

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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MEETING WITH THE ADVISORY COMMITTEE
ON NUCLEAR WASTE

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PUBLIC MEETING

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Nuclear Regulatory Commission
One White Flint North
Rockville, Maryland

Thursday

October 23, 2003

The Commission met in open session, pursuant to notice,
Chairman Nils J. Diaz, presiding.

COMMISSIONERS PRESENT:

NILS J. DIAZ, Chairman of the Commission

EDWARD McGAFFIGAN, JR., Member of the Commission

JEFFREY MERRIFIELD, Member of the Commission

(This transcript is produced from electronic caption media and audio
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STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE

Secretary

General Counsel

DR. B. JOHN GARRICK, ACNW Chairman

DR. RUTH F. WEINER, ACNW Member

DR. GEORGE M. HORNBERGER, ACNW Member

DR. MICHAEL T. RYAN, ACNW Vice Chairman

PROCEEDINGS

CHAIRMAN DIAZ: Good morning. The Commission is meeting this morning to hear from you, the Advisory Committee on Nuclear Waste, on the status of the Committee's activities as being conducted over the past year. Although the Committee advises the Commission on a wide variety of waste and materials issues, I believe the focus of today's meeting is, surprise, surprise, the high-level waste program.

The Commission was last briefed by the Committee in December of 2002. The NRC staff has begun, in earnest, its preparation for the potential submission of a construction authorization request from the Department of Energy for a geologic repository at Yucca Mountain, Nevada.

The Committee has been following the staff's preparation and the Commission is very interested in hearing the Committee's views on the status and effectiveness of these preparations as well as any views the Committee may have on areas where additional efforts are necessary.

Before turning to my colleagues, I would like to recognize two changes to the Committee membership. First, on behalf of my fellow Commissioners, I would like to welcome Dr. Ruth Weiner, the newest member of the Advisory Committee.

DR. WEINER: Thank you very much.

CHAIRMAN DIAZ: We are pleased to have you.

In addition, I would like to recognize the departure of a friend of many years, Milt Levinson. I have appreciated Milt's contributions to not only ACNW but his statesmanship for many years. And I wish him good fortune and good health in his future endeavors.

And before we start, do my fellow Commissioners have any additional remarks?

COMMISSIONER MERRIFIELD: No, thank you, Mr. Chairman.

CHAIRMAN DIAZ: If not, Dr. Garrick?

DR. GARRICK: Thank you. Good morning.

The Committee is very pleased to have this opportunity to brief the Commission in a variety of topics that we have considered over the past few months. The source material for this briefing is principally the letter reports that we have provided you. But we will, of course, embellish that information with additional information and response to questions.

A good place to start is with our action plan. As you know, the Committee has, for some time now, developed an action plan, the purpose of which was to outline what was considered to be the primary issues and the primary direction of the Committee.

And the action plan contained a scope of activities to the Committee, our mission, our vision, our goals, and our activities. Especially important in the action plan was an attempt on our part to lay out, for the coming one to two years, the priorities of the Committee, realizing full well that those are always subject to change, depending on circumstances.

So my first exhibit is on those priorities. And we divide the priorities into two categories. A first tier and a second tier.

The first tier is clearly the emphasis of our effort for the most part. We use it as a metric to help us to put together agendas that are focused and aimed at the issues that we have -- that have been identified by the Commission and others as the most important. As you can see, the current list of first tier priorities include risk-informing the high-level waste licensing program, resolution of key technical issues, performance confirmation, transportation of radioactive waste.

Now, we believe that when we looked at the Committee's activities globally and where we have had the greatest impact, that such activities as Part 63, the Yucca Mountain review plan, the total system performance assessment work and the risk insights initiative are examples of where we think that we have made some impact.

Our second tier of priorities involve decommissioning,

research, low-level radioactive waste and a proposed private fuel storage facility.

And these activities move back and forth sometimes between first and second tier. We have had decommissioning on a first tier level in the past.

One of the tools that we have found to be extremely effective to the Committee in pursuing and focusing and ferreting out the issues and increasing our knowledge of those issues has been the process of the use of working group sessions as discussed -- as noted on my slide four.

The working groups are meetings that we put together that have primarily the objective of giving the Committee in-depth information and focus on technical issues that have been previously identified, to understand the NRC expectations with regard to those issues, and to review work in progress.

And just as to illustrate examples of working group sessions, in the last year we have had three. We had one near the end of 2002 on transportation. We reported to you at our last Commission briefing on that working group session.

This year in March we had a working group session on total system performance assessment. Very well attended. Very interesting discussions. And you will hear more about that from George

Hornberger later this morning.

Another working group session that we held this year, more recently in July, was on performance confirmation. And Mike Ryan, a member, will discuss that some later.

The working group sessions that we have in the planning are covered in the next exhibit. They include a working group session on the biosphere that's now scheduled. The prospectus has been prepared. And moving forward, that's scheduled for February 4th. We are planning one that is in the process of having its prospectus developed now on igneous activity some time this spring.

And then we are also talking about having one in the fall on radionuclide transport in the geosphere.

The one payoff from the working group sessions that has been very satisfying to the Committee is the contribution it has made as a mechanism for public outreach. We have found these sessions maybe to be the most effective forum that we participate in for involving the public.

And here we are not just talking about the non-technical public. We are also talking about the technical stakeholders that are not involved with the nuclear program but have expertise who can make a contribution. And so our strategy is to involve them in the presentations and in the panels that we have put together and so forth.

So the public outreach, something we have always been very interested in, now has been stimulated, if you wish, by the working group sessions. We have always had planned meetings for the purpose of public outreach. Such as we approximately once a year go to Nevada and have a meeting. And we have tried various formats for public outreach with stakeholders when we have been in Nevada.

Also with respect to public outreach, we have tried to be reasonably active in interacting with the other organizations that have similar kinds of interests with respect to reaching out to the public. And they include the national academies, the Nuclear Waste Technical Review Board, and, of course, international organizations.

Let me now turn to what we see coming up for the Committee on slide seven. As we see it, as far as our pre-licensing activities are concerned with respect to Yucca Mountain, we will continue to provide independent oversight. And as a result of that, identify potential technical and safety concerns.

We will rely heavily on the risk-informed process to provide that focus. And we will also rely heavily on having access to experts within the NRC.

As to what the Committee will do during the licensing phase that has been under discussion, as you know, recently. We submitted a letter to the Commission on the role of the Committee

during the licensing of Yucca Mountain. Actually, these slides were put together before we received a response to that letter. But, in general, what we will do is we will focus on risk-significant issues as referred to us by the Commission.

Now, this pretty much ends my introduction. And I would like to now move into the subject, the first subject on our agenda. And that's going to be the subject of key technical issue status and pathway to closure. I will cover that topic. And then the other topics will be covered by the other members of the Committee.

With respect to the key technical issues and the resolution of the key technical issues, my first slide on that subject highlights a little bit some of the ACNW recommendations. The ACNW has a legacy, pretty much, of pushing for evidence-based models. That is to say, models that rely less and less on assumptions and more and more on evidence. And, in particular, models that allow us to see what is the evidence supporting the analysis.

We have recommended, on several occasions, the identification and ranking of key contributors to risk as a part of the risk menu. We also talk and encourage an emphasis on quantification of the uncertainties involved.

And in the context of risk communication, we like to, wherever possible, have the analyses represented with simplified

models such that they do the right job of communicating physically what's going on.

Now, as to the status of the KTIs, we can offer a few comments. But we have not been briefed on the KTI situation.

We have heard in the last hours, as a matter of fact, a little bit about what's going on. And we will share some of that with you.

But we do know the following with respect to the KTI status. And that's on my slide number eleven.

As you know, because you were briefed on this subject at some length earlier this year, the staff has identified information gaps on the nine KTIs. And I think you have a sheet of paper that summarizes what those KTIs are at that level.

The NRC and the Department of Energy have reached agreements on 293 additional information needs. And the position being that providing this information should result in a reasonably complete license application.

Now, of course, adopting a point of view of risk-informing the agreements, some KTI agreements are much more important than others. And we believe that the risk insights and particularly the somewhat newly developed risk insights initiative by the NRC staff can help a great deal in resolving the agreements.

And I have some examples. But let me just say that the staff, the NRC staff has attempted a ranking process for the 293 agreements. And based on data that the NMSS people have provided to the ACNW staff, we have summarized some of those numbers.

Forty-one of the 293 have been classified in a high-risk category, 92 in a medium-risk category and 160 in a low-risk category.

There's a spreadsheet somewhat on that material on the next slide. And, of course, there are some things that kind of jump out at you in this table. One is the number of agreements for which they have not yet received responses. And the other -- and that's the 134 number.

And the other are the 29 agreements that have not been received but are classified in the high-risk category.

Now, the areas of highest risk, we don't know the technical basis for this yet. We will be getting a briefing on this soon. But we do know that on the basis of previous reviews and previous briefings, the general areas of the high-risk grouping, and they have to do with the corrosion issues associated the drip shield and the waste package, and mechanical degradation of the drip shield and waste package.

So it's certainly an area where a considerable number of these high-risk agreements are addressed.

Another category of high-risk agreements is in the radionuclide transport saturated zone. And finally, issues related to igneous events.

Now, as to the path forward, on my next slide entitled "Pathway to Closure," as best we can understand, DOE does plan to address all the KTI agreements by the time the license application is submitted. There is a strategy that seems to be unfolding with respect to accelerating the review process and the response process, having to do with the grouping of KTI agreements.

As a matter of fact, while we have not had an opportunity to review any of the responses that have come as bundles or groupings, we have heard that some 45 agreements have been bundled into three or four categories and have been submitted to the NRC. And we have been advised that we will be seeing those very shortly.

As to the concept of categorizing agreements and the bundling agreements, we do believe that there is a basis for such an approach. And it all depends upon just how it is done. Obviously, for a lot of the agreements, some of the same analytical methods, some of the same tools are employed. So this provides some opportunity for integration and consistency, consistent treatment of different issues. Therefore, you would expect that this might be a basis for integrating

and categorizing.

On my next slide, we understand that the staff, the nuclear regulatory staff is developing a process for evaluating the agreements based on risk. There will be a technical basis document for this process. We understand a draft might be ready in November. We expect to be briefed on it early next year.

And the Committee will continue to monitor the resolution process as it is something of great interest to us because it's a manifestation of how much success we are having in the movement towards risk-informed regulatory practice.

The Committee has had the benefit of some briefings with respect to the invoking of risk insights initiative. These are kind of preliminary. But we have some examples as a result of staff work. And all of this is work that was performed by the staff. And as to the general approach of risk insights initiative and our earlier comments on that, Ruth Weiner later on will cover that in some detail.

What I want to do right now is to just drop a few results that have been a product of applying some of these ideas and concepts.

As we know, when the spent fuel comes out of a reactor, you have about 300 species in the fuel that you didn't have when it went into the reactor, some 250 fission products and about 50

actinides. Fortunately though, the number of fission products and actinides that drive the disposal requirements are few.

In particular, as far as the short term dose is concerned, by that I mean thousand of years, two fission products are the main contributors as far as dose is concerned. They are Iodine and Technetium. They are very mobile and they essentially move with the water. And there's little or no retardation associated with them.

One actinide is a contributor, not only to some extent during the shorter term dose, but it dominates the long-term dose. And that's Neptunium 237. I'm talking about the nominal case. It's a little bit misleading to say that there are only three radionuclides that are significant. It is true that they are the most significant dose. But there are two radionuclides that are very important with respect to repository design because they determine the heat load. And that's Strontium and Cesium.

Then of course there's the actinides that are -- contribute to the dose in the igneous event. That's Americium and Plutonium.

The key factors that influence the performance, of course, are the waste package failures. We have already seen many results that indicate that as far as the compliance period is concerned, two phenomena are responsible for the dose. One is waste package failures that are assumed. And two is the igneous event. Both of those

are very much in the dynamic stage in the sense that the results can be impacted by actions that can be taken.

So just to give you a little idea of what an agreement is all about slide 18 has a couple of --

COMMISSIONER MERRIFIELD: Mr. Chairman, point of clarification. And this is consistent with philosophy that I have had for some years.

On this slide, the first bullet -- although I realize that you have got an acronym list in the back, I would recommend in the future that for the purposes of our stakeholders who might be looking at these on our web site, spelling out those radionuclides rather than referring simply to the acronyms would make a better presentation.

Minor point. It's just one that I have made repeatedly here.

DR. GARRICK: We know you are concerned about that and it's a good concern. We try in our publications and anything that might get on the web site to make sure that the words are spelled out.

COMMISSIONER MERRIFIELD: Thank you.

DR. GARRICK: In this next slide, we have a couple of agreement titles, if you wish, for two associated with radionuclide transfer in the geosphere. One is to provide data on retardation factors for radionuclides important to performance. Of course, we will talk

about that a little more in a minute.

The second one is to provide results for alluvial field and laboratory testing.

A risk insight with respect to the primary contributor to the long-term dose is on the next slide. And that has to do with Neptunium 237.

As we know, Neptunium 237 is available in the basic inventory. But it is also created as a result of decay of the actinide Americium 241. So it becomes a very important radionuclide as well.

If Neptunium 237 is an important radionuclide, but particularly for the long-term dose --

COMMISSIONER McGAFFIGAN: Could you define long-term.

DR. GARRICK: Pardon?

COMMISSIONER McGAFFIGAN: What is long-term? You said short-term was 1,000 years or something.

DR. GARRICK: Long-term in this case is the dose that drives it to the point where it has a peak value and that's hundreds of thousands of years. That's beyond the compliance period.

COMMISSIONER McGAFFIGAN: Beyond the compliance period. And we don't make regulatory decisions on that.

DR. GARRICK: I know. The only thing in the regulation

that it says is that this should be addressed in the environmental impact statement.

COMMISSIONER McGAFFIGAN: So long-term is hundreds of thousands of years?

DR. GARRICK: Correct. Right.

Now, the thing that effects the contribution from Neptunium very much so is its solubility and its retardation factor. Right now the retardation factors that are used in the performance assessment vary over a very wide range. So this suggests an opportunity for reducing some of the uncertainty by getting a better handle on things like the solubility of the actinides and retardation factors.

So the bottom line, as far as Neptunium is concerned, on the next slide, is that the alluvium retardation is expected to have a major impact effect on performance.

Now, if it turns out that there's little or no retardation, then, of course, the backup condition is minimizing the release rate from the waste packages.

One additional insight on the next slide with respect to Neptunium is that it isn't something that is just there and decays. It's growing as a result of the availability of Americium in the inventory.

The interesting thing about Americium and Plutonium is

from an inventory standpoint, from a curie standpoint, its most of the inventory. That's maybe the bad news. The good news is it's relatively immobile, at least in the base case. And the Americium and Plutonium, based on the studies that the NRC staff have done and have reviewed from the technical exchange meetings with the DOE, is that there's considerable evidence that these radionuclides will remain near the repository because of their immobility.

Now, there are uncertainties associated with that. And one source of uncertainty has to do with the form in which something like Plutonium really takes, such as -- there's a major contribution in the transport through a colloid transfer form or what have you.

COMMISSIONER McGAFFIGAN: Mr. Chairman, could I again clarify?

You are again talking well beyond the compliance period.

DR. GARRICK: Yes. Yes. But there is a contribution from Neptunium in the compliance period, depending on which scenario you look at. And again, even though the compliance period is 10,000 years, we have observed in the public meetings and in the dealing with technical community on this project, that there is genuine concern that the dose extends as long as it does and that it doesn't have its peak value until hundreds of thousands a years into the future.

So whatever the compliance period is, this is a safety issue that we cannot ignore.

COMMISSIONER MERRIFIELD: But I think the point of Commissioner McGaffigan's clarification is that our obligation under the law is to look at a defined period of time.

DR. GARRICK: Right. We always, as a Committee, kind of take as rule one that we understand as much as we can about what the science is and what the technical issues are. And Neptunium is a technical issue with respect to a repository design. But to be sure, it's not a major issue with respect to the compliance period.

And the drivers to the risks are the fission product of Technetium and Iodine. Although, again, one of those issues that is unresolved is the issue of the role of the volcanic activity. There could be contributions in there in the compliance period from Americium and Plutonium, depending on how the volcanic studies come out during the compliance period.

But I don't want to cover this -- this was just an attempt to drop in a few very specific examples where the invoking of risk-informed process was able to pinpoint a few critical issues having to do with the radionuclides and what their disposition was.

As to the process, the risk-informed process, that's going to be the subject of our next presentation and what some of the

Committee's views were with respect to briefings we received earlier in the year on the risk insights initiative. And for that, I'm going to turn it over to our newest member.

CHAIRMAN DIAZ: Could I just -- because there were issues here of time dependence and the importance of the radionuclides. And, you know, several times you made the comment that the peak period for the dose is after the time in which our ten thousand year compliance period ends.

I think it leaves us a little bit in the air, you know, what is the peak dose that people are estimating? It is not orders of magnitude.

DR. GARRICK: That's a good question, Chairman Diaz.

Well, one number that I can share with you is the number developed by the Department of Energy through their supplemental science report. And these numbers seem to be outdated in a matter of weeks. This was a number that came out several months ago. They talked about calculating a peak dose of about 35 millirem at approximately a millions years.

COMMISSIONER McGAFFIGAN: And just to put this into context for anybody who might be listening, 35 millirem at a million years or hundreds of thousands of years is about one-tenth of a typical radon dose in this country and probably, you know, one-100th of the

radon does that some people get without bothering to test their homes and figuring out that there are, in fact, getting a couple of rems from radon.

CHAIRMAN DIAZ: So I thought it was an important qualification that, yes, we would be concerned, not as a regulation but because of a public health and safety issue. But that dose is still a small dose compared to the normal doses that people receive for different types of exposures in this country. I think that's what I was driving at.

Thank you so much.

DR. GARRICK: It is a small dose.

COMMISSIONER McGAFFIGAN: Again, Mr. Chairman, just to educate the public who may be out there, it's about the difference between living in Santa Fe and living in Washington as a result of the altitude difference. It's about the difference between living in a brick house and living in steel and glass house. You know, that's what we are talking about here.

DR. GARRICK: It's overwhelmed by the medical doses we receive, most of us receive.

COMMISSIONER McGAFFIGAN: The medical doses in the United States today are probably, on average, about 200 millirem or higher for the average person. A lot of people get zero. A lot of people

have CT scans and PET scans and get rems.

CHAIRMAN DIAZ: I appreciate the Committee maintaining, you know this orders of magnitude under technical assessments so its's an important issue.

Please proceed.

COMMISSIONER MERRIFIELD: Mr. Chairman, I think there's a very important point here and I want to -- just so that there's a degree of unanimity in this regard. I think the point being made in your clarification; you saw it as that you have to look at these things in the bigger context. As we are receiving this information, for individuals who are coming in looking at this presentation via our web streaming, putting some of this important data into that bigger context I think it fleshes out the record and provides a, you know, a balanced way of showing it and an educated way of showing it to the public as a whole. So I agree with that in general context.

DR. GARRICK: These are very low doses. There's no question about it. And the compliance period doses, at least to the calculations that have been done to date, are a couple orders of magnitudes below the standard requirement. So, yes, we are talking about very low doses based on the analysis to date. If we have to keep probing and looking and seeing if there's a possibility they can be higher.

CHAIRMAN DIAZ: And we appreciate your efforts.

DR. GARRICK: I suspect we see lots of opportunities for them to be lower.

CHAIRMAN DIAZ: Okay.

DR. GARRICK: Okay, Ruth?

DR. WEINER: Thank you very much.

First, I would like to say that I am very honored to have been appointed to this Committee. I beg your indulgence. I'm new at this. I'm still trying to read all of the documentation that went before. So I don't have the history with the Commission or with the Committee that my fellow Committee members have. So, I'm just a rookie at this.

DR. GARRICK: That's no excuse.

COMMISSIONER MERRIFIELD: Is there -- is there a particular reason why your slide has a rattlesnake on it?

DR. WEINER: Oh, I thought it was a good example of risk. I live in New Mexico and when you hike in New Mexico that is a risk you take. There are rattlesnakes that come out of the underbrush. And they look at you. You look at them and walk on and hope that the risk that it strikes is very small.

DR. GARRICK: I used that picture in Oxford a couple weeks ago and I presented it as one approach to stewardship because it's a native resource.

DR. WEINER: It is certainly a native resource.

COMMISSIONER McGAFFIGAN: Is this sort of like Indiana Jones? Sow the mountain with snakes.

DR. GARRICK: Yeah.

COMMISSIONER MERRIFIELD: The most important thing about rattlesnakes is that you don't step on them. So that's instructive as well.

DR. WEINER: Yes. That increases your risk markedly.

Risk insights are the results and the findings that come from risk assessments as defined in the Commission's white paper.

And I want to make a point that risk assessment and developing risk insights is not easy. One of the reasons that my talk will be a little bit general is precisely that. We are feeling our way as to how to incorporate risks. Clearly, there's one way and that is with a quantitative risk assessment.

Some agencies have risk-based regulations. And that, again, is a fairly straightforward thing. You make a quantitative calculation and there you are. But to develop a risk insight that informs regulation is a more complex process.

And you cannot always -- you quantify the risk wherever possible but you can't always do it. Sometimes you have to include very large measures of uncertainty. And sometimes the risk is a matter

of qualitative assessment rather than quantitative assessment.

The staff's risk insight initiative, on which we have had a briefing, is based on qualitative considerations. And to that extent, the first staff effort, I would say, was successful. It increased the awareness of risk issues and of putting risk into one's considerations and developed a state of knowledge of perspectives on importance.

What risk insights allow you to do is to categorize the issues by importance, not only importance to health and safety, but also importance to the public.

The most important issues may very well require a quantitative approach. And I would like to say you always have to be as quantitative as possible in developing a risk insight.

The August 2003 report to the Commission from the ACNW touched on three particular issues and I'm going to talk about these three issues in slightly greater detail, on evidence-based risk insights, on the completeness of analysis, and on the question of risk ranking terminology.

Risk insights need to be based on and related to quantitative performance assessments. Essentially, risk is central to the whole idea of performance assessment. We do performance assessments precisely because there is a very large degree of uncertainty and we must in some way prioritize which of these

uncertainties we quantify and which of these uncertainties it isn't necessary to quantify so closely.

All performance assessments should be evidence-based to the extent possible. And just to clarify what evidence is, evidence is documented experimental results, documented field results, field research results, and documented data.

In other words, if you can back up the evidence that you have for some parameter that you put into a performance assessment, then to that extent, the performance assessment will more closely represent reality. We want to be as realistic as possible.

In the early days of performance assessment, we used bounding values for things because there wasn't any other way to do it. We have now amassed a very large database of evidence. And we need to use that.

We need to be able to identify where more data is needed, and just as importantly, where more data isn't needed.

Risk-informed performance assessments -- if I could have the next slide, please -- provides a metric for terminating analyses, especially for low risk issues. The question always comes up, when are you done? And I recognize that many people like myself, having been in the science area for a very long time, we always wanted to do more, and you always want to investigate more.

But when you are focusing on a regulatory decision, you really want to know when you have done enough. And this can be very well informed by a risk insight.

Any analysis should be wound down or terminated, if you will, when the analysts feel that sufficient evidence has been presented. But it should also be flexible enough to incorporate new evidence. That is, you can open it up again. We do not intend that risk insights be used to forever seal up some area of analysis.

Finally, the question of risk terminology comes up. We are, all of us, fairly new in the area of presenting risk to the public and of incorporating risk insights into regulation. The former administrator of the Environment Protection Agency, William Ruckleshouse, gave a seminal speech in 1982 where he introduced the notion of risk into regulation. So it's a new field.

And at this point, the terminology is inconsistent and potentially confusing. For example, there is a tendency to say that technical -- a technical statement is not risk-based and that risk has nothing to do with technical accuracy, that kind of thing. What is risk-informed as distinct from risk-based?

We have all got to use the same language; otherwise, the public will be totally confused, not to speak of me being totally confused. And our suggestion is that the NRC white paper on

risk-informed performance-based regulation should be used and serve as a common dictionary for all of the Federal agencies involved and for any communication with the public.

In sum, the risk insights need to be linked directly to the performance assessment. And we had a briefing yesterday on the status of the performance assessment modeling at the Center for Nuclear Waste Regulatory Analysis. And they are, in fact, using risk insights to come to closure on certain aspects of the performance assessment.

We also understand that the staff is making good progress on applying risk insights. And we look forward to hearing from them on the status of that progress. We expect that that progress will be timely and will inform the license application review very, very well.

DR. GARRICK: Thank you.

George?

DR. HORNBERGER: I believe I'm next.

DR. GARRICK: Yes.

DR. HORNBERGER: Good morning.

To pause on my title slide here, there's no rattlesnake on my slide here but you will notice beautiful Yucca Mountain in the distance. And I believe this photo taken by Neil Coleman on the staff. So you can see the multiple talents that our people have, photography

as well as everything else.

I'm going to talk a little bit about the working group we held, I believe it was last March, on total system performance assessment. It's on my first slide. We convened at the end of March in 2003. And as is typical for our working groups, we convened a group of experts.

One was from Geosciences Management Institute that was a representative for the State of Nevada from that organization, Case Western Reserve, Iowa State, University of Michigan, and MIT. In addition, we had presentations from staff from the Department of Energy and the Nuclear Regulatory Commission, and also from a group of stakeholders, including someone representing Nye County and Clark County and the Paiute Tribe, as well as EPRI.

COMMISSIONER McGAFFIGAN: Just a clarification. Two of these people are also on the Nuclear Waste Technical Review Board?

DR. HORNBERGER: Yes.

COMMISSIONER McGAFFIGAN: Which two?

DR. HORNBERGER: The two were from Iowa State and MIT. Iowa State is Dan Bullen, and from MIT, Ron Latanision. They were not appearing as members of the NWTRB but as individuals of our working group. You understand that for the record.

COMMISSIONER McGAFFIGAN: Talk about the public getting confused.

DR. HORNBERGER: I think it's important for them to know.

The next slide.

The purposes of the working group. Of course, the TSPA, which is the Department of Energy's code for Total System Performance Assessment, we know, is going to be a primary underpinning of a safety case.

And we also recognize that the NRC code, Total System Performance Assessment, which we refer to as TPA, is going to be a key for reviewing a license application when it comes in. We, therefore, thought that it would be a good idea to continue our emphasis on looking at how performance assessments are playing out.

We, as has been mentioned several times already in our presentation, we have advocated realism to as great an extent as possible. And we wanted to investigate that aspect of the PA and also to basically use it as an updating time to look at staff readiness for a review.

Can I have the next slide, please?

We did decide however, rather than to look at total system performance assessment in the large, to focus it on the source

term. This is obviously a major component in the assessment. And it's essentially the critical boundary condition for the whole computation.

And by source term we mean -- we refer to processes and rates of radionuclide release from engineered barriers.

And again, as we know, we know that the performance results are sensitive to assumptions made there. So I have several observations.

The next slide, please.

Again, as you have heard already several times, we have advocated the use of an evidence-based approach to as great an extent as possible. These are analyses we think that provide the strongest support for any decision.

And we also note that where there is a lack of strong evidence basis, where there are assumptions that are being made there, potentially this provides areas where further work might be very profitable.

We also recognize, of course, however that some of these processes may be so complex that bounding assumptions will have to be made to present a case that would be conservative.

The working group identified several assumptions made in the source term that do not have a terribly strong evidence base.

And I list several of these there.

And that is the formation of secondary mineral phases within the waste package, waste mobilization mechanisms and the waste package manufacturing flaws. We didn't see strong evidence for the assumptions made in total systems performance assessment.

Next slide, please. My final slide.

Again, the ACNW has consistently advocated an approach to identify key contributors to performance. And the NRC staff, in particular, has certainly made lots of progress along this line using a whole variety of different types of sensitivity analysis.

And we recommend that that should continue. We also recognize that both NRC and DOE have made progress toward using more realistic performance assessments.

And in my last bullet I will note that in the letter we wrote to you, I think we used the word "outstanding" when we referred to the staff capabilities that were obvious at our working group. I think the word was carefully chosen. It wasn't used loosely.

We have been quite impressed in interacting with the staff over the years. We hear from people like Tim McCartin and David Esh. And yesterday, one of your younger staff members, Chris Grossman. We are really impressed with how the staff has really developed their capability to investigate a whole range of things that we think are important.

And with that, I think that's the center of the ACNW basketball team that goes last.

DR. RYAN: Point guard.

Good morning, gentlemen.

I want to talk to you this morning about the performance confirmation working group which we convened in July, late July of this year, similar to the working group, the performance assessment that Dr. Hornberger just talked about. We convened a panel of six experts, had presentations from stakeholders from Department of Energy and from Commission staff.

The working group really addressed performance confirmation, a program that's required as an element to the license application which doesn't kick into full gear until after a decision to authorize construction but is tied to data collected in the site assessment as the baseline data and is tied to design and exactly what and how they are going to do performance confirmations.

So that was the genesis for why we wanted to take a look at the subject.

The focus of the working group was to review plans for a program of tests, experiments and analyses designed to evaluate information to show compliance with Part 63 performance objectives, including the lead time to incorporate these plans and programs into

the design.

Our purpose was, again, to better understand the performance confirmation issues that could affect licensing, assess the appropriateness of the scope and content of the performance confirmation planning and understand expectations for DOE's performance confirmation program.

Next slide, please.

We had several observations that were developed from the working group session. First, the NRC and DOE have not finalized agreements on performance confirmation.

The NRC expectations for DOE performance confirmation program are currently being developed. And there are opportunities over the next year to enhance that communication and come to a better expectation and agreement on performance confirmation.

The Department had an early version of a performance confirmation program plan. They withdrew it. And now, over the next few months, there are two revisions to that plan expected. The first is a portfolio of experiments and tests. And that report or the portfolio of what they expect to do is due out very soon.

And a second report will be due out later this year. So our advice was to be active and involved in those two revisions of the performance confirmation plan, both from the DOE side and the staff

side.

A risk-informed -- next slide, please.

A risk-informed program focusing on parameters and processes important to safety will allow DOE to optimize resources in the performance confirmation program.

The next slide is our recommendations. The NRC staff should provide further guidance to the Department on using PA results, performance assessment results, to design a risk-informed performance confirmation program and also to think about how performance confirmation results will be used to make decisions.

It's a forward reaching view but we thought an important one that, if you are going to collect a lot of data and performance confirmation, it would be interesting and important to think about how that data will be used in future decision-making.

And finally, the Committee recommended that the NRC should provide further guidance on how performance assessment can or should be updated using performance confirmation data and how any differences in NRC and DOE approaches to performance confirmation can be resolved prior to the license application.

The Committee believes that performance confirmation planning for Yucca Mountain is relatively immature. However, the review of the two revisions of the performance confirmation plans

scheduled during the next two years should provide good opportunities for meaningful guidance and dialogue.

Thank you.

DR. GARRICK: Thank you.

We are open to questions now.

CHAIRMAN DIAZ: I certainly appreciate a very good briefing. And I believe it is the turn of Commissioner Merrifield to start us on the right path today.

COMMISSIONER MERRIFIELD: Thank you very much, Mr. Chairman.

First, I want to thank George Hornberger for his comments about the quality of our staff. Frequently we as a Commission and others outside of the Commission raise concerns about, you know, do we know enough about various things. And so, it's gratifying that independently having received the briefings from our folks, that you have a lot of confidence in their abilities. That's a good thing. Hopefully we can maintain that.

The first question I have, I guess, goes to Dr. Garrick.

On page eleven of your slides -- which is in your second set -- the last bullet, providing requested information should complete a license application.

As a point of clarification, is it my understanding that DOE

must address the issue in license application but that some of the issues may need to be a part of the performance confirmation program?

DR. GARRICK: Well, I think that all we are trying to say here is --

COMMISSIONER MERRIFIELD: Is your microphone on?

DR. GARRICK: I think all we are trying to say here is that based on the positions that we have read with respect to the staff that one of the reasons for the whole issue resolution process and the implementation of the KTI exercise was to arrive at a basis where they had high confidence that they were -- that the applicant was in a position to submit a license application.

So we are not so much professing here to be experts on what constitutes an adequate license application as merely indicating that, as we understand it, that the issue resolution process was designed primarily as a mechanism to reach the necessary level of confidence that DOE would be in a position to submit a license application.

DR. HORNBERGER: May I add something?

DR. GARRICK: Yes.

DR. HORNBERGER: It's my understanding that DOE will address all of the outstanding issues. That the information referred to

may, in fact, include information about plans for acquiring additional data in the future. So I think that information covers a broad territory there.

COMMISSIONER MERRIFIELD: That's a very good clarification.

I just wanted to make sure that it was clear for the record that addressing KTIs at the time of license application doesn't necessarily mean that all work is done.

DR. GARRICK: No.

COMMISSIONER MERRIFIELD: There may be additional work to be done.

DR. GARRICK: As a matter of fact, there are a lot of issues having to do with corrosion, corrosion measurements, and longer term measurements where the results are clearly not going to be available. And so, it's more a matter of increasing their confidence as to the issue of performance confirmation. We don't necessarily see this as a performance confirmation issue.

COMMISSIONER MERRIFIELD: On page 13 you note of the staff ranking of the 293 agreements. Obviously the staff has ranked those from a risk perspective. I'm wondering in the main, if there's agreement on the part of ACNW with the overall risk rankings and they generally ranked them in a way that you think is the right

direction?

DR. GARRICK: Yes. A very important question.

As we indicated, the Committee has not reviewed the technical basis for this ranking at a detailed level. We have had the benefit of an exercise, being briefed on an exercise the staff went through that was as much a communication exercise between the different groups to get them thinking in a risk informed way and to extract from the various people involved their opinions and their own evidence as to what they think are the important issues. And at least at a global level that seemed like a reasonable thing to do.

And we also tend to agree that the four or five areas that have been identified as the most important are the same areas that we have probably asked the most questions about. These have to do with things like the performance of the drip shield, the performance of the waste package, and the degradation of the tunnels.

And so we are certainly in tune with what has been generally identified as the issues of greatest importance. But we have not yet had the opportunity to evaluate in detail the technical basis for the ranking.

COMMISSIONER MERRIFIELD: Just so that it's clear, nothing that you have looked at so far would lead you to believe that the staff is on the wrong track?

DR. GARRICK: No.

COMMISSIONER MERRIFIELD: Dr. Weiner, I want to go to page 26 of your slides. You talked about the notion of analysis being based on sufficient evidence. There's also the issue of when you rank a variety of things and then you look in the subcategories of what some of the rankings are, obviously you dig deeper you can get into some of these debates.

But one of the issues that you really raise -- and I want to pull the string on this a little bit more -- is how you declare when you are done. And this is an issue that, you know, I think I have looked at and I think every member of this Commissioners has looked at one point or another. How do you do that?

Because you are quite correct that sometimes there's a tendency to want to find that next decimal point. But as a policymaker you have got to say, okay, do I have a sufficient amount of information in which to make a policy decision?

One of the things that you said -- and I wrote this down -- one way to determine this is when analysts feel that sufficient information has been presented. I was wondering if you wanted to expand on that a little bit. Because I think that still goes to the issue of difficulty of drawing that line.

DR. WEINER: Well, thank you very much for raising the

question because it brings up a point that I had meant to make and didn't. One metric to use is that when the risks to health and safety of the overall project are not increased, not changed basically by additional analysis, additional risk considerations, then you are pretty much done. Or at least you can hold any further analysis in abeyance pending some discovery of brand new evidence that you might have.

But that's really the metric that you use. If the contribution of the particular parameter to the overall risk, you can do more research on that parameter, develop it further, but the contribution of those further developments doesn't change the overall risk any.

And that is what we would recommend that the staff use in the TPA to terminate any particular direction of analysis.

COMMISSIONER MERRIFIELD: That's a good suggestion.

Next question would be for Dr. Ryan.

You spoke in some level of detail about the performance confirmation program. And my take at what you said was that you did have a belief that neither our staff nor DOE is quite doing enough in this area, we need to do more.

I guess I may have some issues with that concern. It seems to me DOE is going to have to make a safety case for licensing.

The performance confirmation serves to support that analysis and the claims made in the licensing process.

But from my perspective, the confirmation program is developed from the license application and not before the license application.

The current Yucca Mountain review plan has appropriate instructions for the staff to consider the data needed for the confirmation program. So it's not clear to me why you feel that it all needs to get done right now.

If we are risk-informing our efforts it would appear that the current focus really should be on the license application.

DR. RYAN: Yes. I think that's true. And if I read the regulations correctly, there's an element where a performance confirmation plan is a required element of that license. That plan will be founded in the data collected for the application. And, of course, it has a life well after the decision to construct and a formal program to do measurements, tests and so forth to collect additional information that's in the confirmatory role.

So while I agree with you, the emphasis is certainly after a decision for construction authorization. It's not completely divorced from activities that have come before.

And I don't think it is something we are recommending as

a key focus. But there are a couple opportunities over the next year to add some clarification to that element of what will be obviously a much bigger activity.

So with the DOE's portfolio analysis report of what they think is important in that arena, as well as the revision to their overall plan in the next year, it's a chance for dialogue.

One of the comments that Dr. Weiner made, for example, on the dictionary of risk terminology, that was one of things that we learned in that performance confirmation working group session, was that there was some different interpretation of terminology. So that recommendation kind of fell to the risk insights part of our presentation but really was developed in that report.

So I completely agree with you that it's not an emphasis prior to LA but it certainly is not completely separated from the process before LA.

COMMISSIONER MERRIFIELD: I wouldn't quibble with that interpretation. The only thing I want to, again, leave for the purposes of the record is the notion that we don't necessarily have to shove all of that up front; that there is an appropriate timing for that information. You need to be mindful of it.

The fact that you have separated this out as a separate presentation might leave an observer with an impression that you are

placing an emphasis that that be done much more up front. And I'm taking from your comment that that's not the case.

DR. RYAN: I agree with you. And I think that the committee as a whole agrees with that characterization of how you have laid it out. Thank you.

COMMISSIONER MERRIFIELD: Very briefly, and these are as much comments as they are questions. Obviously, the presentation today was focused principally on issues associated with Yucca Mountain, which is, of course, the most significant issue that we want to have ACNW looking at at this point. In some of the first slides it talked about some of the other things that the committee is working on, two of which I think are noteworthy.

There is legislation, and it's not listed here in your second tier, but there is legislation before the House and Senate right now which would call for a change in the status of the West Valley site in New York with a much greater degree of effort being undertaken by the Department of Energy.

In the absence of that language reaching final passage, it's unclear what role would be envisioned for where this agency is going to go if that were to be adopted. But I would want to just to put on your radar screen that that's something I think ACNW should be mindful of. Because if, in fact there is bigger NRC role or a different

host of issues that we may be grappling with if a change in the status of that site is adopted by Congress and by the President, it's just something that we are all going to have to keep an eye on.

DR. GARRICK: Yes. That's a very good comment. The Committee has already expressed an interest in getting a briefing on the performance assessment that's being done site wide for West Valley.

COMMISSIONER MERRIFIELD: Well, this is a case where, obviously, you have got to wait for whatever decision Congress and the President make. And then obviously a careful coordination between Commission staff and ACNW to make sure that we are looking at the right things before we go running off again.

The final comment I would make is that overall in the area of decommissioning. As you know, our Office of Research sponsored a conference this week. One of the topics that were raised was, in fact, decommissioning, where we as an agency are going down the road.

What is clear -- and I have made some comments on this publicly -- we are in the most active decommissioning effort that this agency has ever undertaken relating to the activities of our licensees.

We are at a point now where there may be some utility in stepping back and looking at where we are in that decommissioning process to see whether there are lessons learned which would make us

a more effective and efficient regulator of that decommissioning process and our ability to enhance redevelopment to provide opportunities for properties to be moved forward and put into a condition where the communities can embrace them in the future.

And I would again want to put on the radar screen I think that's something that the ACNW -- when you have some free time, which given the presentation, isn't very much, but it may be something, in a very limited way, ACNW may be able to provide some suggestions to the Commission in terms of capturing what's going on right now so that some day in the future when we have another round of decommissioning activity that we will be able to fully utilize those lessons and do so in a way that is more efficient.

DR. GARRICK: Thank you. That's a good comment.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman.

CHAIRMAN DIAZ: Thank you, Commissioner Merrifield.

Let me start with a question. Because I think fundamentally, you are all so nice that sometimes you don't tell us everything that we should know. But many of these issues are what I call very time dependent. But the time dependence is now appearing to getting shorter and the number of activities seems to be really increasing.

Does the Committee have all information they need when they need it? Do you have the resources? Not that we are going to give you any more money -- we just want you to work harder with what you have -- to really put all the things into perspective and do what you need? Is that something that you have when you sit down and analyze, because, you know, we are concerned that the workload is going to be increasing significantly.

I want to make sure that you have the time to look at it and tell the Commission whether your resources and preparations, and the timing that you are getting things and all of those good things that we would like for you to have are there.

DR. GARRICK: Well, I would like to double the Committee.

CHAIRMAN DIAZ: All right. It's noted. Next year we will talk about it.

COMMISSIONER McGAFFIGAN: Briefly.

DR. GARRICK: No. I think the Committee is reasonably satisfied with the resource situation. I think that we are quite self-critical at times at making sure that we are doing our part in creating the kind of agendas that are as effective as they possibly can be.

And I think that, frankly, we can improve on that. And we

are working on that.

As an example of trying to improve on the risk-informing of the agenda, if you wish, a couple of us are going to come back in here in a couple of months and just do a survey with Division Directors and some Commissioners and other people that are in leadership positions at the agency and try to develop as good an understanding as we can of the role of the Committee and the sources of information and what have you.

So I think right now we are not in a position of where we feel that there's a shortage of resources or that we are not getting adequate support. I think that what we have to keep working on is making sure that it is a Committee activity and that the Committee -- that we are all very active in contributing to deciding what we should do.

We are here, supposedly, to provide some vision and some advice, not only on the day-to-day problems but the future problems. And we need to, in our self-assessment, keep pushing for ways in which we can have the best possible agendas.

I don't see any real missing resource base at this time. I think it's more a matter of how we carry it out.

CHAIRMAN DIAZ: Is the information flow to you from the sources that you need timely?

DR. GARRICK: Right. Yes. When we know what we

want and we are uninhibited in our inquiry, we usually can get it in a very timely manner.

CHAIRMAN DIAZ: I see, all right.

Let me go to your slide ten. And I heard a lot of discussion this morning on a subject that is very dear to my heart. I have called it, at times, the third significant figure. Other times, I call it some other things.

This week I talked to our Nuclear Safety Conference, and I call it realistic conservatism. It kind of embodies, in a few pages, some of the things that I observed. And I used to be a researcher, of course. I'm all rusted right now.

But your slide ten, in different parts, there are several things that, to me, they are obvious, but I think they need a little bit of discussion.

Like you know you start talking about evidence-based model. And I understand that. Although, I think that we are now getting to the point in where evidence-based models might not always have all of the parameters defined by experiments or evidence. But they have to be internally consistent.

You can have some of them that, you know, utilize models that actually are extrapolations. But they have to be some evidence where they need to be done.

Other things that were said was that, you know, you have got to be careful with your approximations, something that I'm always very concerned with. And then at the end you said, this is a simplified model.

It seems to me like, that's a simple statement. But it's really not a simple statement. You use it in the sense of how do we create either public confidence or inform the public, meaning that when you use a simplified model it is not that it started as a simplified model but it actually ends being a simplified model because you are now confident that you have enough knowledge embedded in the model that it can be said in simplified terms for the purpose of discussion or uses.

But it is really the result of a more sophisticated, complex, you know, series of evidence-based results and models. And it ends up being a simplified model so that you can work. Is that --

DR. GARRICK: Yes. Yes. That's the proper interpretation.

CHAIRMAN DIAZ: I just want to make sure that that was clear.

DR. GARRICK: The idea here is not that the models be simpleminded but that the models be understandable.

And sometimes the way you take a very complex model

and the performance assessments are certainly in that category and make it understandable is to abstract that model into a more physics-based format that you can clearly see what's going on.

To be sure you lose something. You know, it's like, we have said many times the risk assessment is not the plant. And an abbreviated risk assessment is not the risk assessment.

So the whole idea here is a risk communication issue, that it would enhance our understanding of the performance assessment if somebody would take this performance assessment now. And rather than having 100 data points or an activity network of 65 blocks, reduce it down to four or five in physical terms that communicate and that we can see basically and fundamentally where the results are coming from. So that's the context.

And you have interpreted it correctly.

CHAIRMAN DIAZ: So it embodies a significant number of issues but is presented in a manner that is more usable and it's easier to use and to communicate.

Now, the key question after that is, are you satisfied that the staff is doing this?

DR. GARRICK: We have been very encouraged as a result of the implementation of what is now being called the risk insights initiative. That is right on target with respect to this issue, in our

opinion.

And it's the idea of being able to take the results of a complex model. And it was a suggestion that this could be made. You know now on the basis of your big model what's driving the risk. Now let's take those radionuclides that are driving the risk and back track them through the model and turn up the microscope on them a bit and see just exactly why they are the culprits, why they are driving the risk as they are.

So we don't have to, any longer, look at 50 radionuclides when we do that. Let's just look at the ones that the big model said are the important ones.

And that has proven to be extremely helpful in bringing out some other issues that we can attack and in understanding what's going on.

CHAIRMAN DIAZ: It is an important technical task to take, complicated models, and reduce them to a model that can be used in a more expedient yet you can communicate better. So I believe that is a very major issue. And I just want to tell you that I think -- I strongly support efforts in that arena.

On page 14, you highlighted issues of the 29 high risk rank that have not been received.

Let me go back to the time domain. Have you looked at

the timing of these things to give us an indication, even if these have not been received, there is indications that the timing with regard to when they should be here is still appropriate or is that something that the Commission should be concerned with?

DR. GARRICK: Well, when we first looked at this table, there was some concern because here you have a license application that's supposed to be coming in. And now it's a matter of months, it's not years.

And we are talking about trying to at least address all 293 agreements. And this table suggests that it is now November and there are 134 on which we have received no responses.

But, as I say, this table was developed a few weeks ago. In the meantime, we have heard some very good news in this regard. We have not been able to review the responses but we think that, properly done, this concept of grouping the agreements could be very effective and if it has a solid technical basis.

And we were told as recently as this morning that some 45 or so of the agreements are now in four bundles that staff has in their hands. And I assume we are going to get access to those pretty soon.

And that's a major step forward. And if the grouping concept, the categorization concept really is effective, then maybe the

alarm that this would first send us to schedule problems is not as great as we thought.

CHAIRMAN DIAZ: Okay.

DR. GARRICK: But we had concerns.

CHAIRMAN DIAZ: All right. Serious concerns?

DR. GARRICK: Not as serious now. But they were pretty serious concerns.

CHAIRMAN DIAZ: Quantitatively. All right. Sometimes words mean more to us.

DR. GARRICK: Medium risks.

CHAIRMAN DIAZ: Medium risk. All right.

Dr. Weiner, I enjoyed hearing your clear consideration of the risk-informed regulation. I sometimes think that that white paper which Commissioner McGaffigan and I worked on was short and to the point.

I believe that right now we may be now at a point to expand it a little bit and get it into better shape. So I think that's something that we should do.

Let me go to the issue of qualitative versus quantitative. Of course, the staff is conducting as qualitative risk ranking and that really helps. Eventually we need to quantify it as much as we can.

And again, there's a time line. And there's a progression

in there.

And my question is, as you look at these things, and you may not have had a chance to look at this, but I want to make sure that the Committee has looked or will look at the fact that there is a progression. And that progression has some time lines that have to be affected. And whether you have had a chance to consider it or look at whether -- with the constraints that are coming very shortly on all of us, whether that process is -- whether the work has been planned and whether the issues are being addressed in a manner that those time lines will fit.

DR. WEINER: Well, we just began. The staff made their first preliminary report on risk insights.

But I think you have raised a very good point. It's related to the question of when you quit, when you have done enough and when the -- you have done enough to investigate the quantitative aspects of risk.

It's very difficult to quantify risk to get the data to do it properly. And we have -- I think the Committee, with information that we get from the staff, can define that balance pretty well. That is, we can say, okay, it looks like here is a range where your risks fall and here is the contribution to the overall health and safety of the repository and, okay, we can move on now to something else.

I think you have made a very good point that we have to keep focused on the question of how much work is done and in what time frame.

DR. GARRICK: I think I would like to make a comment on that because I think this is a very fundamental idea. And that is that quantification does not necessarily mean elimination of uncertainty. Quantification to the risk assessor means telling the truth about what the risk is.

And if that truth represents a very broad distribution with respect to the parameter that you are using to measure risk, so be it. It is quantified because that's based on the evidence that you have.

Now, it doesn't mean that you -- so I think that's kind of a fundamental idea that is often not fully appreciated when people talk about quantitative risk assessment. Quantitative risk assessment is a matter of letting the evidence speak, not a matter of a precise number or precision in that sense.

CHAIRMAN DIAZ: Very good. I totally agree.

Dr. Hornberger, you noted that many of the assumptions for the source term in the performance assessment for the repository are not evidence-based. Evidence-based is a word that we use a lot today. And I kind of like it.

How important is this concerning terms of estimating the

overall performance of the repository? Is this sufficiently large that data should be pursued at this time and, again, in the appropriate time frame? Is there anything we should be doing that we are not doing already?

DR. HORNBERGER: I think that there is actually because the source term has such an important bearing on calculated doses, i.e., performance, that there is room for enhancing confidence, shall we say. So we may be talking about certain things that might be done even in the performance confirmation period.

For example, it was several years ago that the ACNW noted that the formation of secondary mineral phases, if thermodynamic data could be acquired, might, in fact, lower the calculated doses by orders of magnitude. And not having the evidence basis, what typically we are forced to do is to, of course, make conservative assumptions and go strictly on solubility limits which we then know to be conservative.

From the standpoint of the regulation and evaluating the license, no, I don't think that this is necessary to be done. As you say, the time frame is not such that between now and the license application that one could anticipate some of this research being done.

But it might be worth considering in the future simply because if you can demonstrate additional confidence by lowering

calculated doses significantly beyond what is shown in the license application, one could make an argument that should enhance confidence.

CHAIRMAN DIAZ: And I'm sure the Committee will be looking at these things and prioritizing it in a manner that the Commission can not only be informed but eventually make some decisions on these issues.

DR. HORNBERGER: We grapple with this a lot Chairman Diaz, as you know from your days as a researcher. Prioritizing research topics is a very difficult thing. There are various qualitative views that people hold and it's a difficult thing for ACNW to grapple with because of the broad spectrum of things that need to be done.

But the simple answer to your question is yes. It is on our list.

CHAIRMAN DIAZ: I think that's fine.

Dr. Ryan, the Committee has made a number of recommendations concerning the need for pre-license guidance on performance confirmation, after the questions of Mr. Merrifield, to avoid it becoming a de facto site characterization and without the benefit of risk information derived from the performance assessment. This goes to the issue of necessary and sufficient.

Is the fact that the Part 63 requirements are risk-informed and the staff is using performance assessment to risk-informed in its review of a licensing matters, is that necessary only or is that necessary or sufficient to achieve the desired outcome?

DR. RYAN: I think our view is that performance confirmation is certainly something that has an element, to say, as I mentioned in response to Commissioner Merrifield's comment, that is after the decision for construction authorization.

So clearly there's a component afterwards. Our working group and our recommendations are focused on the fact that's not completely divorced from things that come before that decision point.

So it's a very difficult thing to decide exactly what part of the string connects through to the history up to the point of that decision. But we do recognize that a major activity in performance confirmation comes after the decision for construction authorization.

CHAIRMAN DIAZ: In other words, we have the necessary elements but we are not sure that we have the sufficient elements to get to the end point?

DR. RYAN: I think that's a fair way to say it. Yes, sir.

CHAIRMAN DIAZ: Okay. Thank you so very much.

Commissioner McGaffigan?

COMMISSIONER MERRIFIELD: Mr. Chairman, if I can

just make a brief comment. I know that in the time that I have been on the Commission, your scientific way of looking at things has certainly had a great influence on my development as a Commissioner. Given your comment to Dr. Hornberger about evidence, I would seem to think that my legal influence has had some regard to that as well.

I just want to note that for the record.

CHAIRMAN DIAZ: I totally agree.

COMMISSIONER McGAFFIGAN: And I will probably just contribute because I'm probably about to play a lawyer. But on this performance confirmation --

COMMISSIONER MERRIFIELD: No. Influence is one thing. Acting like a lawyer is another which I would caution against in support of my fellow attorney on this side of the table.

COMMISSIONER McGAFFIGAN: I'm not sure. The only comment I would make to start off -- I'm not sure that our performance confirmation program is in any way, shape or form risk-informed or performance-based because unless the Commission, back when they were doing Part 60 this in the early '80's, was already there, it looks to me like we took the performance confirmation program from Part 60 and pretty much verbatim brought it into Part 63.

So there could well be elements in here that are not particularly risk-informed or performance-based. That may be what's at

the root of your concerns with regard to the performance confirmation program. I have not gone through the language to find out whether it would prove an impediment or not.

But that wasn't my line of questioning. It isn't necessarily risk-informed or performance-based unless Mr. Hendrie, Mr. Bradford, Mr. Gilinsky and Mr. Ahearne were ahead of their time as they poured over these documents in 1981.

CHAIRMAN DIAZ: My point is that there are elements that have increasingly been put in there but they might not be sufficient.

COMMISSIONER McGAFFIGAN: Mr. Hornberger, your first question, in your June 12th letter about the total system performance assessment working group, you mentioned the two members of expert panel shared their views about the temperature effects on the performance of the repository. Were those the members from MIT and Iowa State? Were those the members from the Nuclear Waste Technical Review Board?

DR. HORNBERGER: They were indeed.

COMMISSIONER McGAFFIGAN: So it's a consistent picture of the Nuclear Waste Technical Review Board.

DR. HORNBERGER: It's consistent and it's been consistent for several years.

COMMISSIONER McGAFFIGAN: This brings to an issue

that comes up. And I don't think there's been enough thought about it. You may want to do some thinking about it prior to next December; the staff certainly should do some thinking about it.

But 63.32, which is another part of our regulation that carries over almost entirely from Part 60, I think verbatim, in which Mr. Bradford and Mr. Gilinsky, Mr. Hendrie and Mr. Ahearne worked in 1981, has a requirement in it that the construction authorization will include restrictions on subsequent changes to the features, the geologic repository and the procedures authorized.

And then it says these restrictions will -- these are wills, these are not may's -- these restrictions will fall into three categories. The first category is one where there is 60 days prior notice to the Commission, 30 days notice of an opportunity for a prior hearing, so an additional hearing and prior Commission approval.

The second set of features and procedures that would require -- the Commission would require 60 days notice to the Commission and prior Commission approval but there is no mention of hearing rights.

The third set is 60 days notice to the Commission. And the Commission has the option for these category three items to put them into category two if they so choose during that 60-day period.

It strikes me that, you know, we haven't really thought

about which items belong in which category. But we should be doing some thinking about it. Like this hot versus cold. If DOE proposes a hot repository -- there's every indication they seem to be about to do, despite the Nuclear Waste Technical Review Board's strong views to the contrary. And at some point they have an epiphany and decide they want to go to a cold repository, they might well be a category one item that would require a separate hearing.

If you go back and read the transcripts of the Commission deliberations in 1981, as I have, this provision came from Peter Bradford and Victor Gilinsky -- primarily they were the advocates for it -- and they talked about if the depth -- and what a category one item might be is if the repository were going to be at 500 feet and somebody decided, no, we are going to do it at 1,000 feet. They had no repository in mind at the time. That might be a category one item.

So that's the extent of legislative history on this provision. But I think somebody needs to be thinking about and making sure DOE understands that this provision is there, that we need -- and it might be a place where risk insights could play a role. I mean, it gives us -- it gives the staff -- it doesn't give us -- I mean, it gives the staff a fair degree of flexibility in putting things into these three categories. But presumably the category one items that require a prior hearing have to be fairly fundamental changes to the construction authorization.

Category two items are items that are less significant but not as significant. Category three items, you know, may be not as significant at all.

And I think people need to think this through. People need to be aware that this provision is there. Again, if you read the legislative history, Mr. Bradford and Dr. Gilinsky were trying to avoid a problem that they found in reactor space where people -- construction authorizations were very broad and vast changes could be made during the construction period with no NRC involvement until the second hearing, where, you know, license application, obviously things could get changed. And they wanted more control during the construction authorization phase.

And as I say, what I worry about, in all honesty, people talk about opening the repository in 2010. Under our procedures we have a hearing on construction authorization then the GROA -- if granted, the GROA has to be largely completed before they can ask for a license to receive and emplace at which there's another hearing.

And if I toss in a third hearing somewhere in there and we do them lickety-split, you know, for NRC three or four years each, you start stretching things out. Two hearings are enough, I would think. But it means that DOE has to have its act together the day that it applies. If DOE --

COMMISSIONER MERRIFIELD: If I may interject here for a second. I think this is a fierce question you have laid out there in terms of, given this language, what's the interpretation of that and what are the impacts of this language on various changes that might be sought at some point down the road. I think that's a very fair question to be asking.

It would strike me under no circumstances would I suggest that the ACNW seek to answer your question in that regard. But it may be something that we need to direct to our office of legal counsel to take a look at and supple us with a paper that would outline some of the interpretations and the options --

COMMISSIONER McGAFFIGAN: Somebody has to lay it out. And I think we need to be very clear. I mean, part of my doing this is to -- you know, DOE sits there without counsel other than their government counsel, to this day, to my knowledge. And there are some very naive notions that sometimes come out of senior DOE officials' mouths about how flexible things should be able to be. And, you know, they can amend their application.

COMMISSIONER MERRIFIELD: DOE has their offices of counsel. They are seeking to have additional outside assistance from outside legal counsel.

COMMISSIONER McGAFFIGAN: Right. I understand.

They have legal counsel.

But they need to have a clear notion that they have to make this decision and any decision they make is one that they have to live with through the hearing process.

And if they add changes, there's a possibility for additional hearing, if they are fundamental changes under this provision.

CHAIRMAN DIAZ: I think it's a fair point. I believe the Commission needs to have an opinion rendered by our legal counsel to us and what are the implications, and what are, you know, the different issues.

COMMISSIONER McGAFFIGAN: If there's nothing in the review plan about this -- and I understand the staff's reluctance to get there because until you have it in front of you, you don't know what it is that might be so fundamental that it belongs in what category.

So you sort of have to have the application. Then you will know -- and it will probably drop out fairly clearly. Here's something that is so significant that it belongs in category one.

COMMISSIONER MERRIFIELD: Well, as you have evidenced in times past, you are thinking perhaps ahead of the rest of some of us. And that's a good thing. That's why we are all here.

But I think we are at a point in this process where our staff

and the DOE folks have sort of been focused incrementally. And you are looking beyond that. What are the impacts down the line. And I think these are absolutely fair questions you are asking.

COMMISSIONER McGAFFIGAN: This is something that has to be included in our construction authorization. It's not an "if" or "may." The language says that the staff will include these restrictions.

And so there's definitely something that is part of the construction authorization process on which I could, you know, easily envision that there could be contentions as to what should be in categories one, two, and three.

COMMISSIONER MERRIFIELD: Which means that we should clarify it?

COMMISSIONER McGAFFIGAN: Clarify it is all I'm asking.

I think there's a role for the Committee potentially bringing risk insights into that, and the staff. And I'm not trying -- the reason I have raised it with the Committee here is that they are looking for ways to bring in risk insights into this process.

You know the extent that we took Part 60 and made it Part 63; it's probably relatively little of risk-informed to the extent that it's our new stuff. I think it is risk-informed.

Okay. The second issue that I want to raise with you, and

again, it's not directly related to your testimony today but have you all done any thinking about the number of times a fuel assembly sitting in either a spent fuel pool or already in an ISFSI today, is going to be handled between the time, between where it sits today, say, you know, and when it's going to get to a repository if a repository is opened?

The reason I have the concern is we once had, you know, a vision of a high quality multipurpose canister program that was basically going to serve -- there was going to be a truck and a rail version -- and it was basically going to be the fundamental canister for everything. And it was going to be -- once it got to Yucca Mountain -- it was going to be a fair piece of the waste package.

In 1996, the Congress terminated the DOE multipurpose canister program under the influence of various, I think, industry folks who felt that anybody could build a canister. And it caused us a lot of problems because we had to, you know, shift resources to then deal with the large number of different applications we had for transport and storage canisters, multipurpose canisters.

And we have worked through that. We have worked through the backlog where we are today. But I worry about if the fuel assembly is sitting here today and say at Surry, which is an ISFSI that's been there -- probably our oldest ISFSI, it's about to hit 20 years and be re-licensed, will it need to be -- it's probably not in a transport

canister, it's probably in a storage only canister -- is that going to some day conceivably go back into a spent fuel pool, get repackaged? It's sent to Yucca Mountain, gets repackaged again. Has any systematic thought been given to this?

CHAIRMAN DIAZ: Can I answer that question, because I want to get you fully and currently informed now?

There is reconsideration right now going on the request from several, you know, Congressmen and probably Senators on the issue of the multipurpose cask and this particular question. And so I think I was present in a meeting where DOE was engaged and said, how is this going to -- exactly the same question and what is going to happen.

I think they are looking at the issue and they, you know, supposedly there's some answers that should be coming in a reasonable time. But it is a very valid question regarding radiological protections --

COMMISSIONER McGAFFIGAN: It just strikes me that if you are trying to be risk-informed and look at the risks -- since the risk is a system as a whole, the more times I am handling that fuel assembly in the way that it's exposed to the environment or just handling it period, as opposed to leaving it in an inert environment, that the more chance of mischief or environmental harm.

DR. GARRICK: Yes. We haven't had a lot of formal briefings and discussion about that issue in the context that you are presenting it. But we have had lots of informal comment and discussion about it.

When you are dealing with something where the doses are very low and the risk standard is a very low number, it doesn't take much handling and processing of the fuel by the workers to relocate the risk to them rather than to the long-term performance of the repository.

So we agree with you 100 percent, that when you start talking about managing temperature of the fuel and having to incur a lot of handling and processing, perhaps, and storage, you really have to compare the two alternatives at the total system level if indeed you are meaning what you speak, that it ought to be a risk-informed approach.

COMMISSIONER McGAFFIGAN: As I say, it strikes me. People talk about rail being the primary means of getting stuff to Yucca Mountain if it's authorized and gets a license to receive it in place, which are two hearings away. But, you know, there's a lot of stuff that's accumulating at these sites not in rail casks. I suppose you can put a truck cask on a rail car. It wouldn't be the most efficient use of the rail car.

But if what's envisioned is taking something that's in a smaller cask, bringing it back into the spent fuel pool, repackaging it in

a larger cask, there's an awful lot of fuel handling there.

DR. GARRICK: We went into this extensively in WHIP. And I'm sure Ruth can remember some of those, when there was a desire to control the wattage in each barrel. One way to control it was to dilute the barrels. And so that meant emptying the barrels and diluting them with waste.

What that did was, that had a very serious ripple effect on the number of shipments that were involved, the amount of handling that was necessary, the accident opportunity that was created. And when you compared some of those scenarios with the risk that was really associated with the performance of the repository, it became very clear that in many of those cases that was not the way to go.

So I think the same kind of thought process has to be handled here. If we are talking about managing the fuel elements in the repository and each of these different approaches to their management requires a different handling of the fuel, that's got to be taken into account.

COMMISSIONER McGAFFIGAN: Well, it would have been nice -- and I think somebody had a vision in the early '90's at DOE. But it would have been nice to have had a vision from the get-go as to how the system as a whole would work so that when you packaged it once you were a good step of the way towards what you

needed in the long-term in terms of putting it in the repository itself.

But we can always recover. And recovering early is better than recovering late.

So if there is thought processes going on -- but I think people should be thinking about it because it could influence -- if there are people in the Congress thinking about reviving a multipurpose canister program, a uniform canister program, if there are good risk reasons for doing it, we should be telling them that.

The final comment I will make is -- again not in a letter before us today -- but I very much appreciated your June letter to us with regard to a report that Dr. Weiner, I'm afraid, was one of the principal authors of. I have quoted it both to the staff in an all-hands meeting and yesterday at the Research conference.

It talked about a report -- I forget, NUREG-CR-6672 -- with regard to spent fuel transport. You all talked about five different over conservatisms that, in your view, were there that when taken out of context as they were in the report you were citing, you know, provide -- I don't remember the exact words -- but it was not useful. And you said the staff needs to be more careful when they put out reports like that.

And the staff came back and said, we don't think that, you know, its many orders of magnitude. We think it's only one order of

magnitude. And since we were already within a regulatory limit, we didn't think it was worth spending the money to reduce the conservatism.

I think that's always a question of, you know, how much is enough in the way of research, how many decimal points you want to get to.

But if we are going to have reports that have five different conservatisms in them, I think we have to be very transparent in making the conservatisms evident and say this is not meant to be a best case; it's meant to be a -- what do you call it -- a bounding analysis to prove that even with five conservatisms we are well within regulatory limits. And then hope and pray that if you put that in enough places in the report, it's difficult for somebody to come along afterwards and use what is a bounding analysis as a realistic analysis.

It happens all the time. But I very much appreciated that letter. I think it was one of the more -- it applies to things other than just NUREG-CR-6672.

I don't know whether you have had any interesting discussions since Dr. Weiner joined the panel as to whether your letter was accurate or not. You might have a minority opinion today if you try to send that letter.

DR. WEINER: If I might.

In another life, I actually wrote very little of it, and none of it to that. But the genesis of 6672 -- and I believe this speaks to the Chairman's time constraint interests -- the work on 6672 began in 1997.

And consequently, the focus at that time, which was as the Sandia staff was directed, was to say if the bounding case is relatively acceptable risk, then you don't need to do anything else.

And as time marched along, of course, the focus has changed. And I, for one, am very glad to see it change.

I was uncomfortable with this notion that we piled conservatisms up and make a bounding case, always make a bounding case. And I do think that in the light of new work that is being done, that these conservatisms can be reduced considerably.

COMMISSIONER McGAFFIGAN: This is part of the Chairman's realistic conservatism -- there's a place for bounding analysis both in reactor space and in materials space, and any other things we do. We just have to be absolutely clear that it is bounding.

You know, the danger that we have repeatedly encountered in recent years is old bounding analyses done by us or by our contractors get portrayed by various entities as realistic best estimate analysis, which they weren't. And they are not. But sometimes there can be a passing phrase or something in these reports that lend themselves to being interpreted that way.

And those passing phrases tend to end up in letters from Congressmen to the Chairman.

COMMISSIONER MERRIFIELD: Well, I was going to say --

COMMISSIONER McGAFFIGAN: We almost have the lawyer speechless. This is good.

COMMISSIONER MERRIFIELD: I was agreeing with you.

COMMISSIONER McGAFFIGAN: And that worries you?

COMMISSIONER MERRIFIELD: I don't necessarily phrase thing it the same way that my esteemed colleague does. But I agree with the point in the main, and that is, we get focused on the utility of the data for a specific purpose. And so in that context we say, the bounding analysis is fine.

But it's important for us to label it as such very carefully because of that very same issue. That it could be pulled out in a completely different context, taken out of context and be used in a way that will be misunderstood by a whole variety of stakeholders that we have.

CHAIRMAN DIAZ: I don't want to add anything to that because I think the point is so clear. I think the Commission is unanimous in this arena.

I want to thank the Committee for their work and for the briefing. We value your efforts. We want to continue to hear from you, whether it is in letters addressing too much conservatism or too little. And you know, we do pay a significant amount of attention because not only the area is important but, again, we can see that you are a group of experts that is supporting our efforts in an independent manner. And that has a tremendous value to us.

I want to encourage you to continue to be in contact with us. I know that sometimes we don't see you often, but again, if there are issues, I encourage you to get to the Commission those issues because the train is coming. And so we want to make sure that we can get on it.

And so with that, my fellow Commissioners have any additional comments? If not, we are adjourned.

(Whereupon, at 12:00 p.m., the meeting was adjourned.)