we have listened and encouraged their participation numerous times. So it isn't as if that this is --

COMMISSIONER McGAFFIGAN: I know, but it's one thing to encourage it and even mention that it's coming, and again I read the whole letter. You had mentioned it was coming at the previous meeting. There was opportunity for stakeholder involvement if they had come on their own without being given the -- you know, seat at the table. And they didn't avail themselves of that. On the other hand, it's -- as I say, I think you'd be better off each time just as in the case of WIPP, you probably called up Bob Neill each time and said do you have something to say on this issue. I think calling up Bob Loux and saying do you have something to say on this issue. Do you have some expert you'd like to have participate is not an unreasonable -- I mean, I think it's the best

approach.

DR. GARRICK: Yeah, and I think that WIPP was a good model and as George says, you make a very good point and we should be more -- we should reach out more.

DR. HORNBERGER: But we did for example several years ago. We had another meeting where we focused on transportation. In fact, what we focused on was the idea of risk communication. We held it in Nevada. We specifically organized to have not just state representatives, but representatives of counties. We organized the whole meeting so that we did have broad input. No, no, no, I'm not arguing --

COMMISSIONER McGAFFIGAN: This meeting was a particularly dangerous one for you all to not have more involvement because -- you know, Senator Durbin introduced a bill just before the Senate left session where as a layman he took a stab at what our criteria should be for, you know, certifying casks. I suspect you all might not agree with some of the criteria. I don't necessarily agree with some of the criteria. But I'll tell you, there's a lot of people who

believe that this is relatively understandable compared to trying to understand the total system performance assessment and getting into some of these KTIs. You know how robust the cask should be. You know, what's the biggest drop over a bridge in the west headed toward Yucca Mountain on a highway or on a railroad and why shouldn't the cask be able to survive the drop from that cliff is a question that people are going to ask you. And we're going to have -- all of us -- we're going to have to answer, and so did this issue of designing what's the deepest body of water. If you look at Mr. Loux's letter to the chairman of December 9th, what's the deepest body of water that a barge may be going to have to navigate in order to ship spent fuel to Yucca Mountain. And what if the barge sinks in that deepest body of water? Should it be designed to that deepest body of water?

Those are -- this is an area where as I say there are a lot of people who are going to feel quite confident in their ability to help us design these tests and will demand answers to those sorts of

questions.

DR. HORNBERGER: Yeah, and I wasn't disagreeing with your main point. I just was again indicating that what we did in organizing this one -- and again in retrospect, we probably would have done it just as you said. But we were organizing it to focus on very technical issues and not on some of the issues that you raise.

COMMISSIONER McGAFFIGAN: But I'll make a bet that Nevadans believe that they have people who could contribute to --

DR. HORNBERGER: No, no, and I think you're right and I think you're right, and I think again in retrospect. And as I said, we have invited Mr. Loux to make presentations in the future and if we learn new things, we would certainly report that to him. And we take your main point that we should be more circumspect in the future.

COMMISSIONER McGAFFIGAN: And I would have even -- you know, I don't know on this issue, this other workshop on the volcanism issue and if they had anybody that wanted to send to that, I would have had

them there as a participant. 70

Going to -- staying on this issue of transportation, Dr. Levenson, I share the Chairman's view. We face -- you know, you talked about these teraflop, hundred teraflop, or whatever they're at, there will be a thousand teraflop, whatever a thousand teraflop is soon.

But in the case of nuclear weapons, they have a whole bunch of tests. They have a whole bunch of data points that they are trying to simulate with these on their computers nowadays as part of the stockpile stewardship program.

In the case of the casks, we don't have the full-scale tests and getting some data points at the full-scale end of the spectrum, there can be arguments about those data points are, but I think we need to have them and I -- you know, otherwise you -- I mean, I believe that what we have done -- I mean, I testified with Chairman back in May or so to the Congress and we do believe that our current sub-scale modeling and all this is quite good. We don't test World Trade Centers to failure or other buildings or

bridges or whatever. We use sub-scale models in designing them, but we -- at some point, if it's feasible, you presumably want to test at full-scale and yet you say you're not against that, but even testing it full-scale in the regime the staff wants to test I think may make some sense.

Let me ask, Dr. Garrick, you've mentioned you have a lot of experience with TRUPAC. In Mr. Loux's December 9th letter he says that the state of New Mexico was very heavily involved in designing the tests that were done on the TRUPAC canisters and I don't know whether -- you said you had these people, the WIPP experience in mind at this workshop. Was the testing of TRUPAC what you guys would call risk informed or was it in non-+realistic regimes where as a result of the public process they followed to design those tests they got out into a regime that you all wouldn't have been comfortable with?

DR. GARRICK: Well, they certainly were not specked against any kind of risk model, but you're absolutely correct that the environmental evaluation group, the

EEG group, was a party of the process, and I considered that organization to be one of the better organizations that I have seen in keeping focused on the real issues and the technical issues.

I think as a matter of fact they contributed a great deal to the issues not going astray with respect to the technical issues that demonstrate safety. But, no, I don't think those tests were necessary -- were guided by any fundamental risk --

COMMISSIONER McGAFFIGAN: I don't think they were either. We may be about to do the same thing despite your advice to the contrary. One issue I know that came up at your workshop. I had a staffer who attended part of it. You gave a fellow from the American Rail Association a pretty hard time about the notion of dedicated trains and I'll tell you, I speaking as one commissioner, don't know why we don't use dedicated trains. I think dedicated trains make a lot of sense. You get the best stock. You get the best routes. You don't have to hang around waiting for

locomotives to be switched in vulnerable places where you might be subject to attack by terrorists. And you ensure there is no flammable cargo on the train so that, you know, if you get in a tunnel and a fire occurs, you are not going to be there. You can probably even impose rules that the train will not enter a tunnel if there is another train with flammable cargo in the tunnel until that flammable cargo has cleared, if you are using dedicated trains.

So the resistance that I understand you all have to dedicated trains I would like you to explain to me.

MR. LEVENSON: Well, I think there are two. One wasn't ours. It was quoted by I think the participant responsible for the Navy shipments. They don't use dedicated trains for a completely opposite interpretation of the terrorist issue. They say a dedicated train is a flag and a target. Everybody knows where is it is, what it is, et cetera and they much prefer to --

COMMISSIONER McGAFFIGAN: You think we are going to be able to hide these casks, these two

hundred ton casks?

MR. LEVENSON: No, no, but you can't hide it as it goes by, but from the standpoint of people planning, a dedicated train takes a lot of planning, a lot of information. Everybody knows, there's published schedules, the track has to be cleared because a train is going to be going through there next Thursday and this is an area about which I know nothing. But I just say that this is the view of some of the people who are concerned about security. It's for security reasons they prefer not. I suspect we don't ship our nuclear weapons in dedicated trains either. We don't ship Navy fuel in dedicated trains.

The other part is strictly the -- I think one of economics, the man from the railroad association at the end of the day, I don't know whether your staffer reported to you at the end of the session, he said he wanted to make it clear that he didn't think dedicated trains was necessary for safety to have dedicated trains. There were other issues and the railroads liked, and what they may like is the extra fees they charge.

COMMISSIONER McGAFFIGAN: Yeah, I think the 75 railroad folks who have been arguing for dedicated trains, it's quick and easy to say they're doing it because they're going to make more money. But I think they make a fair number of persuasive arguments for dedicated trains.

In the security issue, I understand it can cut both ways, but it's hard with these 200 ton casks, you are going to know what that thing -- I don't think there is anything else on our rail system that's going to look like what one of these spent fuel casks once they get on the rail system some day.

Is there anything else that looks like a spent fuel cask?

DR. GARRICK: Well, there's a lot of things that are covered that -- you know, I have observed trains as I travel around that you ask yourself I wonder what that is that certainly could be like that.

Many years ago, I participated in a set of hearings with the ICC on this whole issue and all I can say is that when we tried to look at this

extremely objectively and tried to let the evidence 76
speak, that any analysis that we perform on the basis
of risk at least, that dedicated train concept could
not be justified. And --
COMMISSIONER McGAFFIGAN: But you're
looking at risk in a narrower sense not including
security considerations, right?
DR. GARRICK: Well, at that time we
certainly weren't looking at security like we're
looking at it now, that's correct. But at the same
time, there's a lot of people that agree with you,
but I think that the one thing that we have to take
into account if we're genuinely interested in risk is
that there is a tremendous amount of hazardous
materials shipped on trains and if on the -- and if
we can justify dedicated trains for spent nuclear
fuel or high-level radioactive waste, and considering
the safety assessments that clearly can be done and
done competently, then we may end up with a whole
bunch of dedicated trains for other set of -- other
hazardous materials.
COMMISSIONER McGAFFIGAN: I understand that

argument. I mean, the basic argument is if we can ship phosgene and chlorine around on trains where you can kill lots of people -- if you can ship those on normal trains, why can't you ship spent fuel which can't kill anywhere near the number of people, isn't anywhere near as dangerous. But I think that there's a different -- unfortunately, there's a different standard for us and we can protect this stuff better. Phosgene and chlorine and whatever are very, very, very difficult to protect. They never designed the canisters from a security perspective. So, you know, you would be asking the impossible there.

We run into the same issue we have been trying to get compensatory measures for highway route control quantities of radioactive material for months and we are running into resistance from our sister agencies on the grounds that why are you being so protective of a million curies of cobalt. You know, heck, phosgene shipments are a lot worse.

I think the Chairman tried that argument in a slightly different form with the

Environment and Public Works Committee this spring and it 78 didn't go over real well, the notion that the real issue -- that, you know, we are much better than the chemicals so leave us alone.

DR. HORNBERGER: I just want to correct one thing and that is I don't think that the ACNW is on record, and I don't think that we are, as you have suggested, opposed to dedicated trains.

COMMISSIONER McGAFFIGAN: Trust at the workshop, you gave the guy a real hard time.

DR. HORNBERGER: We did give him a hard time, but again it's in the context of understanding the risks.

COMMISSIONER McGAFFIGAN: It's like me giving you a hard time.

DR. GARRICK: It's in the context of what's the evidence, you know. It seems to me that you have to fall back on that. There are other -- there are extenuating reasons and you have articulated them very well. The legacy of this being something very different is there and we have to deal with it.

COMMISSIONER McGAFFIGAN: Well, I don't

want to belabor it, but, you know, the West Valley waste going to Idaho is going to go in a dedicated train. DOE uses dedicated trains a lot, but I'll leave it at that. 79

MR. LEVENSON: Let me just make two comments. One is, I think the reason we pushed on him is that he started out with leaving a perception with some of us that there was safety issue and dedicated trains made it a lot safer and the question was what is the evidence for that? The other thing that we should note is even though it's not a requirement to use dedicated trains, some of the utilities that have shipped fuel have done so and so it's made -- they may end up doing it whether it's a requirement or not, but from a standpoint of the risks and so forth, we just couldn't find evidence for it.

CHAIRMAN MESERVE: Mr. Merrifield?

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman.

Many of the issues have already been addressed. I have principally some comments I would

like to make and I have one closing question that I want to ask. The first comment I want to make is I want to thank ACNW for what I thought was a very thoughtful, measured, and useful presentation today.

I also want to note the degree to which there is an appreciation and a sensitivity to the issue of public communications. It was reflective of the comment that was made by the chairman and I wanted to recognize that.

The second comment I wanted to make was and a couple of these are related to comments either made by other commissioners. Commissioner Diaz made a note of a need to be reflective in looking at these issues and I don't disagree and I agree with the commissioner in that regard. I think it's useful for ACNW to take a look at these things independently.

I would only footnote that as you weren't being reflective before you go charging off into an area that you continue to appropriately coordinate with the commission to make sure that you are working on things that the commission would find useful in terms of making our policy decisions.

The third comment I would make is regarding 81 full-scale tests and my comments are reflective of those made by the chairman and Commissioner McGaffigan. I would say up front I have a high confident level and a great degree of confidence as the ACNW has on the use of smaller scale tests and the use of computer modeling. The degree of sophistication that we have available to our agency and available in a scientific community to use those models and those computer databases and technologies to come up with scaled results that are incredibly accurate in their prediction of what full scale tests would be like. I feel very comfortable about that as the committee is.

I think my sense of where the commission is coming from is reflective, and I'll use an analogy, sort of reflective of an individual who is buying a car. You could meet with the best salesman and the best automotive engineer who explained to you precisely what that car is going -- how it's going to work and how it's going to perform under a variety of tests and you can do with a great degree of

precision, but convincing the person to actually buy the car is going to require them to actually sit in the car and drive it.

I think that is reflective of -- and we have been focusing a lot on the state of Nevada. But when we get into the issue of transportation of casks, we must also be mindful of our stakeholders in states like Illinois, Missouri, Oklahoma and elsewhere. And I think it is while we in the confines of this room or in the confines of the community which we involve ourselves can have that comfort level about the models and the comfort level about the technologies and our predictive capabilities using smaller scale, when you ask the average person on the street who lives in Missouri or Illinois or Oklahoma, it's going to be a more realistic full-scale test.

It's going to give them the information and increase their confidence about that we are doing the right thing and I think that is in part reflective of certainly where I'm coming from in my sense of the comments of the other commissioners.

My fourth comment is regarding the issue of 83 dedicated trains and I say this principally for the -- just so that the record is clear. When I first started working up on Capitol Hill, among the issues that I was intended to be -- to advise a U.S. Senator on was the issue of transportation. And at the time when I was years younger than I am now, I certainly thought I was doing that well and providing lots of information. Time brings with it knowledge and I reflect now on the fact that I did not know as much as I probably thought I knew at the time.

The only comment I would make on this and so you get a balance on the commission, I certainly do not have an opinion right now on whether dedicated trains versus nondedicated trains is the right thing to do. I have an open mind on it and certainly appreciate your comments and certainly want to hear from the other stakeholders and staff about their recommendations. But I just didn't want to leave -- and every commissioner is free to have their own position on this, but I didn't want to leave you with the impression that that was -- that view of

dedicated trains was one that was unanimously supported by the commission.

My question relates to slide 42. On the first bullet you talk about supporting the commission with an independent review of DOE license applications. And my question is a simple one and I direct this to the Chairman, but other members can certainly answer it as well: Do you believe that you have access to the necessary information and the necessary resources to provide an independent and unbiased review of high-level waste issues to the commission? I can repeat that if you want.

You have access to the necessary information and resources to provide an independent and unbiased review of high-level waste issues to the commission?

DR. HORNBERGER: I think the simple answer would be yes. You have taken it a bit out of the context of the license application, which has their other potential issues surrounding that, but --

COMMISSIONER MERRIFIELD: I have. I have.

DR. HORNBERGER: But I do think that, yes,

I think we do have the resources and the access to the information that we need to do our job properly. 85

COMMISSIONER MERRIFIELD: Let's, let's -- and you make a good comment. Let's focus it on the license application. Would your answer be any different?

DR. HORNBERGER: No, I don't think so, but we do recognize that -- and in fact we are moving forward. We have to plan what our role may be in supporting you in terms of the license application and we are going through discussions now to try to come forward to bring to you a proposal on exactly how we would do that and we anticipate and we hope that we will do that certainly this winter some time.

COMMISSIONER MERRIFIELD: And that's not to say this won't evolve.

DR. HORNBERGER: That's right.

COMMISSIONER MERRIFIELD: What I'm saying is right now, are we giving you the resources and are you getting the information necessary to advise us?

DR. HORNBERGER: Yes. And you know that we have complained a little bit in the past of not

having access to predecisional information on a timely basis or only in terms of where we can do it as individuals and not as a full committee. I still have some concerns about how we can move forward on that because I think to give the best advice, we do have to have discussions of a full committee.

On the other hand, as I indicated in my Yucca Mountain Review Plan Report, we did interact I think pretty effectively as an individual basis dealing with predecisional information and then that certainly fit into the review when we -- when the document was publicly available. So I still have some of those concerns, but still the answer to your question is yes.

COMMISSIONER MERRIFIELD: Yes. Great. Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Good.

MR. LEVENSON: If I would, I'd like to make one comment on one of your comments. We did not raise the issue of dedicated trains in our presentation. Our draft letter, which I suppose I shouldn't discuss in public because we haven't voted

on it yet, but since I'm not discussing what's in it, 87
I'm discussing what's not in it, I think it's okay,
does not make any recommendations in connection with
dedicated trains. It was just that we gave someone
-- we pressed someone who was recommending them to
what was the basis of his recommendations and it was
-- it is not in the letter and we are not
recommending dedicated trains.

DR. HORNBERGER: So we have an open mind as
well.

COMMISSIONER McGAFFIGAN: I have the only
closed mind.

CHAIRMAN MESERVE: I'm glad you
acknowledged that.

Well, we have come to the end of a very
helpful meeting. Again, I would like to thank you
very much for our efforts. We know that the task
that we present to you and the intrusion on your
lives and unfortunately as we move forward on
consideration on Yucca Mountain matters, it is likely
that the load will get heavier. And on behalf of the
commission, I really do want to express our very deep

appreciation for all of your efforts. 88

With that, we are adjourned.

(The proceedings concluded at 11:18 a.m.)