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NUCLEAR REGULATORY COMMISSION

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148TH MEETING

ADVISORY COMMITTEE ON NUCLEAR WASTE

(ACNW)

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FRIDAY, FEBRUARY 27, 2004

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ROCKVILLE, MARYLAND

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The Advisory Committee met at 8:30 a.m. at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, B. John Garrick, Chairman, presiding.

COMMITTEE MEMBERS:

B. JOHN GARRICK	Chairman
MICHAEL T. RYAN	Vice-Chairman
GEORGE M. HORNBERGER	Member
RUTH F. WEINER	Member
JAMES CLARKE	Consultant
JOHN T. LARKINS	Executive Director-ACRS/ACNW

NRC STAFF PRESENT:

TAE AHN

ANDY CAMPBELL

NEIL COLEMAN

GREGORY HATCHETT

BALER IBRAHIM

PHILIP JUSTUS

HOWARD LARSON

MICHAEL LEE

BRET LESLIE

RICHARD MAJOR

TIM McCARTIN

I-N-D-E-X

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

(8:49 a.m.)

21) OPENING REMARKS BY THE ACNW CHAIRMAN

CHAIRMAN GARRICK: Good morning. The meeting will come to order. This is the fourth day of the 148th meeting of the Advisory Committee on Nuclear Waste. I am John Garrick, Chairman of the ACNW. Other members of the Committee present are: Michael Ryan, Ruth Weiner, George Hornberger. Also present today is our consultant, Jim Clarke.

The Committee will do three things. We will be briefed by representatives of the NRC staff on recent risk insight activities. We will be briefed by representatives of the NRC staff on the status of Yucca Mountain key technical issues and will continue our preparation of ACNW reports.

Neil Coleman is the designated federal official for today's session. The meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act.

The Committee hasn't received any comments or requests for time to make oral statements from members of the public. If anyone wishes to do so, please make your wishes known to one of the Committee staff. As usual, it is requested that you use a

microphone, identify yourself, and speak clearly.

We are running a little behind. So we will move right into our first presentation. James Danna of the NRC staff is going to handle that. You will introduce yourself and the topic.

22) RISK INSIGHTS REPORT

MR. DANNA: Good morning. My name is Jim Danna. I am a senior assistance performance analyst with the NRC's Division of Waste Management. As Dr. Garrick stated, today I am going to provide the Committee with an update on the status of the staff's high-level waste risk insights initiative.

Before I begin, I want to point out that the risk insights initiative has been a team effort among the staff at the NRC and the staff at the Center for Nuclear Waste Regulatory Analysis in San Antonio. To this, I would like to acknowledge the contribution and the commitment of the staff of the NRC and the center to developing the risk insights in the initiative in the baseline; in particular, the contribution of Tim McCartin to developing the risk insights baseline report.

Next slide. In my presentation this morning, I will start by providing a brief overview of the risk insights initiative, the activities that led

to the development of the risk insights baseline.

I will then discuss the risk insights baseline report itself, describing its purpose, content, format. I will also discuss the basis for the staff's ranking of the insights. And I will provide several examples of the risk insights from the report.

I will then give a set of examples followed by the staff has used in risk insights to risk-inform its high-level waste program activities. I will discuss how we may use the baseline in reviewing a license application assuming one is submitted by DOE.

Finally, I will discuss the current status of the report. And the future activities for maintaining the risk insights baseline; in other words, keeping it up to date.

The term "risk insights initiative," it has been used to characterize the staff's ongoing effort to enhance the use of risk information and its regulatory activities and high-level waste program. In other words, it refers to our activities to risk-inform our program.

As you know, the staff has been generating risk information in the high-level waste program for

many years, the risk insights activities, risk assessment activities.

Through the risk insights initiative, the staff has attempted to pull together the risk assessment results and to synthesize, to integrate the knowledge and understanding gain through those risk assessments to formulate an understanding of how the components of the repository system at Yucca Mountain might function together to isolate waste and, thus, affect risk to public health and safety. It is this synthesis and integration that are the focus of the risk insights initiative.

We also aim to develop an understanding of which components of this system are most important and why. This understanding can then be used to risk-inform staff's activities, both during pre-licensing and following submittal of license application.

Risk insights. Risk insights provides the staff's perspective on the important parameters, models, and assumptions, the importance here being judged relative to risk to health and safety. Risk insights also reflect uncertainties in the staff's knowledge or understanding of the particular technical issues. The risk insights provide a basis for

focusing staff's attention and resources on more important technical issues relative to risk. And the risk insights indicate where the staff can benefit the most from additional information.

I will briefly summarize how we got to where we are today, primarily for the benefit of some of the newer members of the Committee. The risk insights initiative began in January of 2002. The early efforts reflect that communicating among staff, relative risk significance of technical issues, the effort was focused squarely on risk ranking the 293 key technical issue agreements.

We used a facilitative approach to solicit from staff members their perspective on the relative importance of the agreements. Staff reported preliminary results to ACNW in April 2002.

In its letter to the Commission, the Committee noted that as a communication exercise, they thought it was successful. However, they emphasized they encouraged the exercise to be repeated, this time with an emphasis on more traditional quantitative health and safety risk metrics.

We began to develop the risk insights baseline later in 2002. The idea here was to shift staff efforts from risk ranking individual agreements

to developing a fairly comprehensive and integrated system level understanding the risk significance of the technical issues associated with a repository system based on our current knowledge.

This understanding would be supported by quantitative risk information. This baseline of the system-level understanding of risk information could then be used to not only rank the risk significance of the agreements but also risk-inform other activities in a high-level waste program.

In March 2003, the Commission issued an SRM requesting the staff's risk ranking of the 293 agreements. At that time, we had a draft baseline, risk insight baseline, developed. We used that baseline to provide an initial ranking of the agreements, risk-significant ranking. We provided that ranking and a draft insights baseline to the Commission in June 2003.

In July of 2003, we updated the Committee on the status of the risk insights initiative. And at that time, we introduced the concept of the risk insights baseline, stating that we were taking this integrated system-level perspective. And then we would use that. We have used that to rank the agreements.

In their letter to the Commission following the presentation, the ACNW encouraged the staff as it completed the risk insights baseline to clearly identify the linkage between risk insights and the supporting quantitative results of risk assessments.

And also for both the NRC and DOE, ACNW encouraged us to defer to the Commission's or the agency's risk-informed performance-based white paper for terminology related to risk.

Just quickly with respect to terminology, we want to emphasize to the Committee at this time that we are committed to the risk-related terminology and concepts in the white paper. Particularly germane to the risk insights baseline are these terms from the white paper: risk, particularly not just looking at consequence but also likelihood of those consequences happening.

The concept of risk easement is a systematic method focused on understanding likely outcomes, sensitivities, areas of importance, system interactions, and areas of uncertainty. Here we are today: risk insights. The results of findings that come from risk assessments.

The white paper also discusses other

concepts, particularly the distinction between risk-informed or risk-based regulation. As you know, we are focused on risk-informed, rather than solely risk-based. And the white paper discusses the role of risk insights in identifying and evaluating the adequacy of the components of defense-in-depth in the case of high-level waste program multiple barriers. Again, we are committed to terminology in the white paper.

At this point, I would like to point out that the risk insights compiled by the staff and presented in the report are intended to assist the staff in our pre-licensing activities with DOE. At this time, the staff has not made any determinations regarding the type of conditions or adequacy of the potential repository at Yucca Mountain.

If DOE submits a license application for such a repository, the staff will review the information provided by DOE, information available at that time, on which to make its determinations. Insights presented at the baseline are for our use during pre-licensing and license application review.

Next slide, please. I would like to move now to a discussion of the risk insights baseline report itself. The report documents the results of

the risk insights initiative. The report was developed to provide a reference for the staff to use in risk-informing its regulatory activities.

The objective of the report was to compile the risk insights into a single baseline document to promote consistency in the approach the staff uses in risk-informing its activities, consistency among the staff as well as consistency in its application to our activities.

The development of the report enhances the understanding and communication of the staff's perspective on the relative importance of features, events, and processes, allows us to communicate our understanding of how these components might work together to contribute to or detract from waste isolation and, thus, risk.

The risk insights in the report are based on performance assessment results, including subsystem analyses and auxiliary calculations. The risk insights and supporting information presented in the report were developed by staff in all areas of the high-level waste program, not just PA, both at the NRC and at the center.

We didn't attempt to develop risk insights for all aspects of the repository system but, instead,

tried to focus on the technical areas of greatest importance or uncertainty.

As a starting point, we reviewed the KTI agreements to ensure that the technical issues addressed in the agreements would all be covered by the risk insights.

Because of the ready availability of risk information, the report kindly focuses on post-closure repository system performance. The staff has begun, however, to develop the risk insights for the pre-closure system and when these are incorporated will ask that risk insights are finalized to become available.

The report includes both system-level insights and detailed risk insights related to specific features, events, and processes. Individual risk insights are supported by quantitative risk information as well as a discussion of uncertainties in that information. And the report provides references to the detailed risk analyses supporting the insights. What the report does is summarize the risk assessments and provides the references to the detailed results.

The report also identifies areas for additional analyses. These are primarily aimed at

reducing the uncertainties that are discussed.

The risk insights in the report are organized around the integrated sub-issue, structure of the ISI, structure of the radionuclides. This is the same organization used in the Yucca Mountain review plan and the integrated issue resolution status report. We adopted this structure to facilitate application of the risk insights to these other program areas. This is also the organization that DOE is likely to use in the license application.

Finally, the report includes ratings of risk significance of the insights; in other words, significance to waste isolation. Why rate the insights based on risk significance? Rating the insights based on risk significance helps communicate our understanding of what is more important and what is less important relative to risk. It is to make that link from performance assessments results and the risk insights to program management and decision-making. It helps to prioritize our activities, focus staff resources, and support project management and decision-making.

The ratings consider potential effect on waste isolation capability. Specifically, we looked at potential effect on waste package integrity,

potential effect on the release of radionuclides from the waste form, and effect on the transport of radionuclides through the geosphere. These are the three aspects of waste isolation that we looked at in developing the risk rankings.

We didn't use a specific numeric threshold for rating significance, but we did rate the significance based on potential effect on the quantitative risk estimates. In other words, we didn't specify a particular threshold to say more than this is high, less than this is medium.

Essentially the risk information we had, our risk assessment techniques, doesn't lend itself to this sort of strict quantitative approach distinguishing high from medium and medium from low. Again, it is, though, based on quantitative risk results; in general, high significance in the case of order of magnitude effect on risk estimates.

On the other hand, low significance indicates a somewhat negligible effect on risk estimates. And medium significance is in between. It is not quite orders of magnitude, but it is not negligible either.

These ratings do take into account uncertainty. For example, if there is a potentially

significant consequence; yet, there is significant uncertainty in the likelihood, we tend to leave that as a high until we can generate additional information to reduce some of the uncertainty and the likelihood, which then may bring that down to a medium or to a low. That is how uncertainty is reflected. This is discussed in the report for each insight.

I would like to now present several examples of system-level insights and detailed risk insights from the report. The first system-level risk insight relates to radionuclide inventory. Stated here, we specify the potential risk from repository during post-closure -- and this is for the groundwater pathway dominated by relative few radionuclides: Americium-241, plutonium-240, 239, americium-243, less the contribution to U-234, and neptunium-237. This is show in the following slide.

The information in this table is drawn from the NRC's TPA code. The table shows most of the key radionuclides included in performance assessment calculations and their half-lives in the first two columns.

The third column shows the distribution of the inventory at 1,000 years based on activity. The third column here shows that most of the contribution

to activity after 1,000 years is dominated by relatively few radionuclides, those generally at the top.

The fourth column shows the distribution of the inventory again, but this time it is weighted by the dose conversion factors in the TPA code which are based on the dose conversion factors in federal guidance report 11. What this does is this, rather than just basing it on activity, it takes into account potential risk, relative risk, of these radionuclides.

As we see here, when we factor in this potential risk, there is little change at the top. The top four radionuclides stayed pretty much the same. But as we move down, the potential risk significance of the other radionuclides generally decreases, the exceptions being to some extent U-234 and neptunium-237. What this tells us is that the potential risk during post-closure period would be dominated by this smaller subset of radionuclides.

When we look at total system performance assessment results, we can use this table. And we can ask ourselves, "Why don't we see a contribution to the dose and to the risk from these radionuclides?" We ask ourselves, "What is happening in the system that is contributing to the waste isolation and reducing

the risk from these radionuclides?"

Next slide, please. This leads to our second system-level risk insight relating to potential effectiveness of the repository system to isolate waste and, thus, reduce the risks from these most significant radionuclides.

Again, this is the staff's perspective based on our perspective. We think that the features of a repository system will significantly release and transport of the radionuclides, both by delaying the time to release from the system and also by limiting the rate of release from the system.

This insight is shown quantitatively on the next slide. This table again shows the radionuclides that make up most of the inventory at 1,000 years across the top. This table also shows the components of the system that may contribute to either delaying the release of radionuclides from the system or limiting the rate of radionuclide release from the system.

The entries in this table, although they are depicted here somewhat qualitatively, are based on staff's performance assessment results. There is quantitative information to back up what we see in this table.

In this table, the D's are used to indicate a delay in the release. And the L's indicate a limiting of the release. The number of the D's and the L's from none to one, two, or three denote the order of magnitude effectiveness of the delay or the limit.

For example, the first row shows that for all radionuclides, the engineered waste package is expected to significantly delay the onset of release of the radionuclides from the waste form into the geosphere. Subsequently, the transport of those radionuclides through the natural barriers. The delay is expected to be significant, on the order of magnitude of tens of thousands of years, for all radionuclides.

The next several rows show that the characters of the waste form, radionuclide solubility limits, and the limited availability of water are expected to limit the rate of release of radionuclides from the engineered barriers to the geosphere.

In this case, the effectiveness is radionuclide-specific and is greater, orders of magnitude greater, for some radionuclides than for others. That is shown by having no effect on limiting for some radionuclides in some columns and orders of

magnitude greater effect on limiting releases for other radionuclides.

Finally, the last two rows describe the effectiveness of the natural barriers in delaying the transport of radionuclides through the geosphere to the receptor location. Again, in this case, it is radionuclide-specific.

What we can take away from this table is looking down a column for any radionuclide, one can see the expected effectiveness of the system components from isolating that particular radionuclide from the receptor. This goes back to our previous table, where those radionuclides where we would expect to see have a potentially significant contribution to risk, how the system will effectively work to isolate those radionuclides.

Again, the information in this table is drawn from quantitative results from risk assessments. In addition to these system-level risk insights, the staff has developed a number of supporting detailed risk insights related to specific features, events, and processes of the post-closure system, essentially to provide additional depth to what we just saw in the system-level insights.

The staff has developed almost 40 of these

detailed risk insights. They are based on quantitative risk assessments. And, as I stated, they are organized around the ISI structure.

These risk insights are currently under review. The entire report is currently under review. However, I will provide a listing of those specific insights as backup slides. And I will provide three examples on the following slides.

The first example addresses effect of the passive film of waste package performance. Stated here, a passive film of waste package services is expected to result in slow corrosion rates. It is a favorable condition.

High temperatures and aggressive water chemistries do have potentially detrimental effect on the solubility to do passive film. And it could result in lowering of the corrosion rate or increasing the corrosion rate by orders of magnitude.

We have sensitivity analyses to indicate that with assuming a loss of passive film on 25 percent of the waste packages, that calculated doses could increase by several orders of magnitude, approximately .01 millirem per year to almost 1 millirem per year. Again, this is assuming a loss of passive film on 25 percent of the waste packages.

However, that focuses on the consequence. However, with respect to likelihood, there is significant uncertainty regarding the likelihood of whether or not such conditions could exist.

In this case, the scenario the staff has identified warrants additional analyses to reduce that uncertainty. However, given what our analysis indicates, this is an example of something that the staff would rate as having high significance.

I should note here that what you are seeing in this slide is a very distilled version of the risk insight. The report provides much greater detail and, as I said, provides references to even greater detail still. What we are seeing here is a very succinct summary of the information supporting our insight.

The second example addresses the significance of waste form degradation rate. Waste form dissolution is affected by temperature, presence of oxygen, and in-package water chemistry modeled in the TPA code by four different models: Model 1, Model 2, Model 3, and the show-pipe model.

Among the four alternative TPA models for spent fuel dissolution, the analysis indicates a correlation between a release rate from the waste form

and dose, as we would expect. TPA analysis depending on the model selected, dose can vary over two orders of magnitude from the low of .001 millirem per year to one with .1 millirem per year depending on the model selected. Again, these are orders of magnitude.

Base case model is model 2. Assuming a TPA dissolution model 1, which results in a greater use than the base case model, assuming TPA model 1, this increases the waste form release rates by two orders of magnitude. However, the peak dose is expected to increase only by a factor of approximately 2.5 from roughly .02 millirem to .05 millirem.

So while there is a significant effect of the dissolution rate on the potential dose, the change from the base case to the higher release rate model is only a factor of 2.5.

CHAIRMAN GARRICK: Jim, when you make assumptions about these various models, do you attempt to assign any kind of likelihood as to the different models?

MR. DANNA: Well, what we like to see here is that we have focused this analysis on consequence. Given the consequence, we have a handle on the consequence. That helps us gauge how much emphasis we should focus on likelihood.

We could evaluate the likelihood of, let's say, model 1 versus model 2. However, the consequence would indicate that the impact on risk may not be that significant, whether it is model 1 or model 2.

So there is some discussion of likelihood, but we also factor in the focus on likelihood or our resources expended on likelihood to the range and potential consequences.

CHAIRMAN GARRICK: Okay. Thank you.

MR. DANNA: Along that line, this is an example of something that we would rate as having medium significance. It is not orders of magnitude effect on a risk estimate, but there is some level of effect. So it is an area we would be interested in looking at further.

A third example is related to juvenile failures of the waste package. Juvenile failures are early failures, generally result from manufacturing defects or other waste package flaws. Failures are expected to occur early in the waste package lifetime.

While such failures are expected, we do expect them to be limited to a small fraction of the waste package. And our analysis indicates they are not expected to have a significant effect on overall repository performance or risk.

In addition, this is something that can be somewhat controlled relative to other aspects of the system. Quality assurance procedures, for instance, or waste package fabrication characterization handling, these types of procedures should reduce the likelihood of significant defects and, therefore, the likelihood for juvenile failures.

In respect to the consequence, our analysis indicates that assuming a limited number of juvenile failures, 44 on average, peak doses are on the order of .021 millirem per year. So given that the likelihood is low and somewhat controlled and the consequence is low, this is something that we would rate as low significance.

So what I have done here is I have provided three examples. One example is an example of something we would rate as high. The second example is something we would rate as medium. This example is something that we would rate at a low significance, again all related to risk and all supported by quantitative risk information.

I would like to move now to a discussion of the application of the risk insight baseline, basically questions of why do we do this. As I stated earlier, the idea is to provide the staff with a

reference base, a consistent approach to risk-informing its activities, and a consistent tool for the staff to use among the staff in risk-informing those activities.

I will provide several examples here of how we are currently using this risk information, these risk insights, how we will likely use them, and then I will move into a discussion of how we might move the information during the review of a license application.

The first example is application of the risk insights to issue resolution. As you know, the staff is currently reviewing DOE's technical basis documents and agreement submittals. Reviewing agreements was, as I said, the starting point for the risk insights initiative. As you will see, we have developed the risk insights baseline. Now we have circled around, and we are applying what we will have learned, what we have to review in those agreements.

In conducting its review of the technical base documents and the agreements, the risk insights are used by the staff to ask, again, "What is important? Why do we need this information? How does it affect risk?" It also allows us to ask, "How much do we need to know?" We look at the uncertainties.

We look at the potential effect, potential risk significance and ask, "Do we know enough or do we need more?"

Greg Hatchett, whose presentation follows mine this morning, will discuss that process, the process of using risk information in the review of agreement submittals in additional detail.

Staff is also currently updating their integrated resolution status report. And in that report, there is a discussion of the relative importance to risk for all the different key technical issues. Staff is pulling that information from this risk insights baseline. This risk insights baseline document provides the basis for that perspective in that report.

Risk insights are also being factored in the development of the inspection program in two ways. First, risk insights will help the staff focus on particular areas of inspection that are most risk-significant. In addition, the staff will use the risk insights to help judge the significance of its findings.

Finally, I think you have seen a presentation on this before. The staff will incorporate risk insights into the development of a

performance confirmation program. Again, focusing performance confirmation on the more risk-significant aspects of the system and the depth of the confirmation were based on the relative risk significance of those components.

As I mentioned, the staff expects to use the risk insights baseline in its review of the license application assuming one is submitted for repository activity level by DOE.

Risk insights baseline report can be considered part of a license application review tool kit that the NRC has for its use. This includes the Yucca Mountain plan and the integrated issue resolution status report. These three documents together will help the staff, assist the staff in its review of the license application.

In reviewing the license application, the staff expects to use risk information to focus its review. While we will review all aspects of the license application, risk insights will assist in determining the depth of NRC's review in each particular area. The depth of review will be key to the risk significance of those particular areas, as described in the risk insights.

Risk insights will also be used to assist

the development of the staff's request for additional information from DOE. This approach supports our basic review philosophy. We ask ourselves reviewing the license application, "What is significant? Why is it important? What is significant with respect to risk?" We also ask, "What controls the significance? How is that particular feature, event, or process affected?" Then we ask, "What are the relevant details that we need to know to judge that significance?" Risk insights help support this review.

As I stated earlier, our review will be based on the information that DOE submits in a license application and other available information that we have at the time. What the risk insights based on the report do is they provide the staff with an independent look, an independent way of thinking at what this DOE is providing to us. We use our own insights to ask ourselves, "What DOE is submitting to us, does it make sense? Is this what we expect to see? Where do we agree, but also where do we disagree? And if we disagree, why do we disagree? What areas should we focus in on?" That is the benefit of having this independent system-level perspective on risk significance.

Finally, the next steps, as I stated, risk insights baseline report, final report, is currently under review, final review. Staff expects that once that review is completed, the risk insights baseline report will be publicly available.

That is not the end, though. As you know, risk information will continue to become available throughout this process. For example, the staff, the NRC, and the center are currently involved in conducting additional focused risk assessment activities to address particular uncertainties in our understanding.

It is assumed that through these risk activities, we will generate additional risk information that will be used to address and hopefully reduce some of these uncertainties. And then we will have to go back and look at our risk insights to see if they still make sense or if they need to be changed. Those risk assessments are ongoing.

In addition, as you would expect, newer information continues to become available from DOE as it submits pre-licensing documents in response to agreements, technical basis documents.

Based on this information, the staff plans to update the risk insights baseline once more prior

to receiving a license application from DOE. What we want to do is go into reviewing a license application with an up-to-date perspective on our understanding of the risk significance of the components of the system. Additionally, as I mentioned, the staff plans to expand the risk insights baseline to include the pre-closure repository system.

That concludes my presentation this morning on the status of the risk insights initiative. And at this time, I would be happy to take questions.

CHAIRMAN GARRICK: Okay. Thank you very much. An excellent presentation.

Yes, I am sure we have a few questions.

MEMBER HORNBERGER: Thanks, Jim.

Do you have any estimate on the timing for the completion of the review of the report?

MR. DANNA: I am sure everyone would caution me against estimating.

MEMBER HORNBERGER: I am sure they would.

MR. DANNA: Monday would be nice. Let's say weeks. It is currently in the concurrence process.

MEMBER HORNBERGER: Yes. My real question was whether it was weeks or months or next year.

MR. DANNA: I would hope it is weeks.

MEMBER HORNBERGER: Okay. Also, I think your slide had July of 2003, when you briefed us on your ranking of the agreements.

MR. DANNA: Right.

MEMBER HORNBERGER: Again, I know our next presentation talks about the agreements. My question to you is, as you went through completion of your baseline report, did any of your assessments of the rankings on those agreements change?

MR. DANNA: Well, I would say yes. In fact, some of the insights changed. Based on the additional we had and taking another look, we did refine our insights. And some of the rankings did change. Actually, there is still some discussion on some of those particular risk insights.

Relative to the agreements, we didn't go through the arduous task of risk ranking each and every agreement, but what we are doing is in the process of reviewing the agreement submittals, the bundle agreements.

We look at those agreements. We are ranking from last June, from the SRM. We look at our current risk insights document. We ask ourselves, "Is this still what we think? Does it still make sense?"

We are not bound to those ranking. We do

factor in additional information. So it is not a one to one, but there are subtle changes. We evaluate each on a case-by-case basis.

MEMBER HORNBERGER: My real question is, the baseline report is actually already being used --

MR. DANNA: Yes, yes.

MEMBER HORNBERGER: -- in some of the ways that you mentioned?

MR. DANNA: That is right. Well, we need to use it. We couldn't wait until it was final. So the staff, having developed it, is using it along the way.

MEMBER HORNBERGER: Good. Thanks.

CHAIRMAN GARRICK: Ruth?

MEMBER WEINER: First, I would like to commend you because you already answered the first question I usually ask, which is "Why would you have done things differently if you hadn't been risk-informed?" You did an excellent job of that.

My question is very short. On your slide 14, you say you weighted the percent of inventory by dose conversion factor. And I was just wondering which dose conversion factor: ingestion, inhalation?

MR. DANNA: Ingestion. These are the dose conversion factors in the TPA code.

MEMBER WEINER: Right.

MR. DANNA: In fact, I think you --

MEMBER WEINER: They are the ingestion dose?

MR. DANNA: That's right. And those are based on ingestion dose --

MEMBER WEINER: Drinking water basically?

MR. DANNA: That's right.

MEMBER WEINER: Okay. Thanks.

The other question is on slide 16. Could you explain to me how uranium-234 has different solubility limits, very different solubility limits, from uranium-238?

MR. DANNA: I could attempt to answer, but I will defer to Tim. He could probably give you a more definitive answer.

MR. McCARTIN: Yes. That's not saying there were different solubility limits. It is saying the effectiveness of the waste form release or the solubility. And part of the effectiveness of solubility is based on the extent of the inventory, et cetera. So it is not just a --

MEMBER WEINER: So you're basically talking about mass release, if you will, that you have a whole lot more uranium. Am I understanding this

correctly? Do you have a whole lot more U-238 than you have U-234? So in any dissolution, there is going to be relatively more U-238 dissolved? Am I interpreting that correctly, Tim, or not?

MR. McCARTIN: No. there certainly is more mass. There are a lot less curies. And so for a given mass release, there are a lot less curies. And so U-238 in terms of its solubility, will it be effective in limiting the dose for U-238, yes. For U-234, you get the same amount of mass.

Well, in terms of mass release, you are correct. It is a very similar amount of mass, but the curie amount is much higher. And so the solubility isn't as effective. That is all that this is trying to do.

MEMBER WEINER: So you have taken both the mass percent and the activity percent and done --

VICE-CHAIRMAN RYAN: Among isotopes within an element, it is specific activity that drives it.

MR. McCARTIN: Yes. But this is looking at just on a radionuclide-specific basis.

MEMBER WEINER: Okay.

CHAIRMAN GARRICK: Jim Clarke?

DR. CLARKE: I would just like to compliment you as well. I thought that was a terrific

presentation. And it strikes me that you are developing a tool that is going to be very useful, not only here but I can think of a lot of other places where I wish they were doing this.

If you could pull up slide 14, the table "Radionuclide Inventory"? A couple of days ago or maybe yesterday or maybe several days ago, we heard a presentation on research. And I think we were struck by the absence of a particular radionuclide. And there it is right at the --

CHAIRMAN GARRICK: Yes. I was pleased to see it.

DR. CLARKE: I just wanted to make that observation.

CHAIRMAN GARRICK: Yes, yes.

DR. CLARKE: Thanks again.

CHAIRMAN GARRICK: I have a couple questions. I wanted to know, are you interacting with DOE in a way that they understand how you are going to use the risk insights initiative in the review of their license application? Do they kind of know what is coming and how this tool is actually going to be applied?

MR. DANNA: Yes. As a matter of fact, several weeks ago, there was a technical exchange

regarding the -- I think it was the focus from the depths of the information submitted.

Tim McCartin gave a presentation some of these slides were pulled from, mainly, for instance, this slide. Tim explained our approach on how we would use this type of information to, as I said in some of the following slides, focus our review of system developing request for additional information. A lot of that information pulled into this presentation. So many of the parts of this DOE heard a technical exchange several weeks ago.

CHAIRMAN GARRICK: Is this having, to your knowledge, any influence on how they are presenting their analyses?

MR. DANNA: Well, I can't speak for DOE. My impression from that technical exchange comments received was that the presentation was well-received. And it helped to enlighten DOE on NRC's approach of what they might expect.

CHAIRMAN GARRICK: One of the things that you kept referring to was, of course, the importance of certainty being a fundamental part of your analyses. We didn't see a great deal of specific examples of how you are handling uncertainty and how you are handling the different components of the

uncertainties, such as the information, uncertainty versus modeling uncertainty, or if you would refer aleatory uncertainty versus epistemic uncertainty. Would you care to comment about how you are doing that?

MR. DANNA: Sure. An example of model uncertainty would be that in the TPA code, we have several alternative models for waste form dissolution. Given that model uncertainty, we look at the potential effect of that uncertainty by looking at what the range of the effect on dose could be. That helps us to evaluate, given the small uncertainty, how much of a difference does it really make?

Additionally, the first example I provided discussed the consequence. It was mainly focused on the consequence of the passive film if it were to fail. It acknowledged, however, that it was great uncertainty with respect to the likelihood.

Now, the likelihood of evaluating the potential failures is difficult, that uncertainty. But we have additional analyses that we are conducting that will focus in on refining or reducing that uncertainty. We will then factor that back into this estimate.

There are other examples in the report

regarding some of the areas we once considered to be of high significance for reducing uncertainties. So they might have moved on to the either medium or low significance.

CHAIRMAN GARRICK: One of the things we talked a good deal about in our working group session was the difference between what one might call compliance risk assessment and what one might call safety risk assessment, compliance taking into account that some of the safety analysis requirements are highly prescribed, particularly the biosphere.

Are you looking at this somewhat from both perspectives? That is to say, are you looking at the analysis from the standpoint of what the evidence can support versus what the evidence can support plus the constraints that are inherent in the regulations?

Is some circles, some people make the distinction between compliance risk assessment and safety risk assessment. The question is partly why you are doing this in the context of the regulations. Are you also doing it somewhat in the context of the boundary conditions that are not a part of the regulations but more based on the fundamental information?

MR. DANNA: I will try to answer to see if

I understand the question. Our goal through our analysis, through developing the risk insights baseline was to develop an understanding of the repository system, how it works, somewhat independent of compliance.

Now, given that, as we move into the question of what is important, I think that actually gets more to the compliance issue.

CHAIRMAN GARRICK: Right.

MR. DANNA: The level of understanding that we would have if compliance were an issue, obviously we would like to continue toward understanding the way the system works to a greater and greater extent.

However, when we step back from a regulatory perspective, how much do we need to know with respect to compliance? That is why when we are saying, "Let's focus on what is important, what's not important," part of that is what is important to risk and ultimately a compliance demonstration.

Does that speak to your --

CHAIRMAN GARRICK: That is helpful. I think that what we are really talking about is sometimes the compliance requirements mask reality. And the essence of the question is, what are you doing

to unmask the impact of the assumptions that are inherent in the regulatory process?

Now, this is not so much in what you presented here because you sort of stopped at the geosphere and didn't talk much about that part of the performance assessment that is much more prescribed than other parts, namely the biosphere, but it is something of an issue in the risk community of drawing a distinction between what the risk is based on what can be supported by the state of the knowledge versus the risk that is tampered with, so to speak, by assumptions that are a direct result of the regulations.

I was just trying to get an idea if you were aware of that and if there was any kind of side calculation activity going on that would look at those issues, either separate or at least to give you some additional insight on the answer to the question of, what do you really expect to happen?

MR. DANNA: I think Tim looks at --

MR. McCARTIN: Yes. Tim McCartin, NRC staff.

Let me give you an example I think related to the biosphere. All of our calculations are typically done within the regulations. And along the

biosphere, as an example, the reasonably maximally exposed individual is specified to have mean characteristics for lifestyle, diet, et cetera.

For, let's say, the volcanism scenario, where inhalation of dust is a significant aspect of the risk calculation, what we do look at is in determining that mean behavior, what is the important aspect of determining the mean behavior is that the time spent outdoors, highly disruptive activities, inside, et cetera.

And so we are looking at variation of that across the U.S. in addition to relative to the surveys DOE has conducted as we are trying to understand, "How important is it to get the time sleeping versus the time outdoors?"; et cetera.

So it is all within the confines of determining the mean lifestyle but trying to understand what part of that mean lifestyle is more pertinent. We are doing those kinds of evaluations to determine what part is most significant for the calculation.

CHAIRMAN GARRICK: Well, the thought here is not to get nitpicky and worry about whether it is one and a half liters per day that the person drinks or two liters. But whether or not there are some

major effects, -- and they could go either way -- that should be looked at.

Maybe my final question, this is a very valuable effort in our judgment, I think. One of the issues that is always before us is, how do we package this in such a way that the public knows how you are doing it, what you are doing, and that you can get some benefit from it? Is there any effort being made to cast the risk insights, products if you wish, in a form that maybe is more reader-friendly, more suitable for public consumption than often risk results are?

MR. DANNA: When the initiative began, the idea was to have a concise prescriptive. And, as you can imagine, over the past few years, it has grown. Now it is no longer concise.

The report does include an executive summary. We attempted to write in plain English. It takes the 100 pages of the report and presents it in a way of saying, "These are the high areas. These are the medium, and these are the low."

I think that communicating the technical details; for instance, persistence of the passive film, in order to communicate a greater understanding requires some depth of technical knowledge.

As I said, I think the executive summary

of the report gets a part of that. It may be that as we apply it as questions are raised, we address those comments.

I am not sure what the vehicle would be, though, to distill it.

CHAIRMAN GARRICK: It is something you might want to think about because one of the biggest issues facing these kinds of projects is the context and perspective. The one tool that you have that is attempting to provide perspective and context and some sort of road map of importance ranking and what have you is the risk insights effort.

It just seems to me that from the standpoint of providing assurance that issues are being addressed, number one; and, number two, here is how that issue enters into the grand scheme of things, that the opportunity exists here to make a very valuable contribution for outreaching to the public as to what this is all about.

MR. DANNA: In fact, I will make a point of that to think about how we roll out this plan, not just among our staff and the DOE but also the public.

CHAIRMAN GARRICK: Very good.

MR. LESLIE: Jim, this is Bret Leslie from the NRC staff. I want to add a little something on

that. After, in fact, Tim's presentation to DOE was so well-received, they requested us to put it onto the Web site.

In addition, when Tim came back, he came to the team and said, "Here is our initial attempt, this table with the D's and L's. What other ways can we better explain to the people around us?"

And so the outreach team has taken the challenge from Tim and the risk insights initiative to try to come up with ways of better explaining. So we are aware that we need to do it. This is a valuable set of information for technically skilled people, but how do we translate that again to the broader public? At least we are going to try to start to work on that and provide that in our publicly available Web site.

Maybe Tim wants to add something.

CHAIRMAN GARRICK: Well, the thought here is not to get nitpicky and worry about whether it is one and a half liters per day that the person drinks or two liters. But whether or not there are some major effects, -- and they could go either way -- that should be looked at.

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Maybe Tim wants to add something.

MR. McCARTIN: Yes. Thanks, Bret. That is very nice.

CHAIRMAN GARRICK: Shall we have a medals ceremony now or later?

MR. McCARTIN: I need to buy some lunches for some people here.

Along those lines, that table with the D's and the L's was a way to in a quick snapshot give people a sense of what is working. The next step is certainly why. We have had suggestions to that. Certainly that doesn't factor in uncertainty. We need to do a way to have uncertainty in that table. We are working on that.

Also, there are possible scenarios that you could look at to add to that scenario. Okay. If this occurs, how does this table change? There are a variety of things that we think we can make easier to understand by a broad range of people, including the staff. No one wants to read through a 100-page report. There should be an easier way to get the big picture.

And so we are working on that. As Bret said, the outreach team is looking at it. And we certainly hope to in future meetings be able to present more of these ideas. And we welcome any comments the Committee may have.

One thing, Mike has his hand raised. Absolutely we do want to add something with respect to the dosimetry and health effects onto that table to give people also an understanding. And that is certainly radionuclide-specific. Like I said, it continues to evolve. I would like to think we continue to get better.

VICE-CHAIRMAN RYAN: Tim, you read my mind in part but only in part. Could you put up 16? Maybe we could have the table while we talk about it a bit.

And, Jim, let me endorse the comment on your presentation. It really is very thorough and

informative and well-done. It is a pleasure to see it.

It strikes me on the left side where you have the safety functions and important features, that those are global and top-level. Are you drilling down to get something to build up to this thing with?

And I think it speaks to the communication issue that you raised, John, that it is probably five or six or two or three. There is some number of things under each one of these two columns, really, where the extraction is to create the influence of this table.

So if that road map can be organized and described, I think you are doing two things. One is you are making it transparent from how you are thinking and what you did to what might help in the communication part.

We didn't see all of the tables that built this up, but how does it work?

MR. McCARTIN: Well, there weren't any other tables that built it up. There were analyses that built it up.

VICE-CHAIRMAN RYAN: Well, analyses. Yes. I understand. Sorry for the wrong term.

MR. McCARTIN: Well, no. That is a very

good suggestion in terms of you are right. This is very high-level. And that is exactly what we are looking at now: ways to sort of peel back the onion and look at the inside parts of this and give a better sense.

VICE-CHAIRMAN RYAN: I would say release just to pick on one.

MR. McCARTIN: Sure.

VICE-CHAIRMAN RYAN: I mean, there is a whole bunch of stuff that goes into the onset of release. So maybe there are a whole bunch of tables like this that actually get the titles --

MR. McCARTIN: Right. In possibly different conditions, if this condition occurs, what happens? Once again, to me I think we get most benefit from the Committee when we come early on. This was done with mean values. Mean values are helpful. Clearly there is a lot more to the story than mean values.

I think that is a very useful suggestion. We do want to build this up to give the sense of, like we said, the range of uncertainties, the different processes, different assumptions. And we will continue to strive.

You are right. Maybe we will see a

presentation where we have a series of tables. At the end, you have this that you will understand how that was derived.

VICE-CHAIRMAN RYAN: Thank you.

CHAIRMAN GARRICK: All right. Any other questions from the staff?

MR. CAMPBELL: I was going to add something here, John.

CHAIRMAN GARRICK: Yes?

MR. CAMPBELL: Yes. I am Andy Campbell. I am Chief of the Performance Assessment Section for the NRC. Thank you.

In addition to the activities in terms of the analyses and the supporting information, Jim has talked about some of how we are integrating performance assessment into essentially the entire high-level waste program, inspections, review of agreements, and the KTI resolution process, which Greg Hatchett is going to talk about into the area of reviewing DOE's performance confirmation program.

All of those I think also contribute to our ability to communicate among ourselves, with the Department of Energy, with a wide variety of stakeholders. And I think that integration component is really also an important aspect of being able to

communicate risk insights, not just that we have done this and it sits on a shelf, but it really becomes an integral part of our whole approach.

As we review the license application, risk insights will be used in conjunction with YMRP. Our understanding is in the integrated resolution status report to help the staff performance review.

CHAIRMAN GARRICK: Okay. Mike? Mike Lee?

MR. LEE: While we have slide 16 up there, it strikes me that DOE takes a lot of credit for the unsaturated sound. And if you are using this tool to, in effect, review their compliance demonstrations, shouldn't you have a line above "onset of release" to evaluate the performance of the vetas? I mean, if you don't get water contact in the waste packages, which is I think part of DOE's argument, you don't get a release. How would you address something like that?

MR. DANNA: That is probably true. I am thinking we do take into account limiting the water, but --

MR. LEE: I mean, this represents your interpretation of the system, but you are going to use this interpretation to review what DOE is doing. And DOE takes credit.

MR. DANNA: Looking at the contribution of

the saturated zone part to release from the engineered barriers, we have that covered with respect to the waste package. I think what Dr. Ryan was saying, that is factored in in that it would show up in that additional detail.

How would the conditions of the unsaturated zone above the waste package affect it? It would be expanded if we expanded on those deeds.

MR. McCARTIN: But also the release rate, that is where you would see it at a third, where limited water, solubilities limits coupled with the fact that you have limited water. That is basically the vetas still involved is part of that. Once again, this is one way to look at it.

We certainly are also in our effort, what I said at the DEC exchange. It is going to get more and more true. I am a big supporter of our PA results, but it is the Department of Energy's performance assessment that we are more interested in.

And we are transitioned to doing more with respect to their results. We will do these same kinds of tables to help us understand what DOE's TSPA is doing. And so it may have a slightly different table.

MR. LEE: Right.

MR. McCARTIN: Our only desire is to make

this as flexible and as understandable as we can to various audiences.

MR. LEE: Well, that's why Dr. Ryan's comment might be pretty important to consider, that there is additional detail in there that is not readily apparent if observers look at this table based on their understanding of what the department is doing.

MR. DANNA: Right. And I think this gets to Tim's comment in his presentation, the technical exchange, the questions of not just what is significant but also why is it significant, what drives that significance and delving deeper into the significance of the waste package. We just have to pull out the significance of the contribution of the effect on unsaturated zones.

MR. LEE: Last question real quickly is slide 27, you spoke to doing additional analyses. I presume these are like other auxiliary performance assessment analyses that you have underway. Is there any way you can describe that in ten words or less?

MR. DANNA: Sure. Rather than doing a full-blown repeat of IPAA, integrated performance assessment analyses, what we chose to do at this time was a series of very focused analyses. I think there

are 20 or 24 in total. Many of these are focused specifically on reducing uncertainties with respect to these risk insights.

When those are completed, in fact, there is a correlation between those risk analyses, individual risk analyses, and the risk insights. And they will be folded in there. I think the schedule for that is July time frame. And they will be folded into the revisions.

MR. LEE: It is something that the Committee may want to consider being brought up to speed on at some later date. Particularly you are presuming it is going to have an impact or either positive or negative on the things you have concluded in your report.

MR. DANNA: It should. It should. In fact, that is part of the reason for doing that, to refine our understanding, our knowledge as it currently exists.

MR. LEE: Okay. Thanks.

CHAIRMAN GARRICK: Okay. I think we want to end this. Jim, we want to thank you for an excellent presentation. We especially want to thank you for complying with the rule of allowing us some time for questions.

MR. DANNA: Again, I want to emphasize that the risk insights initiative has been a team effort, NRC staff and the center, the last couple of years and acknowledge the contributions to all of the staff. Thank you.

CHAIRMAN GARRICK: We are going to take a 15-minute break. Thank you.

(Whereupon, the foregoing matter went off the record at 9:58 a.m. and went back on the record at 10:18 a.m.)

CHAIRMAN GARRICK: If we can come to order now? We are going to now hear from Greg Hatchett on the issue resolution issue. I think we will jump right into it. We have a couple of committee members who will be leaving about 11:15. So we would like to get the presentation and questions in as much as possible by then.

Go ahead, Greg.

23) REPORT ON KTI STATUS AND DWM EVALUATION OF DOE'S BUNDLING APPROACH

MR. HATCHETT: As Dr. Garrick said, I am Greg Hatchett. I am a senior project manager in the high-level waste program for issue resolution. I am just going to sort of give you an update of where we are with this resolution in the current staff's

activities.

I know you just heard from Jim Danna talking about the baseline of risk insights. The story I will tell is the baseline report was actually published out in a June memo back in 2003. We get a letter in June, about the 23rd, from DOE about how they were changing their schedule to address key technical issue agreements.

This concept of bundling came up. Jim Danna and I flew out to Las Vegas to get a look at what they were doing early on before the staff would actually get its first technical bases documents, what they called him. Jim and I took a late flight back. I think we landed around 2:00 a.m. in the morning. But during the whole flight back, Jim and I talked about how we were going to review these technical bases documents.

Jim looked over at me, and he said, "Well, you know, here is my input. Here are my thoughts." And then he kind of winked his eye at me. And then he says, "But it is your job to figure out the process." He sort of just left me there. So it is one of those things that he developed the risk insights, but then he said, "Greg, you figure out the process for reviewing the agreements and these bundles."

CHAIRMAN GARRICK: Sounds fair.

MR. HATCHETT: I want to review the status of the key technical issues, agreements, and the current activities, and, in particular, again, discuss the technical bases documents that DOE submitted to the staff, and little bit about the process for the review. And I will say something about the integrated issue resolution status report.

To date, the staff has concluded review on 90 agreements. There are 75 that have been currently received in review, and there are 78 that are in process. What I will say about this in-process thing is, as you have heard before, we have these different categories of completed; needing additional information; partly received; and, of course, did not receive, as shown here at 80.

The 48 here just reflects the ones that we need additional information on or the ones that were partly received. By the way, anything that is received and then reviewed on its in-process line here, really, all of these are in some stage of processing. Ninety have been completed. And 80 we haven't received any response from DOE to date.

Next slide. This slide represents a breakdown according to the breakdown of risk insights

on the June memo back in 2003, the memo to the Commission.

So what I have here is those that have been completed that reflect high, medium, and low significance to performance, those that are of high significance that are currently under review, medium, and low, in process, and not received in the totals all give you the 293.

This slide is a DOE presentation, actually, that was given last week at the QA management meeting. This is DOE's memo to us, really, back in November 2003, where they changed the schedule yet again from the June memo of 2003.

I started to show you what it looked like from our database, but I felt like that might be too confusing because I am trying to look at when they told us they were going to give it to us and when we actually got it. It wouldn't make much sense.

What is interesting to note here is that this is January. And they were scheduled to submit three agreements to us in January. We haven't received them yet.

In conversations, doing biweekly telephone calls with DOE, the 16 that are supposed to be coming in March, it looks like they may not be coming at all

either. So DOE continues to have schedule challenges, and we continue to try to basically get access to information so we can continue this licensing process and get information as early as possible, despite the delays that may be occurring.

Even the three that were supposed to be submitted in January, we haven't received. Here we are in February. And we are talking March next week. So, again, the only thing I will point out is we haven't received the January submittals. They weren't submitted in February, and it looks like March is in jeopardy as well.

If you go back and look at past performance here, while they didn't achieve what they expected at one point, they overachieved at another. They are still having schedule challenges. Again, our only interest is to make sure that we get access to information. And some of that comes in the form of us going out to the OR's office and looking at work in process prior to their sending it to us.

The staff is currently reviewing the integrated or bundled KTI agreement responses. And, again, this is part of the DOE's schedule change for June 2003.

One of the things this does is the

technical bases documents cover the 14 post-closure component processes. It is kind of a good thing for both the staff and for DOE in that it begins to integrate these KTI agreements in the sense that in the past, we were reviewing these things individually.

It doesn't really give you a very broad perspective of what is going on. And so getting these technical bases documents allows us to work together in a more integrated fashion than we had before, but it also gives us an early look at what DOE's safety analysis might include because they have always stated that these technical bases documents are first in a evolution of what the safety analysis report may look like regarding post-closure performance.

Here listed are just the technical bases documents that we have received to date, ones like water seeping in the drift, waste package and dripature corrosion, and a bacillar transport in volcanic events.

Just listed here for your information are a number of agreements that were responded to in these documents. What the star indicates is we have this one agreement called GEN, or general.

GEN basically is a number of comments associated with many or different KTI agreements. And

in this process, when I first got here, sometimes we would double-count this thing. So when a GEN comment comes in, it is really 17 agreements that were in TBD number 5, TB doc number 5. But I take the 17 off because, really, it shows up in 3 and 5, et cetera, et cetera. I don't want to double-count that thing. It is just that the GEN item, KTI agreement will always be partially received until we receive all responses and close them all. So that is the reason for that footnote there.

I want to talk now about the review process that we use to review the technical bases documents. One fundamental issue up here is that we had a program. At one point we were receiving information from DOE directly. And then we were handling information two or three times, trying to get things interested in document control desk appropriately.

Now we have everything going to the document control desk. Instead of tracking information according to agreements, it is now tracked according to responses because we have already had the agreements. We know what they are. We have 293 of them.

So now we are waiting for DOE to provide

a response to any one or several of different agreements. And so now it is tracked by a session number and a response.

So there is a response that comes in to us. And we receive it. And there is a response that goes out from us and status and the responses associated with agreements that were included in that response.

So what we do is we distribute those documents to the various staff, both here at the NRC and the Center for Nuclear Waste Regulatory Analyses. And we make preparation for the actual review of the document.

Down here, again, we make assignments, both internally here at NRC and down at the center as a joint review. One of the things we do in this process is since the YMRP is a relatively untested document and the agreements were developed before the completion of the YMRP, one of the things we go through is we say, "Listen, here is what the agreement says. If we go into the YMRP, look at the review methods, can we align our agreement with a particular review method within the YMRP?" It gives the staff an opportunity now to start using the YMRP before we receive a license application.

The other thing that we do is we look at the responses in this initial review period and say, "Well, gee, did they actually meet the mark?" It is a cursory review to prepare the staff for the next part of the process, where we get together and talk about it.

The other thing that occurs down here that isn't necessarily listed down here is that the performance assessment staff in preparation for this meeting prepares its understanding of those agreements for the staff consideration during its review.

So, again, we are integrating across the disciplines. And we are also integrating the performance assessment review in a way that we have never done before. It is not to say that the integration wasn't occurring before, but because of the technical bases documents, we are actually planning for the integration, making sure the integration occurs using the YMRP and also using the performance assessment insights, which are derived from the baseline of risk insights.

Let me go to the next slide. Again, after all of that up-front work is done, the review team gets together. One of the things we do is we first discuss the technical bases documents in the context

of the post-closure performance. So back on one of the other slides you saw, you saw the technical basis document on water seeping in the drift.

We want to first look at what DOE is saying about water seeping in the drift more broadly. It gives us a wide view of what is going on with water seeping in the drift, instead of looking at the agreements first and foremost, because at some point, this is what we may see in the license application.

And to the extent that our agreements are relevant to that area, we want to understand that and get responses to that from DOE and see if they can satisfy those agreements.

We also want to know, what is DOE doing? How has the program evolved from the static development of these agreements back in '99, 2000, 2001? I mean, we are talking 2004 now. Has anything changed? Do we still believe our agreement is relevant based on what we see the direction is in this thing? And then we apply the risk insights to that as well.

We want to do that. Then we basically put together some meeting minutes, assessment summary, and some action items. The team goes out and does its detailed review. What is interesting here is because

there are multiple agreements, before we were just getting a response that might have one or two agreements in it. We would just take those agreements and say, "Well, you are the KTI lead for this area. You are the KTI lead for that area. You go decide whether or not that is acceptable or not."

With these technical bases documents, we are looking at things more broadly. We are looking at the risk insights. We are looking at performance. And we are saying to ourselves, "In the context using a technical basis document as a backdrop, how have they answered and responded to these agreements? How does risk information get incorporated into our thinking in terms of what is adequate at this particular stage in the process?"

What we find is that, hey, some of these agreements we believe adequately address. So we end up doing partial responses, if you will: one where we have additional information on some agreements and others where we believe they satisfied it.

And so then we communicate with DOE either asking for additional information or we forward the response back in. We have completed it. So it starts that whole loop again. And that is where it gets a different status or it stays at the same status

depending on where the agreement is in the process.

But, again, we are integrating risk insights. And we are using the YMRP. And we are asking ourselves, "What is the relevance of the agreement based on when it was constructed and how the program has evolved to date?"

Next slide. On December 23rd, we forwarded a letter to DOE regarding the first set of technical bases documents that we had received. The technical bases documents provide -- and everyone on the staff agrees with this -- a very good overview in some sense of that technical area, that component of the post-closure performance.

Again, it is a road map. And we always want to see the underlying justification or bases for their conclusions, which aren't always apparent in these technical bases documents. So we looked at the areas that they had referenced in the technical bases documents. In our letter of December 23rd, we simply asked for those references, believing that those references provided the underlying bases for their positions or for their conclusions.

Unknown to us, they were preparing to send us a letter on the same date, saying, "Here is how we are going to give you access to these references." We

took a look at that letter, and we had a conversation with DOE. They subsequently sent another letter back out on January 30th, saying, "Okay. By the way, here are the 50 or so odd references you asked for. Here is a schedule we are going to give you for when you can get those references. And they are still coming in to date."

To date, we have complete references for the biosphere documents on their Web site. And we are still waiting for the references on the other technical bases documents that we have, some of them for the technical basis document number 8, which is on colloids.

With respect to that, I will say something specifically about technical basis document number 12, which is the bacillar transport. Of the seven agreements that were bundled or integrated together, we sent out a response closing five of those seven. The other two were on igneous activity. And we are currently putting a schedule together to review that. Then we have all of the references.

One of the things that we are doing is we are revising NUREG-1762, which is the integrated issue resolution status report. And it is being revised to reflect the status of the program since F.Y. 2001. So

the information in the existing report is old information.

Of course, this predates also the baseline of risk insights. So we want to to the extent we can risk-inform the IIRSR. We will also document the status of issue resolution agreements and where we stand with that in the document. We anticipate completing this action in September of this calendar year.

In summary, the staff is risk-informing the issue resolution process. We also use it to further refine the nature of the information gaps as we understand them in the update to the integrated issue resolution status report.

We are monitoring the agreements. And, as I said before, back on the other slide, it shows the DOE schedule. One of the things we are doing is we are trying to get early exposure, despite the schedule challenges that DOE faces, by going out to the OR's office and trying to look at these documents, the work in process, and get a feel for what is covered and try to get an understanding of what is going on in the program.

More recently, DOE is creating a satellite office up Rockville Pike, at the Twinbrook location,

that would serve the same purpose as the OR's office. We can go in and review work in process. What that does is as we deal with getting prepared to review a license application and still have the need to do pre-licensing, we are operating in parallel universes here.

We are trying to get ourselves ready to do a license application review. We are trying to continue on with pre-licensing interaction. Schedules are getting tight. And we are reviewing a massive number of agreement submittals. And flying back to forth to Las Vegas becomes time and resource-intensive.

So the idea of the satellite office will help to alleviate some of those pressures by providing a brisk walk up the street and a review of those documents. And then the staff can determine the nature and extent of their interactions based on being able to get information early. And I would say it is somewhat collocated in a way in terms of being on Rockville Pike. So it is close to get to. And, again, it prevents that resource and time-intensive process that we recently have been engaged in.

Again, DOE stated that it did intend to meet its schedule for submission of the agreements.

But, as I indicated before on an earlier slide, they continue to have schedule challenges. All it does is builds up the number of agreements that the staff will have under its review, again, as we move to get ready for a license review and move into a licensing framework and DOE freezes its LA for management review in June.

If you go back and look at the schedule slide and you can just tell, get a feel for the nature of interactions. While we are going to be continuing to engage in pre-licensing, they are going to be more focused on preparing that license application and getting it submitted.

So, again, we are operating in parallel universes the need to continue pre-licensing and the need to move to a licensing mind-set framework looking at the YMRP and using it in our review and incorporating the baseline of risk insights into what we do. It is just going to be an interesting time.

I am trying to be sensitive to other people needing to leave. Hopefully I left enough time for it.

CHAIRMAN GARRICK: Thank you. Thank you very much. You certainly did.

George, any questions?

MEMBER HORNBERGER: Greg, thanks. That was pretty clear.

I just have a couple of things that you can probably clarify for me pretty easily. When I look at your agreement status and you have 90 completed, does complete mean that all of the issues are closed?

MR. HATCHETT: Well, as we stated, complete means the staff has no further questions at this time.

MEMBER HORNBERGER: I understand the nuances of closed, but no further questions at this time. They're not open anymore, right?

MR. HATCHETT: They're not open anymore.

MEMBER HORNBERGER: Okay. You have, then, 75 received and in review. I will tie this with a question related to the DOE schedule you showed. So you have 75 reviewed and received and in review. Can you give me sort of a gut level feeling on your part as to your timing for moving them to the end of your flow charts?

MR. HATCHETT: Well, I mean, I can tell you that part of the problem we are dealing with has to do with two issues. It deals with adequate justification for satisfying the agreement where the

staff has no more concerns and would like to close them and the issue of quality.

I break quality into three categories. There is this transparency. There is traceability. And there is completeness. My observation in working with the staff has been the issue of quality and adequate justification, there is a fine line between them.

And so we are dealing a lot with trying to clarify whether it is adequate or not or it is just a fact that it is just not complete and it is not traceable. We don't understand how they got to their conclusion.

So it is really one of those things where it is a wait and see game. I mean, I believe that DOE may have done the work, but it is clear to me that they have not explained to us in some of these documents how their conclusions are adequately supported. So it is a wait and see game.

I can't give you any definite time. All I can tell you is this. Our only interest right now is to see where they are going to with the program, what they are doing getting early exposure to that information so the staff can have a better understanding of what we may get in a potential

license application.

So to the extent that we close agreements, we are going to continue to engage in that process, but we are not going to obsess over it, if you understand what I mean.

MEMBER HORNBERGER: Yes. Actually, I wasn't even questioning getting to closing the issues, but getting these things at least out of your pipeline and the portions that have to go back to DOE back to DOE and the portions that get closed closed. I am just trying to get a sense of the pressures on your staff.

MR. HATCHETT: We are still waiting for additional information on those other documents. So, again, they have a schedule for taking this out to March, when all of those references would be in. So if you go back and look at the DOE schedule, which is on slide number 5, we have got 75 under review, which stem from the October through December submittal.

And we are still waiting for documentation on five of those TBDs, which are in our December 23rd letter. This is the number here. And we are still waiting to get information to complete our review back here.

So no. The mountain is building. And if

they freeze their LA, they review in June. So you can draw your own conclusion. Again, we engage in pre-licensing. We still need to understand and then get ourselves ready for a licensing review.

MEMBER HORNBERGER: I think I do appreciate the difficulty you are facing. I am just trying to, again, as you say, get a bit of a grasp on the problems you face.

So let me make now a rash assumption. The rash assumption is that, regardless of the timing across this coming summer, let's say that by September, you actually do get all of those technical basis documents in. What does your time frame look like to have your staff review them?

MR. HATCHETT: King, would you like to?

MR. STABLEIN: This is King Stablein with the NRC. I work with Greg on this issue resolution area.

Clearly, as we get closer to license application time, it becomes more and more difficult to do a complete review in terms of closure of the agreements. To the extent that we can, we will. We have a number of other initiatives ongoing ready for the license application review also.

If the agreements cannot be closed by the

staff prior to license application, we will be looking at that material in the license application, where possibly DOE will have provided all of the information needed.

I don't know if that helps, but I think what you are getting to is the point that we are just not going to have time to completely address all of these agreements and certify them closed prior to license application.

MEMBER HORNBERGER: Carol has a comment.

MS. HAMMOND: Carol Hammond, Department of Energy. I just want to add a little bit to what Greg is saying.

Some of the references he is talking about for the first set of documents that were submitted this fall, I think there were seven of them. I know Greg is referring to references that we are making available. He is referring to final references because the references that Greg is referring to were submitted in draft as we were finalizing them.

The letter of the 23rd of December that Greg is referring to asked us to submit final references because the NRC was unable to make conclusions based on the draft references. And so we have submitted in some cases the finals for those, but

all of the final documents, the final references are basically available. That was the follow-on letter that Greg referred to that we submitted the schedule for, those final references, most of which are available.

So that is for the schedule that Greg referred to. But the staff I do think has the draft references that will allow them to do a lot of their work. So I just wanted to clarify that.

MR. HATCHETT: DOE gives us access to the draft references. In sticking to our policy of openness and trying to have the public have confidence in what we do, we can't make conclusions on those documents because they are not publicly available.

So let me clarify that. Until they become publicly available, while we may have reviewed some of that documentation at the OR's office and believe that the documentation satisfies agreement even, we can't close it because the document is not complete. It is not available to the public. Therefore, we don't close the agreement, despite what we think about that after having reviewed it.

MEMBER HORNBERGER: Ruth? Mike

VICE-CHAIRMAN RYAN: If you could just back up to the previous slide? I had the same

questions George has asked, but I did them a little bit more numerically.

If I just take the high-risk category, you're a little less than ten percent complete. I know that is not a fair assessment. I want to ask my question in a second. And then, of course, overall half of the high-risk you haven't received yet. That is maybe not fair. And I want you to maybe help me understand exactly how much is not fair.

By not having roughly half of it, does that mean you have half the work to do? The hard one is the ones you haven't received or just some sense of --

MR. HATCHETT: I mean, if I go back to Jim Danna's earlier presentation, these risk insights are how the staff sees the repository, the staff's understanding of the repository.

DOE while they are aware of our ranking of certain agreements are doing their work despite NRC's ranking or significant specification of those individual agreements.

Last week in our QA management meeting, Joe Ziegler with the Office of Repository Development presented a slide that says, "Here is how we are different from the NRC."

What is interesting about that is he made a comment. He said, "Well, the reason why, for instance, the saturated zone is of high significance to NRC but not of significance to us or not as high a significance to us is because we don't believe we have enough data to support that conclusion for us. Therefore, we rely more on the unsaturated zone."

So he made it very clear. He talked about differences. But, again, those differences may not be that fundamental in terms of when they deliver their safety case.

VICE-CHAIRMAN RYAN: I bring this up because I want to caution myself and others to think about this in terms of the detail you are providing, rather than just playing with this numerically and thinking about percent complete.

What you are saying is that is really not a fair assessment. I think that is helpful that people realize that so they don't misjudge them. You said the mountain was building. We don't want to misjudge.

MR. HATCHETT: Yes. I think what we can take away from this is just what King said. I mean, while DOE may submit responses on all agreements prior to the license application being submitted, it doesn't

mean that this staff here will have reviewed it in disposition.

VICE-CHAIRMAN RYAN: Right. As I understand it -- correct me if I am wrong or expand it if you need to -- the first step is the completeness of the application decision. That will kind of factor into where you are in closing these things out or reviewing the application itself or both or how does that work exactly?

Again, what I am trying to think about is you don't want people to say, "Well, if these aren't all closed, that means the application is incomplete." I mean, that doesn't make sense to me, but I just want you to maybe expand on that notion a bit.

MR. STABLEIN: We will be doing, of course, an acceptance review.

VICE-CHAIRMAN RYAN: Yes.

MR. STABLEIN: And that acceptance review will be based on what is required in part 63. And we have some guidance in the Yucca Mountain plan. These agreements will factor into how we look at the information provided. These are not our criteria for determining whether it is acceptable or not.

VICE-CHAIRMAN RYAN: Thanks. Again, I just want to at least clarify in my own mind that

point, make sure others don't misjudge this as a completeness kind of thing standing alone by itself.

CHAIRMAN GARRICK: Okay. Go to slide 9, unpaginated slide 9. At the bottom there, you say you align the agreements with the review areas of the Yucca Mountain review plan, et cetera, et cetera. Is that alignment or aggregation in accordance with the abstractions of the Yucca Mountain review plan?

MR. HATCHETT: To the extent they apply, yes. Sometimes it is even in scenario analysis as well. One of the things we talked to the staff about is, "If I am reviewing this agreement and I am using YMRP, which review method would the agreement be reviewed under?" Sometimes it falls under multiple review method areas. And then we go back and ask the staff. If you had to review it primarily for one, which one would it be? That is kind of how we do it.

CHAIRMAN GARRICK: So DOE has their bundling approach, and you have your bundling approach. Was there any thought given to requesting DOE to bundle theirs on the same basis?

MR. HATCHETT: What we talked about when we went out there in September to look at these documents was DOE sort of felt like the nature of the KTIAs, key technical issue agreements, could fall

under any number of the 14 components of the repository.

CHAIRMAN GARRICK: Right.

MR. HATCHETT: So they made a judgment call to say this group of agreements we are going to address in this technical basis document, and this group of agreements we are going to address in that one. But it could have gone either way. And so they made a choice to decide where they would try to respond to that.

CHAIRMAN GARRICK: I see. But I think it is a good idea to do it by the extraction models if you can do it as they are defined in the Yucca Mountain review plan.

Can you give us a sense of the magnitude of these responses? And do they vary much between your categorization of high, medium, and low? In other words, if you get a response of a risk item, how does that documentation compare with the low or does it depend so much on what the nature of the agreement is that it doesn't --

MR. HATCHETT: I will give the response in this sense.

CHAIRMAN GARRICK: Are we getting --

MR. HATCHETT: Let me explain it this way.

With respect to how the repository is supposed to perform in DOE's eyes, he simply says -- colloids, for instance. That is technical basis document number 8 that is listed there in the slides. We believe it may not be a significant contributor to performance.

And so they make conclusionary statements or the document is thematic in the sense that they also believe it may not be a significant contributor to performance. What is lacking is the baseline of information necessary to support that thematic argument.

And the document is very small. But when will receive technical basis document number 5, which is in the empirical environment, it was two and a half sizes at the time. So if that is any indication of how they are giving us technical information to support an area that is significant in terms of performance versus one that they believe is not that significant in terms of performance, the level of detail in the documentation in an area that they believe is significant increases to about two times.

CHAIRMAN GARRICK: Yes. What I was trying to get a handle on is whether the importance of the issue based on a risk insights perspective was lining up in any way with the amount of documentation that

you are getting.

MR. HATCHETT: To the extent that they agree with us, yes, it does. They give us more information for high-risk ones, higher significant ones, than they do for ones that they believe --

CHAIRMAN GARRICK: Which brings us back to the fact that the 18 remaining high-risk ones could really introduce quite a bit of uncertainty about your schedule.

MR. HATCHETT: I will take that as a fair assumption.

CHAIRMAN GARRICK: All right. Very good. Jim?

DR. CLARKE: Just one question to clarify. If I understand what you said, you are ranking them and they are ranking them. So both of you have a high, medium, and low significance on these agreements?

MR. HATCHETT: No. We definitely want to speak to this, but they had a risk prioritization report they submitted back to us back in -- I don't know. I forget the actual date of the report. That is the report that they are using to do their sort of risk significance, which is not the same way we are doing ours.

DR. CLARKE: Okay. I was wondering if you were running into significant differences.

MR. HATCHETT: Again, at the QA management meeting, Joe Ziegler gave a brief explanation of some of the areas in terms of how they are different from us in terms of our level of significance in terms of performance.

DR. CLARKE: For example, if they thought something was of low significance and you didn't necessarily agree, then there would be reason for you to want more documentation when it is low significance.

MR. HATCHETT: Or had they adequately justified why it is of lower significance. Then the staff would have to make that judgment in its review.

MEMBER HORNBERGER: Yes, Mike Lee?

MR. LEE: One thing this Committee has been asked with some regularity by the Commission is "How is KTI issue resolution proceeding?" In your discussion of slide 3, you noted that the devil is in the details. The transparency, the traceability, and the completeness issues really have to be evaluated on an individual basis of the staff to reach a judgment as to how well DOE has complied with the information request.

I guess in some respects, you could argue from the staff's perspective that by laying out the questions for DOE in the context of these 293 agreements, you are on record as to the information that you need. DOE is on record that they are going to address each of them by the time of license application submittal.

Is it fair to say that you are really not going to have a sense for the type of information you are going to have until all of the agreements are satisfied? I mean, is this a question where the sum is rated in the whole?

MR. HATCHETT: I guess what I would say to that -- and this may or may not address the question that you are raising -- is that from my perspective only -- and I don't know how many people on the staff share this with me, but DOE is doing something.

First of all, this is a one-of-a-kind project We early on were proceeding along the lines of KTI agreements in what I will call semi-silo, each KTI lead looking at their individual area. But at the end of the day, it is a system that performs as a unit.

As you begin to look at it performing as a unit, the department now has to try to integrate its

look and pour on the various disciplines to make all of that work and at the same time as they integrate it, create a regulatory document, which I think is a very different thing than sitting there and trying to integrate your work to meet or to demonstrate compliance. And so, again, I think the quality issue that breaks down into traceability, transparency, and completeness is somewhat plaguing them as they try to do both activities and meet their 12/04 proposed deadline.

So, I mean, again, the devil is in the details. I think it is an overwhelming task that they are trying to undertake. My hat is off to them. But, again, they are the ones that have to do the compliance demonstration at the end of the day.

CHAIRMAN GARRICK: Any other questions?

MR. COLEMAN: Yes. Neil Coleman, ACNW staff.

Greg, about the low significance agreements, there are 160 altogether. Thirty-four haven't been received. I just wondered if the staff have looked at the risk insights to determine if responses from DOE would be needed for all of those 34.

MR. HATCHETT: Giving the party line, we

are waiting for responses on all of the agreements, despite their risk significance. I mean, we are engaged in this process to the end. Now, we just have determined that one has more significance than the other. I mean, the only answer I can give to you is that we are still waiting to receive all of them.

Tim?

MR. McCARTIN: I guess there was never an implication when we ranked these that low meant zero. We felt all of the agreements were information that we needed. Certainly the level of detail is impacted, but we felt that information was needed.

We did not put forward agreements for information we felt we did not need, but it is fair to say not all of the information has the same impact. That is why it was ranked.

MR. HATCHETT: Every licensing activity has a baseline of information that is fundamentally needed to make a decision, despite the degree of significance. I mean, absent that, the staff has a hard time making a decision. It is just that underlying information that girds that safety argument that a potential applicant could make.

CHAIRMAN GARRICK: All right. Any other questions?

(No response.)

CHAIRMAN GARRICK: Thank you very much, Greg. We will look forward to a report later on.

Okay. This ends the formal briefing session of our Committee meeting. From this point on, we will not need to have a record. So we will take just a two or three-minute break while that transition takes place and come back. And the Committee will consider its reports.

(Whereupon, at 11:00 a.m., the foregoing matter was adjourned.)