UNITED STATES

NUCLEAR WASTE TECHNICAL REVIEW BOARD

1995 SUMMER BOARD MEETING

EXPLORATORY STUDY FACILITY UPDATE
REPOSITORY OPERATION AND CONCEPTUAL DESIGN
REPOSITORY LICENSING

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500 South Main Street
Salt Lake City, Utah 84101

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I N D E X

P R O C E E D I N G S

(8:30 a.m.)

DR. BREWER: Good morning to everyone and welcome to the second day of the TRB Summer Meeting.

For the last couple of years, the Board's reviews of the repository program have concentrated on efforts to evaluate the suitability of the Yucca Mountain site to host high-level waste and the repository. The DOE's site suitability decision is the most immediate major goal of the program. A large fraction of the DOE's efforts have been directed toward achieving this goal, site suitability. As we heard yesterday, design and construction of the exploratory studies facility is an activity of great interest to the Board because the information to be acquired from the ESF will play a critical role in determining whether the Yucca Mountain site is suitable.

Concurrent with site suitability studies, concurrent with them, the DOE has also been preparing for a longer term goal; namely, to obtain a license from the Nuclear Regulatory Commission to construct and operate a repository at Yucca Mountain if the site should prove suitable. These are two activities that are running along, more or less, in parallel with some connections.

Today, we turn our attention to those preparations for licensing. We're fortunate to have with us today representatives from the Nuclear Regulatory Commission who will describe for us the NRC's licensing process. I understand that a similar presentation has already been made to some of the DOE employees and contractors and that the presentation was well-received. The Board anticipates that this presentation today will help us better understand the requirements of the licensing process and, thereby, help us in our evaluations of the technical work being undertaken by DOE at Yucca Mountain. Two decision processes with a lot of relationships one to the other; it's appropriate that we've organized, I think, the two days for our summer meeting as we have. Following the NRC presentation, we'll hear a series of presentations from the DOE describing the program approach to repository licensing, the status of the annotated outline of a license application, licensing schedules, and peer review of the thermohydrology part of the whole program.

Now, before we begin today's presentations, I really want to apologize to anyone in the audience who may have come--because we had announced it in our press release and the notification of the Board Summer Meeting--anyone who has come to hear about NEPA, the National Environmental Policy Act. In our view, NEPA compliance may be just as important to the success of Yucca Mountain as licensing, and

the Board has been consistent in this view and consistent over a long period of time. You've got site suitability, you've got license application with the NRC, and you've got NEPA; the three important goals, hurdles, challenges that must be met if the program is going to work. For that reason, we had hoped to include in today's presentation a review, a current review, of current DOE plans for NEPA compliance. And, unfortunately, DOE declined our invitation to provide us with updated information about NEPA compliance strategy and, more specifically, what DOE is going to do at Yucca Mountain. Basically, there is no additional information over that provided by the DOE in its presentation to us, the Board, in January. So, we dropped the topic from today's agenda. We'd like very much to encourage the DOE to take this third major challenge as seriously as we do and we would like to offer them the opportunity at our October meeting to come and tell us what they're doing as of October to meet the challenge. That's a nice way of putting it; meet the challenge of NEPA.

One more administrative item before we go to the day's presentations. You'll notice at the end of the agenda for today, it's a relatively short program. We're supposed to be finished around 3:45 or thereabouts, 3:00 o'clock. We have scheduled, as we always do, an opportunity for the public to make comments on anything that they've heard today,

yesterday, or anything else that's on their mind with respect to this program. Again, this is one of the serious functions of the Board, the TRB, is to provide open access to anyone who has a view or questions, and we've provided this particular opportunity to the public and to others in the audience. To manage the process of public input and comments, please, if you would, if you want to say something later in the day, sign up with our staff in the back, Linda Hiatt right there, and we will be sure that you get your time. If you think of something sort of as the day goes on and you haven't signed up, of course, if we have the time, we'll be glad to hear from you.

Now, let's get on with the day's agenda. The first presentation today is a description of the NRC's high-level waste licensing process. We have a contingent of NRC people today led by Mr. Joe Holonich who is Chief of the High-Level Waste and Uranium Recovery Projects Branch at the NRC. You must have a very wide calling card, Joe. That's long. I'll let Joe introduce his colleagues as the presentation unfolds. There are three or four of them.

But, now, let me turn this over to Joe. Welcome, very much, to the Summer Board Meeting and we all look forward to the presentation.

MR. HOLONICH: There's a package back there with a yellow cover on it which outlines and contains copies of our

presentation. Not to frighten people, we don't plan to go through that entire package today. We've got in there our presentations and our slides, as well as some background information, that we thought might be useful for folks to get a picture of what the NRC does and how it approaches its licensing responsibilities. What we're going to try to do today is give people a little background on the NRC and how it regulates in general. Then, show how that philosophy is applied to the high-level waste program, show what we're doing today to implement our responsibilities in the high-level waste program, and how we're going to approach our responsibilities at the time of licensing.

The presenters today are going to be, of course, myself. I'm going to talk a little bit about the overview of the NRC and how the NRC's basic philosophies are incorporated into the high-level waste program. Mark Delligatti who is our Yucca Mountain team leader will be talking about what we're doing today in site characterization. I'm going to then come back and talk a little bit about licensing. I left John Thoma's name up here because this is actually John's presentation. He couldn't be here this morning. I'm going to be giving it for him, but I wanted to give him the credit that he actually put it together and this is his presentation. I just happen to be the messenger at this point. And then, Marty Malsch who is the deputy general

counsel at the NRC is going to talk about the hearing process which is an integral piece of our licensing activities.

Included in the package are a number of pieces of the Commission's regulations. 10 CFR Part 2, which are the Commission's rules of practice, this essentially says how the Commission does its business, how the Commission will docket a license application, and what's involved in a hearing and notifications and things like that. There's 10 CFR Part 60 which are the technical requirements for licensing a geologic repository. Based on some feedback from the DOE technical exchange, I've included 10 CFR Part 51. Part 51 contains the Commission's regulations for implementing NEPA and 51.109 talks about how the Commission will adopt the DOE environmental impact statement which will be prepared for the repository. So, that was included in there because it is a piece of what the Commission will do in its licensing process. The rest of Part 51 talks about how applicants need to prepare environmental reports and how the Commission will prepare environmental impact statements. The repository is unique. DOE will prepare the EIS and we will adopt it. So, our piece of Part 51 talks about how we'll go through adopting the EIS for the high-level waste repository.

In addition, I've included the statement of considerations which is kind of the legislative record of Part 60. This is what the Commission was thinking when it

promulgated Part 60. This is what it was intending to try to accomplish through these regulations. That helps people understand what we're trying to do with the regulation and what kind of review we'll be approaching this from. This is kind of the philosophy of the Commission whenever it promulgated those regulations.

There's a management directive on openness. The Commission works in a very open forum, and it recently had a policy statement on open public meetings and this got translated into a management directive that the staff now uses and this covers all of our interactions with DOE. It's a very open process.

And then, finally, I included a copy of the Union Electric Callaway Plant License so folks can see what an NRC license looks like. Just to caution people, this is the original license that was issued. It's about 11 years old and it's been amended and changed over the years. But, it shows what a license is and how you prepare a license and what's involved in a license. That's not the complete license. There are a set of technical specifications and a set of environmental specifications which are about four inches thick which are a condition of the license. I didn't include those.

So, that's what else is in the package. And, when I said this morning we're not going to talk about everything

in the package, I just wanted folks to know there was a lot of background information to give you some idea about how we focus and what our efforts are.

So, what I'm going to do is start off with talking a little bit about the NRC and how the NRC views life. Essentially, the NRC is an independent regulatory agency. What that means is unlike DOE when it promulgates a regulation, they have to go down to OMB and get OMB clearance. The NRC does not. The NRC is an independent agency and can promulgate its regulations without any clearance through OMB. In addition, it was established through the Energy Reorganization Act of 1974. It split up the Atomic Energy Commission into the NRC and ERDA which then eventually in '78 became the Department of Energy. Right now, there are about 2800 people on staff at the NRC. Since I've been there, it's been between 2500 and 3300. So, we're about the average of what we have been at the past 15 years. What we're responsible for is the civilian use of radioactive materials. That includes nuclear power plants, special nuclear material, source material such as uranium yellow cake--that's the other half of my title; uranium recovery is the source material--byproduct material which are the tailings from uranium processing, transportation materials, and of course, the regulation of the disposal of low-level and high-level waste.

I've got a fairly crude organizational chart and what I wanted to show here was that, number one, the Commission itself is kind of apart from the staff. The Commission has an Atomic Safety and Licensing Board which is the first level of hearing in the Commission's proceedings, and then if people are unhappy with the Board decisions from the ASLB, they can appeal to the Commission. In addition, the Commission has an Advisory Committee on Nuclear Waste which gives the Commission advice on how it thinks the Commission should proceed.

Under the Commission is the staff headed by an executive director for operations, Jim Taylor. And, what the staff is, the staff is a party to the Commission's proceedings. And, within the staff, there are three major offices that were mandated whenever the agency was created. Office of Nuclear Reactor Regulation which essentially handles the 100 nuclear power plants that are out there. The Office of Nuclear Regulatory Research which does exactly what it says, the research for the NRC. And, there are a number of reasons we do research; help us develop our own models and tools to do our reviews and do some confirmatory research. We want to get an idea are the other folks doing the research correctly? Are we getting the same kind of result? And then, to do basic research. Where we don't have a full understanding of a particular phenomenon, we want to get some

idea of what it is and how we want to model it or maybe how we want to regulate it and that's where research supports us. And then, there's the Office of Nuclear Material Safety and Safeguards which is the office where we reside. That office has about 8,000 licensees. It covers everything from medical use to low-level sites to the high-level sites to about 52 uranium mills out in the country.

Within NMSS is the Division of Waste Management. That's headed by John Greeves. We cover all the waste activities in the office. We have four branches we operate in a matrix type of approach. We have a Low-Level Waste and Decommissioning Projects Branch. That's headed by Mike Weber. That's really not relevant to the High-Level Waste Program. We have my branch, High-Level Waste and Uranium Recovery Projects. We're the project branch which develops the program policy, insures the program is implemented. We have liaison responsibilities with outside organizations like DOE, the State of Nevada, members of the public. There are two technical branches that support us. Performance Assessment and Hydrology which is headed by John Austin, and that branch does exactly what it says, the overall system performance on how the site meets the EPA standards and it looks at hydrologic transport at the site. And then, there's the Engineering and Geology Branch. That branch is responsible for reviewing the ESF design, looking at the

geology of the site, looking at what DOE's doing to characterize the site. Those two branches work with us to make the program. Mark will lead the teams on site characterization reviews, but the teams will tell him technically what they believe is right and what they think is correct and how they think we should approach this problem.

The basic regulatory philosophy of the NRC is spelled out in the NRC information digest which is NUREG-1350. NUREG is the way we characterize our reports to catalogue them. What that philosophy essentially says is that we and licensees share a common responsibility to protect public health and safety. Federal regulations in the NRC's program are important elements in protection of the public. NRC licensees, however, have the primary responsibility for the safe use of nuclear materials. That's an important philosophy and what I'm going to try to show you through the next couple of presentations is how that philosophy gets implemented. What that philosophy essentially says is it's DOE's facility. DOE has got to show us that the facility is safe. We'll decide if we agree with DOE, but we're not the ones responsible for insuring the safety of the facility. DOE is the organization responsible for that.

Because we kind of take that approach, one of the things the NRC does is place a very important focus on

quality assurance and the reason is we cannot inspect and follow everything the DOE is doing. So, we need to make sure that DOE's got some kind of program where it is systematically obtaining datas and facts, where it's making sure the work was done properly, and it's making sure that problems are identified and corrected. We've had a couple problems in the past and most recently in about the October time frame of last year where we had come to the conclusion DOE was doing a pretty good job of identifying the problems, but we weren't seeing them being corrected. And, that's an important piece of the puzzle. To find something isn't bad, but not fixing it becomes a problem then. And, if you're finding it over and over again, you're getting indications that the program is not working the way it should.

What the QA program does is it gives DOE the records that form the detailed basis for its demonstration of compliance with the regulation. What those documents do is support the NRC's licensing decision. They provide traceability of work. When we look at a design of the repository in an application, DOE may describe to us how they did the work and what kind of methods they used, but the actual calculations aren't going to be there in the application. They're going to be contained in the engineering design packages and the engineering drawings that take up file drawers down at the DOE headquarters. Now,

we're going to go back and we're going to want to see some of those files to see that the calculations were done right. We're going to want to see some of those drawings. If we see 10 and nine are right, we'll have a confidence that things are being done right. If we see 10 and three are wrong, we're going to start to dig deeper because we're going to think there's a problem there. But, we're going to be looking for DOE to be able to produce the records to show that things were done right and to produce the records to show that they have the information that builds the basis for the license application. Lack of the records, we're not going to be able to make a finding that work was done properly.

A lot of things are going to happen over the lifetime of this facility. Somebody is going to walk up and say, you know, they went through, they dug the tunnel with the tunnel boring machine, and there were faults there that they shotcreted over, and we're going to have to turn to DOE and say show us that your mapping was done right. Show us that you got all the faults that were there. That's why those records are very important. My experience from the reactor side of the house is there was one utility that people said, hey, they didn't do the strength tests on concrete right. They couldn't find the records. What they had to do was go take coring out of the containment and do

stress testing on the containment concrete because they couldn't find the records to show that the testing was done right whenever they built it. It's very important that DOE have the records and support it. That goes back to the basic philosophy of the burden rests with DOE and we're looking for DOE to make sure the job was done right.

Another important policy framework that we work under is issue resolution. In February of '92, we came to agreement with DOE on what issue resolution was. Essentially, there were three basic principles. Number one, we have no more comments or questions at this time on a particular issue. We chose the words very carefully because what we have done in our previous reviews when we identify something to DOE, we identify it as either one of three things; an objection, a comment, or question. An objection is something that we think is so serious, DOE shouldn't proceed with work. A comment is something that we think is serious, but not warrants us objecting to the work. However, if it's not fixed, it will be an issue at the time of licensing. And then, there are questions where we just basically don't understand something and we need clarification on it. And so, the objections were something that weren't there whenever we went to issue resolution. So, the comments and the questions is what were focused on for issue resolution.

The second principle was you can't get final resolution unless you go through rulemaking or through a licensing process. At this point, all issue resolution means is the staff is happy. It doesn't mean that a licensing board is happy. It doesn't mean that the Commission is happy. If you want to make the Commission happy, you would have to have the Commission promulgate a rule or you would have to go through the hearing process and have a Board decision that it was acceptable and a subsequent appeal process if it happens that the Commission agrees with whatever the decision is. That's how you achieve final resolution. So, right now, when you achieve resolution, it's just between the staff and DOE. It doesn't mean that the Commission, the agency, is happy with the resolution.

And then, finally, obviously, if something new comes up, new information becomes available, we go out and we do an audit and we find some issues as we're doing these checks of the detailed records, we can reopen an issue. An issue is only closed as long as things continue to confirm what the NRC finding was. If things tend to show something different, then we're going to go back and reopen it.

The process is applicable to current open items. We've got a bunch of open items on there, somewhere in about the 300 range, comments and questions. The process can be applied to them. The process can be applied to the license

application annotated outline and I'm going to talk a little more in detail about how that gets done in a later presentation. And then, it can apply to other document reviews like site characterization, progress reports, and topical reports, technical reports, the ESF design packages.

Finally, the third piece of Commission policy is the openness policy. And, as I said earlier, the Commission had put out a Federal Register notice updating its openness policy and soliciting comments back in September '93 time frame. They got comments, they put the policy into place final, and now there's a management directive which is included as a part of your package that talks about staff need to have open meetings. What's involved in a public meeting and what the Commission defined as a public meeting was a planned formal interaction open to the public. It was an interaction between any one NRC staff member and any other member of the public and they defined an outside person as an individual who is not acting in an official capacity as a representative of an agency of the executive, legislative, or judicial branch of the U.S. Government except when the agency is subject to NRC regulatory oversight. That is the high-level waste program. So, the program is subject to openness. In all the meetings we have, we go through a formal process of trying to give 10 day notification and members of the public can participate. We have a group of about 15 local

governments and whatnot who participate in it. It's all done under this open policy statement. There are some exemptions when you don't need to have open meetings and those are spelled out in the policy statement that's attached in the package. That's kind of a snapshot of the overview of the NRC.

The next thing I wanted to do was talk about how that gets translated into what we're doing in the high-level waste program. I wanted to start out by talking about what our goals were. What we're trying to do is, number one, give DOE complete and timely guidance. We want to be able to give DOE the guidance it needs to prepare a high quality application. Number two, we want to identify issues and resolve them early. We're focusing on trying to make sure the system works because we have a mandate that we have to complete our responsibilities within three years. The way the agency has viewed that is the staff will have 18 months to conduct its review and the licensing board will have 18 months to conduct its hearings. So, we're looking today to be able to resolve issues because if we're not doing it today we're not going to be able to do resolution on many of the complex issues in the 18 month window that we have for the licensing process. And then, finally, we want to comply with the applicable statutes. Many of Marty's staff over in the general counsel's office always advise me to obey the law and

that's the best legal advice they can give me.

We want to ensure that our program, our regulatory framework, provides consistent and adequate protection of public health and safety of workers and the environment. And, we want to ensure that our research provides a technical basis for timely and sound rulemaking and other regulatory decisions so that we're getting what we need from research on a time schedule that allows us to incorporate it into our review effort and get feedback to DOE in terms of what we're doing in the review.

Two aspects of the program--it's not really a goal, but I didn't think it was worth making separate slides for these. Two aspects of our program are the regulatory strategy and the review strategy, and I'm going to talk a little bit about those two pieces. What's our regulatory role? Our regulatory role involves developing regulations and guidance and we're doing that. We've got 10 CFR Part 60 in place. We've got one amendment right now, design basis event rulemaking, that's going through. We've got another rulemaking that we've issued and proposed and probably will not be issuing in final at this point on the relationship of siting criteria to the performance objectives. We have issued a draft license application format and content regulatory guide. This is guidance to DOE. I'm going to talk a little more in detail when we get into the licensing

piece of it of how to prepare the application and how we'd like to see the application prepared. And then, we're preparing our review plan which is guidance to the staff on how to conduct its reviews, what are the detailed criteria you're going to be looking for to say that this is acceptable.

In our pre-licensing reviews, what we're trying to do is give consultation to DOE to prepare a complete and high-quality application. We think over the next seven years is the time to try to decide what should be in the application and how do you resolve many of the issues. Then, finally, we're going to prepare preliminary site characterization sufficiency comments to be included in DOE's recommendation to the President. The law tasked us with commenting on the sufficiency of waste form and at-depth site characterization at a minimum. We'll probably give comments to DOE on a broader range than that, but at a minimum, that's where we need to focus on. So, that's what our regulatory role is in this in pre-licensing.

When you get to licensing, what we're going to do is we're going to turn and we're going to look for DOE to provide us with a complete high-quality application that demonstrates compliance with Part 60. We're going to review the application and determine whether we agree with DOE if it's done the job acceptably. And then, probably both we and

DOE will go to a hearing and defend our position and we're going to talk a little bit more in depth in the hearing process when Marty gets in there.

Our regulatory strategy was to look at this as a unique program. You've got a regulation that's never been implemented and, most likely, will be implemented one time. What we wanted to do was to look at this regulation and make sure that you were not ending up in a hearing contesting what the regulation meant. That the hearing was focused on the technical merits of the repository design, not on does the regulation mean this or the regulation mean that. So, what we did was we looked at 10 CFR Part 60 for clarity and for completeness. For clarity, what we did was have our Center for Nuclear Waste regulatory analyses sit down and read the rule and come back to us and say where do you think the rule is unclear? Where do you read something that could be interpreted a number of different ways? And, they came back with about 50 requirements there where they said the rule could be read a number of different ways. And, we took those 50 and we looked at them and we came up with a number of ways we could address them. We could clarify it in regulatory guidance, we could clarify it through rulemaking. Some of them, we weren't sure what to do. There were about nine of them where we needed further analysis and some of those now are starting to come to a head. Substantially complete

containment was one of those where we said we weren't quite sure what to do. It looks like now we've got things focused and we're able to give guidance to DOE.

For completeness, what we did was we did a functional analysis of a repository. What are all the functions you expect to happen at a geologic repository? Then, we took those functional analyses and said of those functions, which ones are related to radiological health and safety? When we got that subset then, we took those and compared them to the regulation and said were they covered in the regulation and, if so, were they covered adequately, and if they weren't covered, do they need to be covered? And, that's where we came with the design basis event rulemaking. There was a gap in the regulation, in addition to having a gap in terms of pre-closure area. We were also missing some design requirements that we thought were important. So, the design basis event rulemaking came out of this second piece of looking at completeness of the regulation.

All together, there are 54 regulatory and institutional uncertainties identified. Our nomenclature, regulatory uncertainty, is something where the regulation is ont clear. What does the regulation mean? An institutional uncertainty is something where we're not sure which agency has responsibility for it. There, I think, were like two institutional uncertainties, one of which has already been

resolved. Who is responsible for RCRA, us or EPA? That was the regulatory piece of it. What we wanted to do was get that framework in place.

The next piece of it is our review strategy; how we're going to be conducting our review. And, essentially, we call it the overall review strategy. It's published as a NUREG, NUREG-1495. And, it documents how we're approaching our reviews. It provides our objectives for license application review and pre-license application review. I put them in that order because essentially what the ORS says, the overall review strategy, is figure out what you want to do to review a license application in 2001, and then think about what you need to be doing today to be able to be prepared to review that application in 18 months when it comes in in 2001. And so, that's how our basic philosophy is developed. In addition, the ORS contributes to prioritizing and integrating program activities. We're going to talk a little bit about vertical slices and key technical issues and that all has its basis in the ORS. That's our vertical slice approach.

What are we trying to achieve? Number one, we're trying to get the Commission decision in the three-year mandated time frame. Number two, we want to streamline the license application review, resolve issues today, if possible. We want to support the Commission's comments on

adequacy of at-depth characterization and waste form. We want to identify concerns and provide guidance to DOE concerning the completeness of the application. We want to identify concerns that could affect the waste isolation capability of the site. Then, finally, we want to be responsive to DOE and be able to review information it sends us, submittals that DOE provides, and give DOE feedback.

The program is being implemented through a number of ways. We're doing regulatory development. I talked about the rulemakings a little earlier. We're developing a review plan. We are reviewing DOE documents right now. We've got a progress report we're getting ready to provide comments on. We've got an annotated outline in-house that we're getting ready to provide comments on. We've got a couple of topical reports. We're out observing DOE QA audits which is another activity we're involved with. We'd like to get out in the field and do some independent oversight of what DOE's doing. This could be done either through what we call an infield verification and right now we're looking to work out a protocol with DOE to do infield verifications or through our OR's (on-site representive) office. We have two OR's stationed in Nevada and we can get out through that office and get people out there.

And then, we're tracking open items. One thing we've looked at in this program and one thing people have got

to develop whenever they come to the program is that this is a long-term program and you need to have some mechanism to know what's been identified and to be able to track that, so that when the application comes in, whoever the reviewer is, whoever is sitting in my position, whoever is sitting in Mark's position knows what's been done in the past and has a record of it. And so, we're tracking open items. And, the way we're tracking open items is through what we call our open item tracking system or OITS. What that system has is the capability for full-text search. It can generate a report on a number of different searches. We can do all the closed items, all the open items, all the items related to volcanism, all the items related to certain chapters of the annotated outline, all the items related to certain study plans. What it gives us is a long-term tracking. We had an objection on ESF design several years ago. That's now closed. What's in the open item tracking system is what the issue was, what the basis for the issue was, its status which is now closed, and the basis for the status. So that a year or two from now, people can say, hey, what happened with that issue and we'll be able to pull it out.

We're in the process of loading the system. We're hoping by the end of the year to have it loaded and be able to provide a report from the Center to DOE which lists all the items we've gotten the status of open and closed or where

we think the review is right now. But, more importantly, it also gives us the ability to go in and look at what items are still open and whether there are open items in the topic so that we don't get to issue resolution prematurely. For example, we're doing review of volcanism right now in the annotated outline. One of the things you will see is that we not only reviewed the information provided by DOE in the AO and in the references, but we went back and looked at all the open items that came out of study plan reviews, that came out of our review of the site characterization plan to see if those issues were closed or if those issues could be closed based on the information DOE was providing.

What's in there is essentially the regulatory issues, these 54 uncertainties I talked about earlier, all the review issues we've generated over the past couple of years, and then the status of those issues. And, we are in the process of having this system electronically available to the staff in about six months, and really starting to integrate that into our reviews. Then, what we envision is we're going to be able to provide DOE an update at least annually in a hard copy and on some kind of CD-ROM or something, where they'll be able to electronically disperse it throughout their organization. Of course, all the program participants will get a copy of it, too, but this will allow DOE to be able to give a check of the status, where they are,

and where they think they are, and do we think they're in the same place.

What we're doing right now in the program is what's called a vertical slice process. What this does is it basically implements the overall review strategy. It implements the ORS. What we're doing is we're focused on key technical issues which have their basis in key technical uncertainties. And, what we've done, as we developed the first version of our license application review plan, we went through and we said what are the issues in here that are the most difficult to resolve and could affect the performance of the repository? And, we identified three key technical uncertainties which are contained in Appendix E of our review plan.

What we're doing through the vertical slice process is grouping those key technical uncertainties into key technical issues and we're focused on the 10 most important issues that we think could impact licensing. And then, we're using that as a method for helping us identify what work we want to do. I have QA listed here as the first one, for example. DOE coming up in fiscal '95 could have 25 QA audits. I'm budgeted to do six. Which six do I want to do? Well, I've got my 10 key technical issues and that will help tell me which QA audits I want to go out and observe. If volcanism is a key technical issue and I'm working on

volcanism and DOE is going to Los Alamos, that's a QA audit I want to be able to go off and observe. If DOE is doing some design work on surface facilities of the repository, that's really not a key technical issue. We've done a lot of dynamic analysis of nuclear facilities. We may not send somebody on those kind of audits. So, it's helping us focus on what's the work we want to do? Helping us focus on what kind of field activities we want to do. It's telling us which chapters of the annotated outline we want to review. In the past, what the NRC would do would be to review the entire annotated outline and give DOE comments back on everything.

What we're doing now is focusing on those chapters related to the key technical issues. Volcanism has got three or four chapters; geologic description, presence of igneous activity, implementation through performance assessment. We're focusing on those chapters and being able to give DOE detailed feedback on what's going on in those chapters. And, also, what we're using it for is to focus our research. You've got a limited research budget. What kind of work do you want to do? Well, you want to do work where you think the main issues are and this is what's helping us decide what kind of research work we want to be able to do.

In addition, it's helping us schedule. When I talked about earlier the ORS prioritizes and integrates the

program, it's helping us schedule what review plans we want to do first. Well, if we're looking at volcanism in the AO, we'd like to have the review plan for volcanism done first. If we're looking at shafts and ramps design because they're doing ESF work out there, we'd like to have that review plan done first. The reason is you want to have that review plan in place. When you give DOE comments on the design of the ESF, you're giving them comments based on an absolute, the review plan. That next year if the reviewer changes, the review plan is still there and the review guidance is still there. So, it gets used again. So, you don't get arbitrary feedback. People know what we're looking for and they can use that and continue to implement it.

In addition, we're looking to give DOE feedback on the program approach. DOE came out with it a little over a year ago and they have yet to update the site characterization plan. So, what we're looking to do is to be able to use this vertical slice process to decide what we want to see, what we want to investigate, and then be able to give DOE feedback. You're collecting the right data, you're doing the right site characterization work, or you're not. We think you need to do more here. We think you need to analyze this a little better. What we're trying to do is give them timely feedback.

Finally, we're looking for the AO to be a very

effective process. You know, part of what DOE said was under the proposed program approach at the time. We're going to be bounding some technical parameters. We see the AO as the vehicle for DOE to be able to present to us the information on how they'll be bounding a particular parameter. Maybe, it's a geochemical parameter for the design of the waste package. They can place that in the annotated outline and, if it's acceptable to us and we think they've bounded it, we can get issue resolution. We may not get issue resolution on the complete design of the waste package, but we may be able to get resolution on that piece of it. And, maybe, DOE is doing the design approach this way for the waste package. We may be able to get a little piece of issue resolution on that. But, we see the AO as a very powerful tool to be able to do that, resolve the technical issues. Finally, we see the AO as a vehicle to consolidate the information, to focus the program for DOE, and help focus the program for us. What we're hoping is to be able to eliminate all these reports, technical reports and topical reports and everything, and be able to focus it in one document that talks about what the site looks like, the geochemistry looks like, and then how that geochemistry is used in overall system performance, how it's used in the design of the waste package. So, we see the AO as a very, very powerful tool. And, we're going to talk a little bit later when I get into the licensing piece of it

about what we're doing, what the corollary to DOE's efforts are. It's called the pre-licensing evaluation report. And, we're doing the exact same thing. We're trying to focus our review now into what's called the PER.

Just for background, here are the eight key technical issues under consideration. I said there were 10. Two of them are the ESF and MPC that aren't on this list because there really weren't key technical uncertainties related to them, but they were so important in the program that we made them key technical issues. But, these are the eight which form the basis from the key technical uncertainties that are listed in Appendix A of the review plan.

In summary, I think what we've got is we've got activities in place to address regulatory and review aspects of the program. We're starting to put our policy in place. We've got it laid out and we're starting to implement it. We're undertaking a lot of work to implement our responsibilities. Mark is going to talk a little bit more about what we're doing in site characterization and I'm going to talk a little bit more about what we're doing in preparing for licensing. We've got a vertical slice approach that's helping us focus our work, and it's helping us be able to provide real time feedback to DOE on what it's doing in site characterization today and whether we think that's sufficient

to be able to support a complete and high-quality application.

Questions?

DR. BREWER: I had a couple of followups and then we can get on to the rest of the presentation. First is how many people are actually resident--NRC people resident in the Yucca Mountain Project Office or at Yucca Mountain?

MR. HOLONICH: At Yucca Mountain in Las Vegas, there are two ORs. There's a clerical, too, but there are mainly two ORs.

DR. BREWER: Two professional staff. And, how much budget is the NRC setting aside for high-level waste at the Yucca Mountain Project on an annual basis, roughly?

MR. HOLONICH: That changes daily at this point, Dr. Brewer.

DR. BREWER: Right. I just want some sense of the order of magnitude of the commitment of the NRC.

MR. HOLONICH: Right now, the budget that was outlined earlier in the year--and these are the earlier numbers and I don't know what changes there will be--was about a staff of 40 people within the Division of Waste Management and around $10 million and around eight people in the Office of Research and around $6 million.

DR. BREWER: Okay. So, it's safe to say it's somewhere on the order of 15 to 20 million a year, in that range?

MR. HOLONICH: Yeah. It turns out to be 22 million a year, roughly. 16 million for the contract or the Center and 6 million for salaries and benefits. And, that includes two OGC FTE and about five or six people at the ACNW, but it's about 22 million, roughly.

DR. BREWER: Okay. Just some idea of the rough scale or the magnitude.

MR. HOLONICH: Yeah. A total budget of about a half a billion dollars. About 510 million is the budget for the entire NRC.

DR. BREWER: Okay. Is it the norm when you're--I presume it's not and I'd like you to clarify this a bit. To have so much NRC activity in the pre-licensing phase? Say, for a power plant, I can't imagine that you'd be doing all of this or in the past have done all this to get a power plant license. Is this a fairly unusual way of doing business?

MR. HOLONICH: It's not. It just happens that a lot of this is occurring before the official application has arrived. The way you do it in reactors was that they would submit an application and we would give them a construction permit.

DR. BREWER: Right.

MR. HOLONICH: And then, they would have seven or eight years and submit their operating license application and we would do the review there. But, in that time frame between

the construction permit and the application for a license, we would be giving them feedback. We would be giving them regulatory guidance. We would be giving them information. They would be coming in for meetings and talking about what they would be doing in their final design and we would be able to do that.

DR. BREWER: Because the power plant, the license was divided into two parts?

MR. HOLONICH: Two parts and we didn't have the mandate to do it in three years.

DR. BREWER: Okay. Are there other--just a quick response. Are there other things because of the uniqueness of this project that have forced you to do business in a different way?

MR. HOLONICH: Actually, when I get into my licensing piece, what I'm going to tell you is that we don't think so. We think our process, the overall licensing philosophy, the approach the Commission takes can be applied to this. There's enough flexibility in it that we think the process will be able to work on a high-level waste repository.

DR. BREWER: So, you're using established routines with modest modifications?

MR. HOLONICH: Yes.

DR. BREWER: You're not making this up as you go along?

MR. HOLONICH: No.

DR. BREWER: Okay. Other questions from the Board?

DR. CANTLON: This repository is a first of a kind technology. It's an emerging prototype really for almost the world. And, as a consequence, the design of it, the approach, even say characterization, changes almost on a daily basis. What in your process is there to diminish wasted bureaucratic effort on no longer relevant issues not resolved? In other words, how do you get the junk out of the process so that you're continually focusing on the emerging clarity of what DOE is trying to do?

MR. HOLONICH: I think we're doing it through two ways. Number one, the key technical issues are those issues that we think are going to be most important in licensing. There's a lot of other activities ongoing in the DOE program that we're not necessarily expending large quantities of resources on. For instance, surface facility design. That's pretty standard stuff. I mean, we've got reg guides in place to say how to predict earthquakes, how to take that and translate that into dynamic loads on nuclear facilities. We're not sure we need a lot of focused effort on that today. We've got to eventually do a review of what DOE has done and confirm that it's sufficient to meet the regulations. We cannot just ignore it and issue a license. But, we don't need to focus on it today because from our perspective that's pretty well-documented. We've done it for 100 reactors, we

do it for fuel cycle facilities. So, we don't need to focus there. But, when you get into something like volcanism, we want to focus our efforts there. So, we're using the key technical issues as those issues that we think are most important where we want to focus our staff effort.

Number two, I'm going to talk about a little later in the licensing presentation. We're writing our preliminary evaluation report. If we can sit down and write that something is resolved, what we're going to do with this PER is archive it in electrical database, update it annually, and if you come in and you say, hey, they did what they needed to do and the seismic events are accurately predicted and the issues resolved, we're going to have that there recorded so that we're not revisiting the issue and just constantly churning on issues that are resolved, that are resolvable, and don't need to be investigated any further.

DR. CANTLON: How about if they're no longer relevant? See, they may not be resolved, but they're no longer relevant. But, they're in your books and you've got kind of a legalistic hang-up.

MR. HOLONICH: I'm not sure.

DR. CANTLON: Well, the design of the repository is totally different now from what it was in the site characterization plan. You had a whole lot of unresolved issues on the site characterization plan that you pressed DOE

for quite a little while to get resolved, but they're no longer relevant.

MR. HOLONICH: Okay. That's one of the questions we have asked DOE. We have said we came up with 196 comments on your site characterization plan. Given the change in the program approach, what one of those now aren't applicable anymore? Help us out. Help us say this one doesn't apply. In addition, as DOE changes its design, we're not going back and saying, well, this comment was there and address it. What we're doing now is we're asking DOE, for instance, thermal load, can you give us some insight on the thermal load? What are you doing in thermal loads, and why do you think with the new thermal load you're doing the right site characterization work?

DR. CANTLON: Is there a specific way you can expunge irrelevant issues that are unresolved? That's the key to my question.

MR. HOLONICH: Uh-huh, yes. If we and DOE need to sit down and talk about the open items--and I think it's going to help DOE whenever we're able to give them the report in about six months after we load the system--they can go back to us and say, hey, this one doesn't apply anymore. Because the waste package is a good one.

DR. CANTLON: Sure.

MR. HOLONICH: The site characterization plan had a thin

walled canister going in the hole. There are a number of comments on that design. We can get rid of those if DOE goes over to the large waste MPC emplacement in a drift. So, you know, we need to sit down with DOE across the table.

DR. CANTLON: Okay. A followup question on your answer to Dr. Brewer. You indicated that in a reactor you have a construction permit and then a licensing to receive and handle spent fuel. They have the same thing in a repository. You have two licenses. So, your activity in the application for a construction license is unique because the license that DOE is looking for is the license to construct.

MR. HOLONICH: Yeah, they will get a construction authorization, and then about six years later, they'll get the license application--the license--

DR. CANTLON: Yeah, yeah. Right. So, your response to Dr. Brewer then needs to be a little bit different from the way you presented it in that the amount of activity you're doing in the pre-construction is probably different from what you do in a reactor?

MR. HOLONICH: Yeah, I guess. Bob Benero used to classify it as what we're doing is the Q-1 and Q-2s today for the repository that we used to do whenever we got the reactor application in place because we would get an application and it could take five, six, seven years sometimes for that design to be done and approved and ready to license.

DR. BREWER: So, this is so that you can meet the three-year requirement that you've got?

MR. HOLONICH: Right. We're essentially doing the Q-1s and Q-2s today during this time. That's what I was trying to say. I'm sorry, you're right. It probably was a little misspoken.

DR. BREWER: Okay. That's clear, thanks.

DR. LANGMUIR: Joe, you've identified 10 key technical issues on Overhead 13. You mentioned two that weren't listed, the ESF and the MPC. I think all of us on the Board have opinions as to the status of those issues in terms of resolution. I'd love to have your read. Could you go down the list and tell us what you think of the status of those issues? I mean, tell us which ones are closest to resolution in your view and which ones have the furthest to go?

MR. HOLONICH: No, I can't. We have just started the vertical slice process. We're focusing right now on four of them; geochemistry, volcanism, ESF, and MPC. The others, we're going to be focusing on as the fiscal year progresses over the next six or eight months. So, you know, we have just completed the plans on how we're going to approach these things. We're just starting to implement the process and the one that's furthest along right now is volcanism. At this point, it's a little premature for me to talk about what's going on in volcanism because we haven't finished our SER

yet.

DR. LANGMUIR: Can I follow up on that?

DR. BREWER: Yes, one more.

DR. LANGMUIR: Plummeting a little deeper and more focused, two of our least favorite definitions in the regulations are disturbed zone and groundwater travel time. I would bet that those were two of the issues that went to the CNWRA folks to look at and reconsider. Are they being looked at in terms of redefining them and how they would be directed towards DOE's actions?

MR. HOLONICH: Actually, what came back from the Center was that in the regulation groundwater travel time was clear. It was not a regulatory uncertainty. There was a technical uncertainty on how you implement that regulation, and that's what we're looking at today. And, I thought we'd had a couple of meetings on groundwater travel time with DOE and it appeared like we were making progress in how to address groundwater travel time. I haven't been involved in those. April, if you can--

MS. GIL: Sure, I can speak about that now, if you like. I would agree with you that was one area that we had some uncertainty and we wanted both regulatory and technical clarification with the NRC. We've had a series of meetings that I think have been very productive. I think some of your staff has been in attendance at those meetings. We continue

to work on that. I think, groundwater travel time is an area where we're moving ahead quite successfully in resolution with the NRC.

DR. BREWER: Okay.

DR. DOMENICO: Again, the key technical issues slide. I know you have a very large effort at the Southwest Research Lab on a couple of processes going on currently; for example, thermohydrologic/mechanical/chemical coupled processes. Once that effort is underway, once you start to have information, can you or NRC unilaterally declare we're not really worried about this? Would you give such advice to DOE? We're not concerned with this because our research says it's not that valid. Or the very same thing with volcanism? If you come to some finding through your research that it is not a concern, would you pass that on and DOE doesn't have to be concerned with it?

MR. HOLONICH: What we would probably tell DOE is that we've looked at the issue and we think if you handle it in this manner, it would be acceptable to us. It would be up to DOE either to follow that guidance or come back to us with some other approach and say we think this is the better route and we think we'll still achieve what you want. So, what we would do is maybe go back to volcanism, for example, and say to DOE, we've looked at your model of volcanism in the overall system performance and we think that maybe it needs

to be changed and here's how we would recommend you model volcanism. And, now, if you go off and model volcanism in that way and you come back and show us the effect on performance is not there, we might at that point say the issue was resolved.

DR. DOMENICO: Okay. And, a followup. Is your main research on the Southwest Research Laboratory?

MR. HOLONICH: All of our research goes through Southwest, yes.

DR. DOMENICO: That was through a request for proposal?

MR. HOLONICH: Uh-huh.

DR. DOMENICO: Is that coming to an end or is that going to be renewed funds for that?

MR. HOLONICH: The contract for the Center was renewed in '87--or '92. The contract for the Center was renewed in '92 for a five year period. And, the way the process works is that we take the key technical uncertainties we've identified and we say what do we need to do to address this key technical uncertainty? Some of it is like, well, we need to develop the model and codes and run some calculations; some of it is we need to do research. We, I mean, NMSS. We take that and turn it into a user's need and we say to research here's what we need you to do. Then, research puts together a statement of work and tasks the Center to do this research program to support us in developing our--

DR. DOMENICO: Well, personally, I'm very impressed with that program. I'm very impressed with the NRC efforts not only there, but at Apache Flats and wherever all this work is going on. It's very good.

MR. HOLONICH: I'll pass that on to the research folks. Thank you very much.

DR. BREWER: Okay.

MR. ARENDT: Who are the three people reporting to Jim Taylor?

MR. HOLONICH: The three people reporting to Jim Taylor are Carl Paperiello. He's the director of NMSS. Bill Russell is the director of NRR. And, we just appointed a new research director. Marty, it slips my mind. Can you remember it? Morrison. Now, there are a whole bunch of other offices under there. There's personnel, there's--

MR. ARENDT: I understand. The second question is are you requiring the use of NQA-1 or are you permitting DOE to use their DOE--I'm sorry, the QA order they have, 5700-6C?

MR. HOLONICH: We're requiring them to use 10 CFR Part 50, Appendix B, as applicable. And, probably QA is one of the areas where we have made the greatest progress with DOE in terms of getting a QA program in place and getting it acceptably and effectively implemented. 10 CFR 60 talks about using Part 50, Appendix B. Part 50 is applicable. That's what we have done to do our review.

DR. BREWER: Okay. Joe, we have two quick questions and then we'll let you get on with the presentation.

MR. HOLONICH: Uh-huh, sure.

DR. BREWER: Don Langmuir and then Leon Reiter.

DR. LANGMUIR: Okay. We're all aware that the National Academy is about to embark on a series of reviews and reportings back to the DOE on specific parts of the program. How does the NRC view that activity in terms of how will you participate or get involved or react? What will be your way to deal with that?

MR. HOLONICH: You're talking about the high-level findings?

DR. LANGMUIR: The high-level findings.

MR. HOLONICH: DOE is going to be using the NAS to provide it peer review essentially for the high-level findings. We plan to be involved with that. We plan to be involved in the ones that are related to the key technical issues. Now, I say that and I'm going to say, but the first one that comes up is surface processes and extreme erosion is not a key technical issue. But, we're going to go off--I think, week after next, you guys are meeting with the NAS. We're going to come in and give our perspective on extreme erosion which is one of the surface processes considering the high-level finding. What we want to do is tell the Board how we view and what our regulatory view of surface processes are

and extreme erosion is an example of--

DR. LANGMUIR: What stage will you participate in that? After the reports come from the Academy or in the process?

MR. HOLONICH: We and DOE have an agreement that as they issue technical basis reports, they will update the appropriate sections of the annotated outline. We will be giving them feedback from the licensing of what they're doing, as well as them getting feedback in parallel from what the Academy will be doing.

DR. BREWER: Okay. Leon, did you have a question?

DR. REITER: A quick question, Joe, about the volcanism. It has to do with why you consider this a key technical uncertainty. Not that there's technical uncertainty, but why it's a key. Just before I came here, I read an article in the "Journal of Geophysical Research" published by the two primary volcanism researchers in the Center, Connor & Hill. After doing completely different ways of analyzing the data, they came up with the probability of volcanic intrusion at Yucca Mountain on the order of 10^{-8} per year which is about the same that Bruce Crowe came up with, one chance in 100 million. There's another big process going on by DOE looking at volcanism. I know there's technical uncertainty, but why particularly is this a key technical uncertainty given the fact that the numbers are coming out the same?

MR. HOLONICH: Can you help me out on that one? Leon,

I'm not sure that there's full agreement on what the uncertainty--what the probability of volcanism is. Part of what we're doing is writing the pre-licensing evaluation report section which is going to document where we think some of the information is lacking. Part of the way the process works, I don't come up with the key issues. I make sure that they get identified and that, once they're identified, we work them in the process. You're just beyond my ability to speak to the key technical issues at this point.

DR. BREWER: Okay, Joe, thank you very much and thanks for a good overview sort of starting the day.

Next?

MR. HOLONICH: Mark is going to talk a little bit about what we're doing today.

MR. DELLIGATTI: My name is Mark Delligatti. I'm the Yucca Mountain team leader. Following Joe Holonich in a presentation is always very difficult because Joe covers everything so well. A lot of what I had planned to say may be a little bit redundant.

I did want to start by mentioning one thing and that was sort of in response to Dr. Domenico's question on Southwest Research Institute and the Center for Nuclear Waste. The Center for Nuclear Waste Regulatory Analyses is a Federally funded research and development center. And, the reason I bring that up is that when we first went out looking

for an organization that would take care of all our research and technical assistance, the Center did not exist. SWRI bid along with seven or eight other organizations and won the competitive bid and really built the Center for Nuclear Waste from the ground. In these last seven or eight years, everything that the Center has accomplished is really quite remarkable and I would like to give credit to the Center as a division of Southwest Research, but as an independent organization within Southwest that provides us with our technical assistance and research.

What I'd like to talk to you about is what we do during site characterization in the high-level waste repository program. NRC's role is mandated by the Nuclear Waste Policy Act, as amended. What we're trying to do is to determine if sufficient data will be collected to support a license application to be submitted by DOE. This is accomplished through our interactions and reviews and my job is to spend a lot of time working on those interactions and reviews and interacting with April Gil and other folks at DOE and trying to make progress. And, April, I would say we've been doing a pretty good job of that.

I'd like to talk a little bit about the governing documents. Questions will come up about why we do what we do during pre-licensing in the high-level waste repository program. Well, for one thing, the NWPA mandates a pre-

licensing consultation program between NRC and DOE. It also describes the roles of NRC, DOE, the state, the tribes, and the affected units of local government. Why do we have a site characterization plan? Because the NWPA required that DOE submit a site characterization plan to NRC, and it requires that at least semi-annually, but not only semi-annually, DOE provide progress reports to NRC telling us how what they reported in the site characterization plan has changed. This is a key document to the NRC staff. The NRC staff finds the site characterization plan to be, in effect, the baseline for site characterization. That is why when the program approach was implemented by DOE, the staff has been so anxious and has repeatedly asked DOE to please update that SCP through the progress reports so we have a documented idea. So that the official record tells us what you're currently doing in site characterization.

The next document that is of great importance to us in the high-level waste program is, of course, our NRC regulations on the disposal of high-level waste in a geologic repository, 10 CFR Part 60. I've listed here some of the parts of Part 60. I don't know if we have Part 60 in the packet here or not, but you can certainly get a hold of it. The various parts that are important are Subpart B which speaks to the preapplication reviews.

A very important part in terms of how we interact

with DOE is Subpart C on participation of states, tribes, and affected units of local government. A lot of the sort of procedural things that tend to drive people crazy in this program really come out of our desire to make this an open process, as Joe talked about, and that is why we try to keep this process open and keep involved the state and local governments. While there are no affected Indian tribes officially, the National Congress of American Indians tries to play an official role and represent the interest of Indian tribes and they do come to many of our NRC and DOE interactions.

Another important part of the regulation is Subpart D which details inspections and what NRC can and should be doing in that regard. Subpart E is really the key, the meat, of Part 60 in the terms of where our technical criteria are. We have our siting criteria which are fondly known as the PACs and FACs, the potentially adverse conditions and the favorable conditions that deal with the geology, that deal primarily with the natural system at Yucca Mountain. And then, we also have our design criteria which are found in the 60.130 part of that regulation. And, of course, our pre- and post-closure performance objectives in 60.111, 60.112, and 60.113.

Performance confirmation program is Subpart F and that's an area that has been of particular interest to all of

us as DOE has considered the program approach and how to implement it and what they must do during the pre-licensing phase, what they can move off into performance confirmation. It's an area we've been discussing a lot in the last year. And, finally, Subpart G, quality assurance, that is where the NRC has mandated that a program based on 10 CFR 50, Appendix B, as applicable, be put in place. As Joe mentioned, that is an area that both NRC and DOE feel we've made a lot of progress in from where we started when the Act was first passed.

To continue with our governing documents in this program, NRC and DOE in the very early years after the passage of the Nuclear Waste Policy Act signed the original procedural agreement; how we are going to interact during this process and that has been updated over time as we've gotten further into the program and as we realized we've learned lessons and we've realized we've needed to change something. But, basically, what it does is it says how we're going to interact during pre-licensing.

In addition to the procedural agreement, we have also come up with what we call the site-specific agreements which deal specifically with issues that have come up on how we are going to interact with regard now to the Yucca Mountain site. When there were going to be more sites, we had anticipated that there would be site-specific agreements

as characterization went on at the various sites. These site-specific agreements implement the procedural agreement, as I said, and focus on the activities of our on-site representatives; things like sample collection, et cetera.

And, finally, as Joe mentioned before, the other important document to us is the Commission openness policy. Again, I can't emphasize enough this is the context in which all NRC/DOE interactions are conducted and it's one of the things that make us insure that our interactions are open to the state and local governments and to interested members of the public.

Now, our site characterization reviews. This is one of the most important activities that we carry out during the pre-licensing phase and that my Yucca Mountain team spends a lot of time on. That's the evaluation of the SCP, the site characterization plan, and the progress reports. The NRC staff reviewed the SCP and published its site characterization analysis, its response to the SCP as it were, in 1989. At that time, the SCA contained two objections, 133 comments, and 63 questions. The staff has continued to generate comments and questions over the intervening years through our reviews of DOE study plans, through our reviews of the semi-annual SCP progress reports, and most recently through our reviews of the annotated outlines to the license application. What's important about

the comments, in particular, is that all comments must be resolved before a license application review can be completed. Again, I think that's one of the things that Joe was emphasizing with regard to the open item tracking system, and we're very anxious to make sure that NRC and DOE both are focused on all the open items and that we work toward seeing all those open items resolved in a timely manner.

Joe talked a lot about this, but I did want to give some recognition to our two on-site representatives. Chad Glenn and Bill Belke are the most recent two to go out to Las Vegas from headquarters and take on those positions. And, in addition, they have a secretary, their clerical staff person, Nancy White. And, they're really our eyes and ears here at Yucca Mountain. We have an office in downtown Las Vegas in our Federal building there and we also have a satellite office at the facility operation center out at Yucca Mountain, and Chad and Bill use both of those offices to carry out their responsibilities.

Chad and Bill conduct routine ongoing field work for NRC. They're out there every day. They're the ones that call me on the phone and tell me when something happens that's unusual or to tell us how progress is going. When there are problems with the TBM, I get a phone call from Chad or Bill to tell me something good or something bad is happening with the TBM. One of the really important things

that they do is they identify areas where additional followup may be warranted. What they do is they'll come to us and say, you know, here's something that we think you need to look at, headquarters, and what we are able to do then is to arrange for the appropriate review with additional headquarters staff, if necessary. If it's just too big for Chad and Bill to carry out, we'll make sure that they get the support that they need. Chad and Bill operate under agreements contained in Appendix 7 of the site-specific agreement which deals with the on-site representatives specifically and gives the on-site representatives the flexibility and the access that they need to the Yucca Mountain site. Chad and Bill are the point of prompt information exchange and consultation between NRC and DOE again because they're there on the mark. The visits by the on-site representatives are not subject to notification and participation or schedule requirements. That simply wouldn't be practical. They're there, they go out to the site a couple of times a week, they go over the bank building, they meet with people, that's what their job is; to keep us up-to-date and keep us informed. Unlike a lot of our interactions that I'm going to speak about in a minute, Chad and Bill don't have to file a formal report every time they go to Yucca Mountain or every time they go to the bank building. They report to us monthly in a progress report that's

submitted to the Division of Waste Management.

Another important area of site characterization activity, as Joe brought up, is the observation of DOE quality assurance audits. The NRC staff reviews DOE QA documents and observes DOE QA audits. This process helps the staff insure the acceptable implementation of Part 60, Subpart G during site characterization. The staff goes out and observes DOE QA audits, as Joe mentioned, and this gives us insight into the acceptability and effectiveness of the implementation of DOE's QA program, and it provides confidence that the work is being done in an acceptable manner. What our staff has found is that we have been able to watch the progress that DOE, the M&O, and the various DOE contractors have made since this whole process started in understanding the importance of quality assurance. Many of the participants in the program really had never worked under a nuclear quality assurance program before, and the staff has gained continuing confidence as the auditors and as the technical staff at DOE and the contractors have come to understand the importance of this. We have documented very carefully over the years these improvements that have been made in the quality assurance area.

Other kinds of interactions. We spent a lot of time interacting with DOE during the site characterization program and we found that it was really necessary to come up

with some very specific ways to interact so that our staff didn't spend all their time talking to your staff and that we had some idea of when things were going to happen, that we were only meeting on important issues, that we weren't simply spinning wheels and meeting and wasting a lot of time. So, what we did was we came up with some definitions and we tried to fit our meetings and interactions into these definitions.

First of all, we have meetings. We have two kinds of meetings, technical meetings and management meetings. Management meetings have been a very effective forum to have our division director and the various DOE managers meet and talk about the important issues and making sure that both sides are aware at the proper management level of what's going on and what's important. We find these management meetings are very useful to resolve problems that may have seemed otherwise unresolvable. When the managers sit down, they hear each other's sides. They can often very quickly come to resolution. These meetings are held, as all our meetings are, in an open manner. The State of Nevada usually attends these meetings. Clark and Nye County are frequent participants in these meetings. Our next bimonthly management meeting will be held in August, and I believe that one is going to be at Rockville at the NRC headquarters.

We also have technical meetings on important technical issues. The reason that we like to have meetings

when we're ready to resolve an issue is the positions can be taken and formally documented in meeting minutes at the end of these meetings. That is really one of the big differences between our technical and management meetings and the next category of meetings which we have which are technical exchanges.

We found that the idea of a very formal process of sitting down and knowing at the end of the meeting there were going to be extensive meeting minutes kept really caused scientists to have some problem when they wanted to talk about some fairly preliminary ideas. They wanted it to be a free and open exchange of ideas among the DOE and NRC scientists and among the participants who chose to attend those meetings. So, we decided, well, rather than just try to fit these all into technical meetings and come to loggerheads over what the meeting minutes are going to say and fear over positions being taken and positions getting hardened, we'd do technical exchanges. And, technical exchanges allow for a free and open discussion of technical issues and an exchange of ideas. One of the ground rules that we always read at the beginning of the technical exchange is that no positions are taken and the sort of formal specific minutes that are taken at meetings are not taken. We simply develop summaries of these technical exchanges. Most recently, we participated in a technical

exchange on the engineered barrier system out in Las Vegas. We have a technical exchange coming up soon on SCC. We've been in the habit of scheduling these every six months. We'll schedule for half of each of the fiscal years or half the calendar years, actually. We try to determine what meetings both NRC and DOE are prepared to participate in and we try to schedule them such that our staff are not overwhelmed with preparation for and the resulting actions that come out of the meeting.

Another kind of interaction the NRC and DOE have been involved in are site visits. These are when the NRC staff wishes to visit Yucca Mountain or one of the national labs. Like the meetings and technical exchanges, these are formally noticed. We tell the world the NRC staff wishes to visit the ESF on such-and-such a date and we let the State of Nevada know, we let the counties know, the affected units of government, and our regular list of people know. These site visits, while formal and sometimes while they get to be a little larger than either side would like, they do provide the NRC staff with the opportunity to observe the field activities.

Another kind of visit that we use, as I mentioned earlier with regard to the on-site reps, are Appendix 7 visits. I said that sometimes the on-site reps come up with issues that are either outside the technical expertise of the

rep or just require more effort than the two of them can handle. What we do then is we have what we call Appendix 7 visits. Headquarters NRC staff are temporarily assigned as on-site representatives giving them the ability and the access to Yucca Mountain and the facilities that they need. While they are assigned as temporary on-site reps, they're committed to carry out duties, meet with DOE staff as agreed upon in Appendix 7 of the site-specific agreement. When the TBM was first started up, this was at a transitional period when our two previous on-site reps had retired and before we had new on-site reps on hand. What we did at that time was we appointed a series of temporary on-site reps to, as we said, ride the TBM, to be out there when this was first starting up, and to help us make sure that this was going smoothly and as we anticipated. That was a very useful exercise. What's really great about the Appendix 7 visits from the headquarters technical staff viewpoint is it gives these folks a chance to get out in the field, to get their hands dirty, to really do geology, to really be out there with the other designers, to see what's going on, and we like to use those whenever we can.

Another kind of interaction that we have is telephonic communications and I guess I should really expand that today to say telephonic and InterNet communications between the staffs. We exchange technical information this

way and we do not present official NRC or DOE positions. Within the last year or so, we've been able to also do that with InterNet. Nye County is on the forefront of the affected units of governments in that they also have a InterNet linkup now. Personally, I really hope in the future all the affected units will be able to get that access because it makes things much easier. Rather than having to fax something to 15 or 16 people, if we can just shoot it over the InterNet via e-mail, it makes all of our lives a lot easier. And, that's one of the things that I'm really hoping for.

That's our interaction. Now comes the dreaded or should I say formerly dreaded implementation of the vertical slice program, vertical slice approach. When the program approach came into being, the NRC staff had to find a way to react to that program approach and we wanted to find a way to find out exactly what DOE was doing with regard to the program approach implementation. As I said, formerly the way that we would find out how the program approach had affected site characterization would be through the progress reports. The magnitude of the changes to DOE's program brought by the program approach has made the process of updating the SCP through the progress report rather a time-consuming process. So, the staff decided to try something else. What we wanted to do was get out there and see this is what DOE was doing

before and this is how they're changing it. That was sort of the germ of the idea that became known as the vertical slice approach. We wanted to understand the changes to site investigations. We needed to prioritize our work in the face level and declining budgets, and we wanted to find a way, given the program approach, that the staff could implement our overall review strategy which Joe talked to you a little bit earlier. Vertical slices seemed like the way to go. We then undertook a process of developing these vertical slices and Joe talked a lot about that.

The key technical issues that Joe mentioned in the high-level waste program were developed by the staff. After the program first came out, I and quite a few members of the technical staff attended a lot of the briefings that DOE held. They briefed you in January, as a matter of fact, out in Beatty. I was able to attend that. We tried to get a feel for what DOE said was important in terms of the key issues. We looked at our key technical uncertainties that we had developed, and eventually analyzing this and discussing this in-house, we came up with our list of key technical issues that Joe mentioned earlier. We consider these to be the most crucial or most important for understanding the effects of the program approach on licensing and the four that Joe mentioned earlier were the first to be implemented.

Examples of current vertical slice activities.

Vertical slice activities are really nothing new. Most of these activities are activities the NRC has carried out before. We're simply sort of binning them in a vertical slice. One of the most effective things that we have done, everybody has been asking us, but what's a vertical slice really? Yeah, I know, Mark, I know you're telling me that this isn't going to change anything, but you guys came out and did this design review thing and it took us three staff years to get ready for it. If that's a vertical slice and if that's an infield verification, you're going to kill us with all this stuff. So, a lot of people at DOE were really worried that we were coming at them with 10 vertical slices and we were going to do them all in the next 12 months. There was a great deal of concern that all DOE would be doing would be responding to me and my vertical slice teams coming out.

Well, we said what are we going to do? We've got to break through this logjam of misinformation. We had one vertical slice, in particular, where we thought we could do that and that was the geochemistry vertical slice that Dr. Virginia Colton-Bradley of our staff is leading up on the technical side and Ardyth Simmons is leading up for DOE. Ginny put together her vertical slice implementation plan and said this is what I want to do. I want to come out and find out what Ardyth is doing, and Ardyth said, wait a minute,

Ginny, I don't know if that's the right thing to do. We haven't talked about this. You're going to come out here? And, I think, Ardyth was afraid that she was going to spend the next year of her life just responding to Ginny and I on this vertical slice.

Well, last month, we had the EBS meeting and Ginny and I came out and we decided that we wanted to sit down with Ardyth and talk about how we were actually going to implement Ardyth's vertical slice. Ardyth, you're here and you can correct me if I'm wrong. What we found out was that Dr. Colton-Bradley had really laid out a fairly conservative program, a program which was not going to impact DOE to too large a degree, and a program that really would allow the NRC staff the opportunity to find out what was going on in that particular area of geochemistry that Ginny was focusing in on, but we were going to do our darnedest to look at activities, first of all, that were the right activities, not things that Ardyth was not going to start until two years from now and we wanted to look at them today. We agreed that would be kind of silly. But, at the same time, we explained that one of the things we really wanted to do was to get one or two people out to look at key activities. And, when we got those people out in the field, we wanted them to not disturb the DOE or the M&O or the national lab staff to any great degree. This seemed like a funny concept to a lot of

people until Ginny described that in the area that she wanted to look at there were labs out there, some of the national labs that were going to be doing the geochemistry work, and Ginny had never been there and never seen the material that they were using. She had never seen the setup of the labs and that was the kind of thing that Ginny anticipated would be an infield verification. Ginny would go out there by herself or perhaps with another staff member, maybe she'd go out with one of the on-site reps, go out to whichever of the national labs, look at it, come home. Another thing that she thought she could do was perhaps to go out and look at some documents. Go to one of the national labs that was working on the geochemistry program and say I want to look at some of the procedures and things. I'm going to read them here. You don't have to sit here and talk to me and take a couple of days of your time, but let me read this, and if I have some questions for you, you can answer the questions for me.

I think at the end of our meeting with April and Ardyth and others, we sort of had tried to lower the level of anxiety about what vertical slices were and how time-consuming they might be to DOE and the NRC staff. You have to understand, as Dr. Brewer asked Joe the questions about the budget, the NRC staff in the high-level waste program is not large. We couldn't tie up DOE if we wanted to. There's just simply not enough of us to do it. What we're trying to

do is find ways that our very few resources can cover the most important areas of this program in the most efficient way that we can. So, we've come up with this list.

Another thing that a lot of people seem to miss as we've talked about this vertical slice idea and this term sort of took on a life of its own was the fact that a lot of these activities are things like reviewing the site characterization plan progress report. We've been doing that for 10 years. Reviewing the annotated outline, well, we agreed to do that long before the words "vertical slice" ever came up. DOE continues to submit study plans to us. While we're no longer giving them the kind of focused review that we used to, if a study plan comes in in a vertical slice area, our staff is going to review it. These are not new things. I guess, that's one of the things that I really want to emphasize. The vertical slice effort is really just a way for NRC to focus its existing work on the key technical areas. And, we hope that we've made people understand that we do not anticipate slowing down the program or stopping the program by doing these vertical slices. I think, in the coming year as we get into these vertical slices, you're going to find that that's the case. Another very good example of that is in the area of the ESF. As Joe said, the ESF is one of the two vertical slices which were not key technical issues; yet, the ESF is the most important activity

that's currently ongoing. I think that what we're doing in the ESF area is basically we're continuing to do what we've been doing for the last couple of years. We're having our bimonthly ESF technical meetings. Raj and his staff and the contractors at the Center are continuing to review the documents that DOE is producing in this area. We're simply hoping that we can stay on top of this program in the most effective way that we can. That's vertical slices.

The other big and important thing that has happened, I think, in the last year in the site characterization area is the document reduction effort. Joe talked a little bit about this. April and I talk a lot about this a lot of the time. Again, the NRC staff is small. DOE is big. DOE produces a lot of stuff. The NRC staff can't possibly review all this stuff. We're just going to get inundated. We were starting to feel like we could never get ahead.

So, we stopped and we said what are the things that will really help us get the ultimate goal which is the license application process? What are the documents that will really help NRC and DOE make progress in this program? Well, we think there are really two key documents. The SCP progress reports, again the progress reports are statutorily required documents and DOE is going to have to produce those and the annotated outlines. The annotated outline for the

license application is DOE's attempt to start to build their license application.

The NRC staff believes that any of the technical reports--excuse me, April, but the topical reports--any of the design reports, all of this stuff, the NRC staff believes, could best be reviewed one time in an integrated manner through the annotated outline. DOE provides us in the annotated outline the information that formerly would have been in any of these other reports. The staff reviews it and the staff provides DOE with what we are calling a preliminary evaluation report or PER. This will tell DOE, yeah, in the volcanism area this is what you're doing right, this is where we think we have some problems with you, this is where we have licensing issues, and if you don't resolve these issues by the time the license application comes in, we're not going to be able to review the license application. Furthermore, by providing us this information in the annotated outline rather than in these separate reports, we get an integrated review. When we look at volcanism, we have to look at volcanism as potentially adverse conditions listed in 60.122, but also we have to look at its effect on performance, the performance objectives. When we look at the annotated outline, we review all of that in an integrated manner. We have our volcanologists looking at it, we have our performance assessment people looking at it. You get a full

integrated review. You know where NRC stands in all these areas.

The NRC has agreed to review a limited number of topical reports, but again we would hope that the initial idea that DOE had was to use topical reports extensively and we really made a lot of progress, we feel, in that once we came up with the idea of the preliminary evaluation report, we've all agreed that to a large extent topical reports could be replaced by putting this information into the annotated outline. However, the staff did agree to review this limited number of topical reports and we are doing so right now. Any other documents that DOE wants to send to us, we'll probably look at only in the context of the annotated outline review and we'll put the majority of our resources on reviewing those sections of the annotated outline that are focused on the 10 vertical slice areas.

What does this document reduction effort do? It helps manage our review effort more efficiently and we've really seen that in the brief time that we've been implementing this. As I said, it increases our integration of information in the program. Here's an example of integration. Extreme erosion topical, that becomes Section 3.2.1.10 of the annotated outline. Total performance assessment, Section 6.0 of the annotated outline. Multi-purpose canister design, Section 5.2. Quality assurance,

Section 10.0.

When you submit your annotated outline to us, we're going to make sure that we review anything that's related and you're going to get a full integrated review and we're really very pleased with the success we've had with this regard and we look forward to continuing to work with DOE on this. As Joe mentioned, we're doing an annotated outline review right now that's focusing on the information that's currently available on a couple of the vertical slice areas, and we're hoping that certainly within the next couple of months to get this first PER to DOE, and I think that probably by the end of this calendar year, NRC and DOE will be in a position to sit down and talk about the lessons we've learned with regard to this first effort at providing an annotated outline and the NRC staff reviewing it and providing a PER.

That's really all that I have to say, ladies and gentlemen. If you have any questions, I'll certainly try to answer them.

DR. BREWER: Let's try to keep the questions, you know, directly. We've got a period at the end, but Clarence Allen has one that he wanted to ask.

DR. ALLEN: You've placed such tremendous emphasis on interaction and I agree with you; interaction with the public, interaction with the field investigation, interaction with the national labs, and so forth. Why is essentially all

of your staff concentrating on Washington where you're really removed from reality? Why don't you have your office here with two representatives in Washington instead of the office there with two representatives out here?

MR. DELLIGATTI: I could hand this off to my boss. I could hand this off to him.

DR. ALLEN: Well, Phil Justus indicated to me how important it was, his total view of the operation, who spent a couple of years out here. In view of the importance you have placed on interaction, I really do feel you're terribly isolated in Washington.

DR. BREWER: Uh-huh. Anyone care to talk about that?

MR. HOLONICH: Mark, I appreciate you passing it on to me and we'll talk a little later at dinner about this.

Dr. Allen, I can't argue with you. Part of what we are focusing on though is that we've got the two ORs out there and they're serving as our eyes and ears. As they find issues, we're sending technical specialists into the field.

DR. ALLEN: At the expense of travel all over the country.

MR. HOLONICH: At the expense of travel. We're in the field observing QA audits. We're following DOE around looking at those. Part of what we're trying to do though is develop the licensing program. And, it's very difficult to develop an integrated review plan when you've got people in

the field and people in Washington. So, what we're focused on is trying to put our licensing shop in order and a lot of that deals with the headquarters' effort. So, that's my only answer is that what we're trying to accomplish deals a lot with having people there and being able to integrate the review plan.

DR. BREWER: I had a similar question, but it was going to be delivered with a somewhat lighter touch. For years in the Department of State, there's always been a problem of sending people to foreign territories because they become coopted and they go native. I wonder if you have thought about that with respect to your ORs and kind of how you handle that.

MR. HOLONICH: We're following the same guidelines that are in place for the reactor resident inspectors. On a five year cycle, we would like the ORs to move out and move somebody else back into the slot.

DR. BREWER: Okay. So, Chad and Bill don't become DOE surrogates on-site?

MR. HOLONICH: We hope not.

DR. BREWER: Okay. One other question?

DR. LANGMUIR: Looking over your interaction list, I've been involved in some of this stuff, but more specifically in the technical exchange side of it. My sense is the vertical slice, really, all that is is a DOE research trained person

getting very much into the level of what's going on at the labs and learning, really, what the DOE is up to. My question has to do with where in these activities are we making recommendations and proposals to the DOE to change this program versus simply in educating ourselves in what they're up to? My sense is the technical change, yes, I've heard recommendations made at those exchanges for changes in DOE. My guess is that the vertical slice, you're simply teaching yourself what DOE is doing.

MR. DELLIGATTI: Well, no, that's certainly part of it. But, there are really two goals to the vertical slice, as I said. The first was to get us to understand what was going on in terms of the changes to the program brought by the program approach. The second part of that though is ultimately what we're learning has to be fed back to DOE. We see two possible ways of doing it.

The way that we want to really focus on is the annotated outline as we do a vertical slice. For instance, as our volcanology staff looks at--goes out into the field, gets the data that it needs to look at it at headquarters, reviews all this stuff, they're going to feed that into the PER that they're preparing. If we're looking at an area and we believe that what we have found out is either so important or so time critical in terms of getting that information to DOE, we do have the opportunity to provide a separate report

to DOE saying in regard to the geochemistry program, having done these vertical slice activities for the last five months, these are what the NRC staff thinks are the important points to make to you. But, again, we think that probably the most effective and resource efficient way to go will be to factor in what we find out in the vertical slices in the annotated outline review.

Joe?

MR. HOLONICH: Dr. Langmuir, maybe one example to give you is the volcanism. Like I said, this is the vertical slice that's the furthest developed at this point. And, we have just completed our draft preliminary evaluation report sections for the applicable pieces of the AO. And, not only do we use the information that's in the AO, but our volcanologist was out looking at the expert elicitation DOE was conducting. He's been in the field looking at study plans and procedures and how they're implemented and he's taken all the information now and he's written up his findings on volcanism. And, some of it is what they're doing appears fine to us; some of it is going to be we're not sure they're fully characterizing in this area where there's basaltic evidence. And, we're hoping within the next couple of weeks, we'll be able to transmit to DOE that portion of our PER and then we're going to pull them all together and issue a PER as a NUREG when we get all the pieces done. But,

that is the vehicle where we're going to start giving DOE the comments. And, on volcanism, we're fairly far along. So, we're hoping maybe a month is a better time to give me some float in it.

But, we're hoping within about the next month, we'd be able to start to give DOE real time feedback on what we've seen in the field, what we've seen in their licensing documents, what we've seen in other supporting reports, and where we think what they're doing is acceptable and where we think what they're doing needs to be amplified or maybe changed or something. So, we're there within the next couple of months. I think we should be able to start to give them feedback on the four big areas we're pursuing right now.

DR. DOMENICO: Mark, as I look at your vertical slice and the key technical issues that evolve from it, it appears to me that some of these key technical issues are even items that, I think, DOE does really not have a program in. For example, scenario selection and consequences which can range from anything from human intrusion to boiling Yucca Mountain, I presume. That's a good range. I know of no DOE program that's involved in any extensive form in scenario selection and scenario evaluation. So, how do you communicate any information you may find on, for example, human intrusion which raises its ugly head once in a while? How do you communicate any information that you may determine to the

Department of Energy which may not have a program or any extensive program in that area?

MR. DELLIGATTI: I think, what we're going to try to do is to start out--when we start getting actively working on this particular issue on this one, we'd like to do what we did in the case of geochemistry. We'd like to have the key technical staff from NRC and DOE go out and sit down together and say, look, this is what we think is an important issue. We want to start working here. And, as we go through this process, I would think we'd meet periodically, for instance, on TSPA and on total system performance. I think that we can use that meeting. We have a meeting in December, for instance, a two day meeting, planned on TSPA. That might be a place to start that off.

This was a particularly difficult area. When you look at performance assessment, it's such a broad area. There's so much in there that the staff is concerned about that we really did, we came up with several different titles for that vertical slice and it had several different focuses. What I think is going to happen is we're going to have to go back and continually rework that vertical slice plan and further modify to make sure that we really are focusing on the right place. But, you're right, that's sort of a tough one to get your hands around. I think, Norm Eisenberg and his staff are really going to have to sit down closely with

Abe and whoever else is the appropriate people at DOE to say, you know, this is what we want to focus on. We want to let you know about that and we want to work together to make sure that we're doing this in the right order and the right time and getting the right information back.

DR. BREWER: Okay. Bill Barnard has one question and then we can move on.

DR. BARNARD: Mark, in several years, DOE will submit a license application. What will that look like in physical terms; numbers of pages, things like that? Will somebody in a front end loader deliver it?

MR. DELLIGATTI: I know that Part 60 says that they have to submit 120 copies of it and I expect several trucks to pull up in front of the NRC one Christmas Eve if DOE sticks with their old way of doing business. Those who were around for the EA days will remember those Christmas deliveries.

I suspect that what's going to happen is that these preliminary annotated outlines that DOE has sent us in the last couple of years which were really basically very bare bones outlines, were two big, thick, three-ring binders. I suspect that over time these are going to be fairly large documents. But, again, remember, in those areas where we've had no further questions--if we go through the 60.122 siting criteria and we have come to issue resolution on many of those and there are new issues brought up, as large as that

document may be, we will have done most of the work there. So that the size issue is one, say, we hope to be able to handle through this annotated outline process. But, I expect it's going to be a pretty big document.

MR. HOLONICH: Mark, if I can just supplement that. Bill, in reactors, there are about 15 three-inch volumes that comprise the safety analysis report. My vision has always been it would be something equivalent to that.

DR. BREWER: Okay. So, the vertical slice yields to the vertical foot.

DR. CANTLON: Horizontal yard.

DR. BREWER: Horizontal yard. It depends on how you stack them, John.

Can we proceed, please? Joe, are you next?

MR. HOLONICH: I'm going to try to pick the pace up a little bit. I don't think we'll get back on schedule, but try to get us closer to--

DR. BREWER: Well, what's happened is that we've-- appropriately, we're asking questions at the end of each of the presentations instead of holding until the end. We have until 10:45 or thereabouts.

MR. HOLONICH: Okay.

DR. BREWER: Picking up the pace is always a nice idea. Thank you.

MR. HOLONICH: I want to talk about the licensing

process now and kind of what we're doing today to prepare for it and what we're going to be expecting whenever the application arrives.

One of the things that we're trying to accomplish through the site characterization work we're doing today is to get an understanding of the details of what DOE is doing through the technical exchanges during the meetings, through the observations of the QA audits, through design reviews, through infield verifications, through Appendix 7 visits. The reason we're trying to do that is we're going to have an 18 month window to review that application. And, if we wait until that time frame to step up and say did you guys do the right volcanism work, did you collect the right data, did you do the right site characterization, we're not only behind the curve, we're not going to be able to do that level of detail review during the 18 months. So, one of the messages Mark's presentation was trying to convey was that there's a lot of things that we're doing today to help us build the technical foundation that will allow us to do our review and conduct our licensing activities in the mandated time frame.

This is kind of an outline of what I'm going to try to do. Just the overall review strategy and go back and refresh people's memory. I'm not going to talk a lot on that. We're going to talk about the pre-license application review, what we're doing today, how we're trying to build for

our license application review which is next. Just reiterate the openness policy and the fact we view DOE as one licensee. Then, the licensing hearing is an integral part of the licensing process. I would have been remiss if I didn't put it up there, but I'm not going to talk about it. Really, Marty is going to talk about it. This is just a repeat slide. We've got to get people refocused on what we're trying to accomplish with the overall review strategy.

What we're doing today is developing our regulatory guidance and what we hope to have is the guidance in place before DOE's application is issued. I think it's prudent for us to be able to tell DOE what we'd be expecting in an application. We essentially have two main guidance documents. The format and content guide which was issued in draft in November of 1990, that's guidance to DOE and that explains to DOE what we're looking for in terms of the structure of the application and the kind of information we would expect in the application. In addition, DOE should be using the review plan as a sister document to help it prepare its license application. From our perspective for the staff's use, we're preparing the review plan. That's guidance for the staff and it outlines how the staff is going to approach its review of DOE's application and really the audit type of approach it's going to be using and where it's going to be able to do some reviews and just look at what DOE

has done and be happy with it and where it's going to do some reviews by asking DOE, give us your code and we're going to run it and where it's going to do some reviews by having its own methods and models in place that it will be able to run independent confirmatory calculations of what DOE is doing.

What we're trying to accomplish today is, number one, we want to streamline the license application review process. We want to identify concerns, try to get issues resolved. We want to make sure that nothing is going to affect waste isolation and we want to respond to DOE. Again, this is what I said earlier and what we're trying to do is refresh your memory, go back, and then talk about what we're doing today and what's actually being implemented.

What we're going to start to do is prepare a pre-licensing evaluation report, PER. And, what this report is going to be essentially is how we're conducting our review and what our findings are. In the past, what we've done is DOE would send us something and we would identify either objections, comments, and questions. We didn't comment on whether we found what was there acceptable. We would only comment on where we thought the problems were. Essentially, silence was consent type of approach in the past. If we didn't identify a problem, we weren't unhappy with what was there. I'm not going to say we were happy, we just weren't unhappy with what was there. We're starting to change.

We're going to start providing a pre-licensing evaluation report. This is essentially the beginning of us preparing our safety evaluation report for the licensing process.

Anything we do is going to be bound by the issue resolution agreement. We're not going to go in that PER and say DOE has acceptably demonstrated compliance with 10 CFR Part 60. The conclusion, the best we can make, is that the issue is resolved, but at this point in time, we have no comments or questions on this issue. My vision is we may not achieve issue resolution on a complete area, but we may achieve issue resolutions on pieces of the area. Again, I use the waste package as an example. DOE can come in and say here's the method we're using to design the waste package. And, we don't have all the site data yet to be able to conduct the actual design. So, we'll assume some site parameters and here's how we come up with the design of the waste package. We can't say the design of the waste package is resolved, but maybe we can say the methodology DOE is using, the approach DOE is taking, the calculations, the engineering design work it's doing is resolved. Now, they've got to plug real numbers in it. When they get the final answer, if they meet Part 60, then we can say, well, the issue is resolved for waste package design. So, issue resolution doesn't necessarily mean you've got to resolve the entire area of waste package. You can resolve some bounding

conditions. Like I said earlier,DOE is going to bound geochemistry and we can resolve that for the waste package design and we can resolve the design approaches. Maybe not the overall issue is resolved, but parts of it is resolved. You can't eat a cow, you can't eat a steak, but you can eat a steak a fork at a time. And, maybe, that's a way to look at issue resolution.

What we're going to do in the pre-licensing reports is document for DOE and any interested party the current views of the staff; whether it's acceptable, whether we think there's issues that are there, and what needs to be done. And, one of the things we're trying to do is document for the future staff what's been looked at and what's been reviewed and what issues have been addressed and what issues we don't think need to be investigated any further because it's a long-term program. A lot of people are going to be gone. I don't know who will be sitting in my chair and who will be sitting in Mark's chair at the time. So, what we want to do is document what we're doing for future generations of staff reviewers to be able to use so that we're not constantly reinventing the wheel in the program. That when an issue is resolved and nothing new has come up, the issue is resolved.

What we're going to be doing at the time of the application is, number one, we want to make sure we've got in place what we need to to be able to meet the three-year

mandatory review schedule. In addition, we want to make sure we've got our piece in place to do our 18 month review. What the NRC does is essentially take its safety evaluation report to the atomic safety and licensing board and defends its conclusions that what DOE has done is acceptable. DOE goes along with us and presents its license application and defends why it believes the repository is acceptable. And then, any intervenors that are admitted by the board defend and present their positions on why they don't think it's acceptable and what was missed and what was wrong with it.

Our review strategy for the license application review is essentially we're going to do an audit type review and we're going to do different levels of review depending on the complexity of the issue, depending on what's out there. It's not up to DOE to write an application that parallels that. It's up to DOE to write an application that is as complete as possible to make its case. And, even though in a chapter we may only go to a certain level, that doesn't say DOE should stop there. DOE should present all the information it thinks it needs to make its case because one of the things it's got to think about is it's going before a safety and licensing board with this also. So, although the staff may stop at a certain level, the board may dig to a much deeper level.

We do two types of review. The rules of practice

call out the fact that we need to do an acceptance review. Before we start our review, before we start our time clock, we want to make sure the application is complete and we docket it. Our vision is if we get to a license application and it fails the docketing review, we have essentially failed our job today. One of the reasons we're looking at the AO to be the primary focus of the DOE program is that when the application arrives, it should be complete. We need to be giving DOE that kind of feedback today on the application.

Number two, we'll do compliance reviews and these are essentially the graded series of reviews that will focus on the different technical areas. Again, we emphasize although we talk about different review strategies and different levels of reviews, essentially what DOE is going to get from us is a safety evaluation saying either we agree with DOE or we don't and here's the basis for why we think it's this situation. And then, anything that we do, anything that's in the program could potentially become a contention in a hearing. Marty is going to talk a lot more in detail about what's being done there.

In terms of our review, we're doing five types. The first type is an acceptance review. What this is essentially is the docketing review. We're looking to see if the application is complete and we accept it and the clock starts. That's when the three-year clock starts Not when

DOE sends it to us, but when we agree that the application is sufficiently complete that we can do the technical review we need to. We think the pre-application activities we're undergoing now are extremely important.

Part of the review strategy for the acceptance review is to look at all the open items that are related to this topic and make sure they're closed. That's why we've got the open item tracking system, the OITS; a nice acronym there. The pre-licensing review evaluation report that we're doing is another way that we're documenting what's being acceptable in the annotated outline. We ain't going to meet the 18 month schedule unless we've resolved many of the complex technical issues today. You know, we cannot say to DOE, go away and come back and tell us in two or three years what you're doing. We need to be there with DOE, interacting with DOE, giving them the regulatory guidance and the regulatory perspective of what we're doing in the program because there's a lot of complex issues out there. We're not going to be able to resolve them in 18 months. DOE is collecting the data today and what we're trying to make sure is DOE is collecting the right data and then collecting enough of the data that they'll be able to make the case and the application. They'll be able to give us a complete high-quality application. So, you know, for us to meet the 18 months, we think it's very important that we continue to act

with DOE at a high intensity today through the rest of this pre-licensing consultation program.

Our compliance review, again I emphasize DOE is responsible for doing a good job. That's the basic philosophy. Remember the philosophy? It's the responsibility of the licensee. It's DOE's job to make sure they do the right job. What we'll do is an audit review of the application and we'll verify with confidence what that review is. What that means is that all of the license application gets a common level of review. The surface design, we'll go in and we'll say how are they calculating dynamic loads and how do they calculate the G-factors and that's acceptable to us. We'll look at what DOE did, review it, and write it up in our evaluation report. The same thing with overall performance assessment. We'll go in and say what did DOE do? How did it model it? What were the scenarios it developed? And, that appears acceptable to us and we'll write it up and we'll say, oh, by the way, for overall performance assessment, this is a very complex issue. We've run our own codes and that additional calculation has given us added confidence that what DOE did was accurate. But, the reviews essentially are the same level of reviews. Some of them, however, we'll start to run our own independent codes to get additional level of confidence in what DOE has done.

We're going to do a number of different types of reviews and we'll talk to them in a little bit. Our review levels are documented in the review plan. This is essentially guidance to the staff on how detailed you should get. What we're doing today, as I said earlier, is trying to build up what we need to do to be able to support our three-year review.

I said we had five types. I talked about a Type 1, acceptance review. Type 2 is general information review. There's a lot of things Part 60 requires DOE to put in the application. We're going to make sure that's there and essentially that will be done as part of the docketing review.

The Type 3 review is the fundamental safety review that the NRC does. This is the common level of review that every part of the application gets. This is the main basis for the NRC review. This is looking at what DOE has done and saying we agree what DOE has done is acceptable.

Then, we're going to do more detailed reviews, Types 4 and Types 5 reviews. Type 4 is essentially picking a code up that's there, developed, and running it; Type 5 review is essentially developing our own independent codes. In my mind, the examples I've always used is the Type 3 review, you can stop at surface facility design because it's wrote. Essentially, it's been done hundreds of times before.

Type 4 review, you may say you're going to have an opening there for a hundred years and you're going to have a high thermal load and, although mining engineers have done calculation after calculation on the stability of openings, we might want to take some of those standard industry codes and run them to see how sensitive they are to heat load and see how sensitive they are to design life of 100 years and maybe help us probe where we want to ask DOE questions. But, we're not going to develop a lot of new technology there because it's been around. Mining engineers are doing this all the time. We may just want to run some of their codes. Then, the Type 5 review would be the overall performance assessment. They have been done before. DOE has got its models. We're also developing our own independent models.

What's our product? Our product is the SER. Every hearing I've been in as the project manager, you go up and sit in front of the board, you put your hand up, and you swear to tell the truth, the whole truth, and nothing but the truth. The lawyer from the general counsel's office says, Your Honor, we'd like to introduce Exhibit A for the staff, the safety evaluation report. This is our basis for why we think it's acceptable. Then, you start the questioning back and forth and the detailed information starts to come out. But, that's the first piece of evidence in every hearing I've been in that's been submitted by the staff. We're going to

get there through maybe having to ask a number of questions, maybe having to write a draft SER. What we're hoping though is that if the pre-licensing process, this will be limited. It's got to be if we're going to do this thing in three years. Essentially, like I said, the SER supports anything we're doing at a hearing. That's our evidence of why we think this thing is acceptable.

Part of the SER is going to look at DOE's performance confirmation program. Part 60 requires that not only DOE collect data and show how that data is supporting the decision of reasonable assurance, but also that it continue to collect data over the operational period of a repository. We're going to address that in the SER, too, to make sure that DOE data collection as it continues is sufficient.

Our review interactions, essentially, are two. Number one, we're going to do the review. We're going to report to DOE what our findings are. We're going to try to resolve the issues with DOE. DOE has available to it an appeal process. Essentially, they can come in--the appeal process starts at the branch chief level. They should contact Mark. He'll set up a meeting with the branch chief. If they can't get a decision by then, they can appeal to John Greeves, the director, and they can eventually appeal to Carl Paperiella. DOE should be prudent on how it uses the

appeal process. Essentially, what happens is the DOE comes in and presents its position, the staff come in and presents its position, and then management there makes a decision.

Like I said earlier, from our perspective, DOE is one licensee who will, oftentimes, call up and say what's going on in vitrification and OCRWM would tell us that's EM. No, that's OCRWM. You're one licensee to us, DOE. That stuff is going into the repository. I don't issue a license to the Office of Civilian Radioactive Waste Management. I issue a license to the Department of Energy. From our perspective, what Richland is doing with vitrified waste, you're responsible to make sure it works within the repository and, if you put that stuff in here, you can show that it's still going to meet the Part 60 requirements. I emphasize again it's an open process. We're keeping things above board. We're trying to maintain a very objective perspective of what the NRC does.

In summary, the high-level waste program is a unique program, but we believe we've been confronted with many unique programs in the past. Okay? Going from small megawatt reactors to the large 3400 megawatt reactors was, in fact, a unique program. You had to start adding emergency core cooling systems. You had to promulgate Appendix K of Part 50 on core melt and peak clad temperature design requirements. That was a unique program going from the small

prototype reactors to the large reactors. About an hour west of here--I was out there yesterday--the EnviroCare site for the disposal of 11e.(2) byproduct materials, the first of a kind license issued by the NRC back in November of '93. We had to get an order from the Commission to tell us how it wanted us to conduct a review because we had no regulations in place for disposal of 11e.(2) byproduct material. It's a unique program. But, what we think is the licensing process, the fundamentals that I tried to lay out to folks earlier, can be applied to the high-level waste program and that the procedures we use in our licensing review and how we approach a license application will result in an efficient licensing process.

The four main people, myself, John Thoma, Sandy Wastler, and Mark--I come from NRR. I was responsible for licensing the Callaway Plant. That's why I put that license in there as an example. John Thoma comes from NRR with a large background of licensing experience. Sandy Wastler who is our licensing project manager, Mark's counterpart on this piece of the program, has been through the NRR review chain and licensed the EnviroCare site. So, she's got experience with licensing unique new sites. And then, Mark has got 12 years of experience in the high-level program. When you put that together, we've got a real strong licensing basis in the staff that's putting out the policy and developing the

program and how it's going to be implemented in the high-level waste area.

One of the things we're doing, one of the things John's doing and I'm doing and Sandy is doing, is learning from what we did at NRR. The process is flexible and we're able to adjust and make sure that the process we're putting in place for the high-level program learns from, for lack of a better word, the mistakes that we did in the NRR licensing process.

I kind of picked up the pace. I don't know if that was too fast.

DR. BREWER: No, no. No, no. We're actually running a little bit behind time because of the questions and the problem of trying to scale four presentations in two hours.

So, would you proceed?

MR. HOLONICH: Marty, do you want somebody to turn the slides or are you going--

DR. BREWER: Oh, wait. Carl Di Bella has one question.

DR. DI BELLA: Okay. The Naval Nuclear Propulsion folks are exploring with OCRWM the possibility of disposal of their spent fuel in the repository. This material has some classified aspects to it. Does that complicate your licensing processes? Does that present any significant problems to you?

MR. HOLONICH: No, it doesn't. I'm going to answer,

Marty, using 2.790 and you can help wherever you think I'm stumbling. The Commission's rules of practice, 2.790, talk about providing information to support an application where some of that information may not necessarily be releasable to the public. And, it talks about company proprietary secrets, national security information, and essentially what it says is you submit two copies. One copy has in it the classified information or the proprietary information identified in brackets and a second copy has that information within the brackets eliminated. You put that information in the public document room and keep the classified version for the NRC staff. I don't know what would happen in a hearing process if you got into the contention of the classified information.

MR. MALSCH: There is actually a provision in the statute designed specifically to deal with public participating involving classified hearings, specifically restricted data because that's the special category or class of information recognized in the Atomic Energy Act. We actually have in the rules of practice special rules for the conduct of classified hearings including granting access to classified information to parties in the hearing process. I've actually participated in some limited hearings involving classified information. It's very unusual, but we have the rules written up.

DR. BI BELLA: Thank you, Marty.

DR. BREWER: Could we proceed?

MR. MALSCH: Let me first ask you a question. I have a two part presentation. The first part is an overview of the hearing process. The second part is some thoughts on expert testimony and what it takes to be a good expert witness. I could run through both of those or I could run quickly through one and spend more time on the second. I guess, my question is what are your druthers given the time frame?

DR. BREWER: Can you give some idea of the amount of time for each?

MR. MALSCH: I would say about 15 minutes apiece.

DR. BREWER: Why don't we do the two together and then we'll take a break. I think that's probably the right way to do it to keep the integrity here.

MR. MALSCH: Okay, fine. What I have in the first piece here is an overview of steps in the NRC hearing process and the hearing process is specified in the NRC regulations in 10 CFR Part 2, particularly Subpart G, but also one of the other subparts, Subpart J. The rules are fairly elaborate. They have been developed and reflect experience that the NRC has in conducting literally scores of contested hearings especially involving nuclear power plant license applications and literally hundreds and hundreds of days of contested hearing experience. The rules are supplemented by also hundreds of decisions by the Commission and by the

Commission's appeal board which interpret and have applied these rules to particular contexts. These decisions are all indexed and cross-indexed and, as a result, the framework is fairly detailed and has been in place for a number of years and the people who work within this framework are quite familiar with it.

It begins with notice of docketing of the application, notice of hearing, and runs through a number of steps; appointment of presiding officer, identification of parties and issues, prehearing conferences, discovery, participation by parties, presentation of evidence at the hearings, the initial decision by the presiding officer, and then appeal to and review by the Commission. Not on this slide, but following this, final Commission decisions are appealable to the U.S. Courts of Appeals as a matter of right either in D.C. Circuit or some other Circuit. And, from there, you may seek to obtain a review of a Court of Appeals decision by the United States Supreme Court.

Now, some preliminary items first. What I'm going to do is give you a summary of the hearing process and I'm not going to describe the rules in great detail. As I mentioned, they are in 10 CFR Part 2. I think the little yellow booklets you have includes the actual rules if you're interested in reading them. There are some special rules for a high-level waste repository application in Subpart J of

Part 2 and this reflects the licensing support system proposal which was put in place a number of years ago.

If the licensing support system is not in place, well, then all the rules in Subpart G would be applied just as in the ordinary nuclear power reactor contested hearing. But, there are not that many changes as contrasted between Subpart G and Subpart J, anyway.

I'll just go over this quickly. The licensing support system is an electronic information management system. It's designed to provide for the entry and access to relevant information in electronic format. It was originally designed not only to facilitate filing documents electronically, but also to facilitate discovery of documentary material. So, there wouldn't be this exchange of boxcars and thousands and thousands of documents. It all could be arranged electronically.

In general, the rules under Subpart J and Subpart G would be very similar in terms of the actual conduct of the hearing process. The first step after docketing and license application would be a notice of docketing in the Federal Register and a notice of hearing in the Federal Register. That sort of begins the process. And, let me say that the hearing process is an essential part of the review process because, although obviously we cannot proceed without an adequate application and the staff's evaluation, as

documented in its safety evaluation report are essential, the actual licensing decision will be made by the Commission or the presiding officer, depending upon the level of review which takes place, based upon the record of the hearing and nothing else. And, the notice of hearing in the Federal Register kicks off or begins the actual hearing process. It announces a time and place of the hearing. The first prehearing conference describes how people may participate in the hearing, how they may intervene, and how to get copies of relevant documents, the application, and whatnot.

The Commission would probably appoint the presiding officer in the notice of hearing, although it could take place in some separate document. That's a very important step because the presiding officer is the judge who presides over the proceeding and renders the initial decision. The judge controls, the presiding officer controls, the conduct of the hearing. So, that's very important. The presiding officer could be one or more members of the Commission itself, it could be a single named official, or an atomic safety and licensing board. It has been Commission practice in contested nuclear power plant licensing cases to appoint a three member licensing board with members consisting usually of a chairman who has qualifications in the conduct of formal proceedings, a lawyer usually, and two other members with technical qualifications that are appropriate considering the

nature of the issues in controversy. I would expect that it would be a licensing board appointed for the high-level waste repository proceeding.

The parties to the proceeding are partially defined in the regulation to include for certain DOE, the license applicant, the NRC staff, the host state if it wishes, affected Indian tribes if there are one, and then any other persons whose interest may be affected by the proceeding. Those persons who have not been designated in the regulations as having party status would need to file a petition for leave to intervene which would set forth their interest, how it would be affected by the proceeding, and a list of contentions with supporting information that they wished to see litigated in the hearing. The list of contentions is essentially the issues that they wish to proceed with at the hearing. Persons permitted to intervene as parties are full participants in the hearing. They have essentially all the rights of the applicant, the NRC staff, and everyone else. They may present evidence. They may obtain discovery. They may cross-examine witnesses. They may participate fully in the entire process. Intervention is also permitted by an affected unit of local government as defined by the Nuclear Waste Policy Act. As a general proposition, the NRC follows Federal judicial decisions on standing in deciding whether or not a person has an interest which may be affected. I would

expect based upon precedent in power plant licensing cases that, in addition to the applicant, the staff, the host state, a possible affected Indian tribe, you would also see a granted intervention of most units of state and local government if they wished, and again I would expect to see probably other groups of parties intervening; perhaps, local environmental groups or national environmental groups. It would depend on their interests at the time.

The first step in the actual process is a prehearing conference. It's just called a special prehearing conference or first prehearing conference. This is the beginning of a series of prehearing conferences. The first one is actually designed to rule on who will be the parties and what will be the key issues in the proceeding based upon the specification of issues in the intervention petition. In order for an issue to be designated as a key issue and therefore an issue that there will be further proceedings on, there must be documents submitted in support of the proffered key issue that would suggest that it's worthwhile pursuing the matter further if there is a genuine technical controversy involving this particular issue. There would be an effort made at this stage and also in subsequent stages to weed out issues which don't present a genuine technical controversy and therefore would not proceed to the hearing stage, an effort to weed out issues which are not factual

issues or technical issues that are, for example, policy issues or legal questions which can be pursued separately either through briefs and oral argument or separately by means of obtaining policy guidance from the Commission itself. The concept here is one ought to confine the hearing as near as possible to technical and factual issues, not policy issues and not legal issues. They ought to be resolved separately, if that's at all possible.

The first prehearing conference would result in a prehearing conference order which would identify the parties and identify the key issues. Now, that's very important, the identification of parties and key issues, because the entire subsequent proceeding would then be confined to those parties and those key issues, although for good cause, you may--you know, additional issues may possibly be added later on in the proceeding, but that gets to be progressively more difficult as the proceeding advances.

After the first prehearing conference, the next phase is discovery. And, discovery is confined to the key issues in controversy. They may not go beyond the key issues. Therefore, it's important at the outset to specify the key issues. As the prehearing conferences proceed, there's a variety of issues that are taken up, including stipulations and admissions, to remove issues that are really no longer in controversy. Eventually, efforts are made to

identify the witnesses, to limit the number of witnesses, and other steps to expedite the proceeding. Hearing schedules can be established. Other issues can be raised and resolved by the licensing board.

Discovery takes a number of forms. Oral depositions is one form. That's essentially a kind of cross-examination conducted outside the actual hearing process itself. Then, that's used as a basis to prepare parties' cases. Access to documentary materials, hopefully most of that stuff will be available in the licensing support system. Written interrogatories are basically a written list of questions submitted to one or the other party's experts in which they are required to answer under oath.

As I mentioned, parties who intervene are granted full rights to participate in the hearing. They may present evidence, they may obtain discovery, they can cross-examine the witnesses, they can file motions, they can file proposed findings which would take the form possibly of their proposed version of an initial decision. In addition, there's a special process we have in the regulations whereby a person who is not a party may still make a statement for the record. Now, this is quite common in reactor licensing cases. These statements are not actually evidence, but they're just statements for the record by people who want to express their views. It's a very informal kind of thing. Usually, it

takes place at the very beginning of the entire process, the very beginning of the hearing, and then the actual hearing process continues on after that. There's also a special provision whereby interested states, counties, and municipalities may participate by offering evidence, questioning witnesses, and filing documents and whatnot, although they do not actually have full party status. That's really at the option of the Government that they can choose to participate as a full party or they may choose to participate under the special rules. In terms of their actual participation rights in the hearing process, there's not a whole lot of difference. The principal reason why that was added in there was because it was thought that some states may want to participate fully without taking a firm position on the issues.

As I said, the presiding officer is responsible for focusing the hearing on matters in controversy and conducting an expeditious hearing. At the hearing, the applicant, DOE, has the burden of proof. As I said, each party can present evidence in cross-examining witnesses. The actual standard in the statute and in the regulations for the scope of cross-examination is, one, it's confined to the testimony. The testimony, in turn, is confined to the issues in controversy as defined by the presiding officer. And, under the statute and regulations, only such cross-examination may be conducted

as is required for a full and true disclosure of the facts.

The presiding officer has control over the scope of conduct and extent of cross-examination. In an especially complex case in which there is anticipated to be extensive cross-examination of witnesses, the presiding officer will probably require the party conducting the cross-examination to submit in advance for the presiding officer's review a cross-examination plan, so that the presiding officer can look in advance as to where the lawyer is going to be going with cross-examination and can rule out extraneous areas and get an idea of how long this is going to take and especially get a feeling for how to avoid duplicative questions.

There's an unusual provision in the Commission's regulations which provide that an expert may actually conduct the cross-examination as opposed to the lawyer. That's not used very often primarily because the experience has been that experts often, while they're very qualified, don't know how to ask good questions. But, the provision is available in the regulations. My experience has been when that's been used, you end up having statements made by the expert who is cross-examining and then the expert who is testifying and it becomes kind of unclear exactly who is offering testimony.

Testimony is offered under oath. The way the testimony will be taken will depend on how the presiding officer wishes to conduct the hearing. At the last

prehearing conference, there is the final specification of the issues for the hearing. They would then be organized according to subject matter. For example, if there are, let's say, 100 matters in controversy in a very contested hearing, you might want to organize just the contentions on volcanism for a special hearing session on volcanism. Or another special hearing session on performance assessments or some aspect of performance assessment. There will be an effort to organize the hearing in some logical way, so that common issues are decided, more or less, at the same time.

Testimony on a roundtable basis, that would depend again on the presiding officer. There could be all the direct testimony offered into evidence by all of the witnesses on a given issue following cross-examination of all the experts or there could be, you know, direct testimony, cross-examination, recross, redirect, expert witness by expert witness. That's going to depend upon the presiding officer.

There can be objections to admission of testimony. There will be rulings by the presiding officer. It's very important. Under the Commission's rules of practice, under the statute, the Commission is not bound by the Federal rules of evidence. So, there's a great deal of discretion on the part of the presiding officer in admitting testimony. There is no jury here. So, it is almost impossible for a presiding

officer to commit error by admitting evidence that should not be admitted because we don't have a jury who could be misled or confused. We have a technically qualified licensing board. So, there's considerable discretion on the part of the presiding officer. This becomes especially important in terms of eliminating duplicative evidence and lots of experts testifying on the same subject matter.

When all of the evidence has been presented, the record is then closed. The record could be closed either on the entire hearing process or, more likely, it will be closed on an issue by issue basis. So, we can say, ah, we're finally done with the five volcanism contentions. Now, let's proceed to the five performance assessment contentions. So, you sort of can make progress and know where you stand. After the record is closed, the parties are then given a chance to file proposed findings of fact and conclusions of law. That's basically what each party thinks the record shows. That could be at the end of the entire hearing process or it could be at the discretion of the presiding officer done on a group of contention by group of contention basis. So, for example, if the record is closed on volcanism contentions, the presiding officer might decide, well, listen, I want to issue an initial decision, a partial initial decision, just wrapping up volcanism. Let me have your proposed findings of fact and conclusions of law just on

the volcanism record. But, that's going to depend upon a presiding officer and what sort of makes sense at the time.

The presiding officer must make a decision on the basis of evidence in the record and the proceeding and nothing else. The record consists of the transcript of all the testimony, all the exhibits filed in the proceeding, and certain other matters which can be officially noticed which I won't go into. The presiding officer is expected to use his expert knowledge and experience in evaluating and drawing conclusions, but he may not base a decision on facts not received in evidence.

In the decision, the presiding officer will issue-- he will determine again and restate what the matters were in controversy, decide the findings required to issue the license, specifically will rule on each of the contentions which were admitted in the hearing process, contentions within the scope of the proceeding which would be both Atomic Energy Act contentions and National Environmental Policy Act contentions, if any such contentions are admitted.

The presiding officer's decision, I would expect, in a heavily contested hearing will be quite extensive. For example, the presiding officer's decision in the TMI Restart decision consisted of a total of, I think, three partial initial decisions, each of which were well over 300 pages long. So, the decision can be quite extensive depending upon

the number of matters in controversy. I mean, obviously, if you have a proceeding in which there are only a dozen matters in controversy, the decision wouldn't be that long. But, if it's a very complicated proceeding, then the decision can be quite extensive.

A party may appeal the presiding officer's decision to the Commission itself. The Commission has full leeway to deal with the presiding officer's decision. It may not go outside the record any more than the presiding officer may go outside the record, but it may reach its own conclusion on the matters in controversy. It can modify the decision. It can send the case back for further hearings on particular points. It can ask the presiding officer for clarification on aspects of the decision.

In our rules, pending a review and final decision by the Commission, a favorable decision by the presiding officer, that is to say favorable to the application, can become effective immediately and the construction authorization can issue by the director of NMSS, notwithstanding the pendency of appeals before the Commission. That's the fairly common practice. That's the practice which is followed in contested reactor decisions. If a party has a problem with that, then there can be an application for a stay of the initial decision to the Commission. In the reactor context in heavily contested

cases, there's been usually a fair amount of controversy involved in whether a favorable decision may became effective or not and there's lots of stay papers filed back and forth and a decision by the Commission on just a stay.

DR. BREWER: Now, is this a natural breaking point in the presentation, Marty?

MR. MALSCH: Yes.

DR. BREWER: I'm going to take the chairman's prerogative and call a 10 minute recess right now. Ten minutes and then we'll come on back and finish up. It's a physiological problem that we're talking about.

(Whereupon, a brief recess was taken.)

DR. BREWER: We're a little bit out of order in terms of the schedule, but I think we'll eventually get to lunch. I want very much to apologize and thank Marty for allowing me to break into the middle of his presentation. It was--we had to; we.

Marty, would you, please, proceed?

MR. MALSCH: Okay. As it turns out, it was a natural break, anyway.

What I'm going to do now is offer some general comments on expert testimony and expert witnesses. First of all, what is an expert in a hearing process? Well, it's a person with special skill or knowledge whose testimony is offered to give an opinion on some relevant issue within his

or her expertise. Well, how do you get to be one? Well, basically, you get to be one by choice of the trial team doing the proceeding. Anyone who is assigned to do research or analysis which is used in the application or used in review of the application is a potential expert witness. As is anybody else in the world, I suppose, who has relevant knowledge on the subject. So, at least from the beginning, all those who work with the NRC or DOE or intervening parties on the project are at least potential expert witnesses and that includes people working on the site characterization phase.

The actual need though for any particular expert witness and, therefore, for any particular piece of expert testimony is going to depend upon the presiding officer because the scope of the proceeding and, therefore, the scope of the testimony will depend upon the presiding officer's decision on what the issues in controversy are. And, the hearing and, therefore, the scope of testimony is confined to the scope of issues as defined by the presiding officer. So, until the presiding officer defines those issues as a part of the prehearing process, there can be no final decisions on who will appear as an expert and what the scope of the testimony would be.

DR. BREWER: Does the presiding officer determine who an expert witness is? I mean, it's fairly important if you are

one or you're not one, I assume, if you're involved. But, can the presiding officer say yes or no, you're not or you are?

MR. MALSCH: If someone is offered up as an expert witness and there's an objection on the grounds the person is not an expert--usually the person is an expert. Usually, the objection is that the testimony is outside his skills and his expertise. That's the more common kind of objection. The presiding officer would make that ruling and decide right up front. In case of any concern about that, it would be possible to get a ruling by the presiding officer in advance of the hearing. So, you wouldn't have someone go through all the effort of preparing testimony and preparing for the hearing only to arrive at the hearing and be told he or she doesn't need to appear. So, that could possibly be arranged in advance. It's quite common to exchange lists of potential witnesses including expert witnesses well in advance of the hearing so there are no surprises in that respect. In any event though, since anyone working on the project has at least the potential to be an expert witness, it's useful to know what makes a successful expert witness. I'll get to that in a minute.

The next issue is how is expert testimony presented? Well, I touched upon that briefly here. First of all, it must be testimony or an opinion on a relevant issue.

That is to say, it must be relevant to the truth or falsity of an admitted contention in the proceeding. It must be within the person's field of expertise. And, as I mentioned, the person's qualifications can be challenged in advance. It is not uncommon to find challenges to person's expertise not in the sense that they're not an expert, but usually the challenge is in the form of the testimony is beyond their field of expertise. As an example, in one proceeding in which I was involved, there was an expert witness offered on the subject of biological effects of radiation. The expert had attached to his resume a list of some 200 publications in which he allegedly did research on radiation. It turned out that all those publications, he was using radioactive materials as a tracer doing other kinds of studies. And, it was not the purpose of any of these studies to actually look at the biological effects of radiation. His qualifications were challenged successfully.

Testimony is almost always prepared in advance of the hearing in written form and submitted for the record, so that there is not this waste of time with the proceeding which you go through in oral presentation of the witness's testimony. It's prepared in advance in writing and circulated in advance in writing so all the other parties can look at it and prepare for cross-examination.

I mentioned how the hearing would proceed. There

would be usually the expert would appear, give his name, and be sworn. The testimony that had been prepared in advance in writing would be received in the record and then cross-examination would proceed directly. Testimony is under oath or affirmation. Obviously, you must tell the truth, the whole truth, and nothing but the truth. And, very importantly, it is your opinion being offered, not the opinion of others and especially not necessarily the opinion of your organization. So, when an NRC witness appears, he is offering his opinion, not the staff position or the agency position. Now, hopefully, if there's been sufficient preparation, the two are the same. But, it is essential to remember that it is your opinion which you are testifying to, not someone else's. So, if you don't personally support the position which you are being asked to testify, you don't belong as an expert witness for that party and that should be planned and arranged and understood well in advance. A transcript or other recording of the proceeding is kept so that there is an exact recording of exactly what you said and what you testified to and what the cross-examination was.

Now, how to be a successful expert witness. And, basically, it's summarized, I would say, by thorough preparation, good testimony, anticipation of questions, being able to express yourself well, not having biases and predispositions, and finally having a kind of natural talent

for it and some self-confidence. Let me go through those one by one.

First of all, thorough preparation. You need to understand exactly what the issue is and how it relates generally to the rest of the case. This requires lots of close consultation with the trial counsel in the proceeding and the other experts who are going to be testifying. Let me give you an example of a case in which there was not such close consultation. I was involved as trial counsel in a case involving a California power plant in which the issue in controversy was the adequacy of the safe shutdown earthquake. During the staff review of the application, there was this giant controversy between the staff and the applicant over the geology, the net effect of which was that the geology was stipulated and not an issue in controversy. The understanding was that the seismologist testifying on the safe shutdown earthquake would take as given the geology as specified in the U.S. Geological Survey report. It turns out that the direct testimony by the applicant seismologist, in effect, was not consistent with the stipulated geology. It was objected to and the entire testimony was stricken from the record. The applicant had to begin his case all over again and the application nearly failed.

That's an example of lack of coordination in the trial team. There should have been a clear understanding on

the part of the seismologist offering testimony on the safe shutdown earthquake as exactly what the premise for his testimony was expected to be. So, you need to have a clear understanding of your testimony, how it relates to the proceeding as a whole and to the other related issues, and you need to have close consultation with trial counsel.

You need to have a good working knowledge of the pertinent regulations which involve your testimony. You also have to have a good working knowledge of all relevant parts of the application. I can't tell you how embarrassing it is to have to ask an expert witness have you read Chapter 6.2 of the application and to have the person say, well, gee, no, I didn't. I mean, even though the chapter, you know, may have been given to him in some other form, if he hasn't actually read the application or at least the pertinent parts, it's a very embarrassing admission to have to make. So, that's thorough preparation.

The next part is good testimony and good testimony has three parts; data or facts the first part, analysis the second part, and the conclusion the third part. First, the facts. There must be some evidence of reliability of the facts, but an expert doesn't have to base his or her testimony solely on data which he or she has personally gathered. But, there must be some other evidence of the reliability of the facts. For example, they could be in peer

reviewed journals. They could be in official Government documents, they could be data gathered using an approved QA/QC plan. That would ordinarily be sufficient. In this respect, it's very important to know exactly what the scope of the contentions are because there is a great deal of difference between a contention, for example, which is essentially challenging a model and one which is challenging the facts upon which the model is based. And so, you need to know in advance exactly what is in controversy so you know whether to bring as an expert witness somebody who is good at modeling or someone who is good in gathering experimental data.

The expert should have a good working knowledge of the data and how it was compiled, in general, and must be familiar with opposing data and be prepared to explain rejection or reconciliation of opposing data. If only some data was used and other was not, the expert should be prepared to explain why some data was rejected and others accepted. And, very important, if data is lacking and more data is desirable, the expert should be prepared to explain how he or she can reach conclusions while ongoing research is being conducted. So, the expert needs to explain why he or she can reach a conclusion even though there is further work being done. The expert needs to explain why he or she is comfortable in offering a conclusion where there's ongoing

research on a particular subject.

A particularly difficult question that an expert often gets asked is explain how you can support your conclusion given the data as it now stands when you are also supporting the expenditure of additional taxpayers' money on gathering additional data. And, explain how it is that things can be sufficient, yet it's worthwhile spending taxpayers' money to get more. And, that's important to understand and have a position on that. And, finally, the data should be cited in the testimony. That's the first step in the testimony.

The second step is the analysis which is the logical bridge between the facts and the conclusions. Now, it must be explained. The expert must be familiar with the strengths and weaknesses of his or her approach and be prepared to answer the question are there weaknesses in your approach. All approaches have weaknesses. You know, don't get so pumped up and to say my approach is perfect, but you should explain candidly what the weaknesses are and how you can reach conclusions notwithstanding those weaknesses. You should be familiar with other models or analytical techniques and be prepared to explain why you didn't use them, why yours is the preferred approach.

And then, the conclusion, the conclusion should follow logically from the facts and the analysis. The major

difficulty in my experience here has been scope. You should be careful that the conclusion is no broader than the analysis and the facts on which it's based. I have an interesting example of a case in which an expert actually offered testimony, the conclusion of which was low power operation of the power plant would not have a significant effect on the environment. But, the expert's work had been confined solely to studying effects of the plant cooling system on bottom dwelling organisms. And so, his analysis and his facts did not support his conclusion and he was attacked and his credibility was severely attacked during the proceeding. That's a matter of close cooperation between the expert witness and the trial counsel to work and make sure the testimony logically follows from its foundations.

Then, anticipating questions is very important. There should be one or more moot courts conducted for every piece of expert testimony so the expert is familiar with what's going to happen. It's also useful actually to have the expert attend various sessions of the hearings so he or she is familiar with the surroundings and how the judge is and how the other parties are behaving. Among the questions you should anticipate are the following. You should be prepared to explain any evolution in your thinking. You should have reviewed all prior statements or papers you issue on a particular subject. If at any time in the past you

offered an opinion which sounds or is different than the one you're offering here, you should be prepared to explain why you concluded then and how you conclude now and how your thinking evolved. So, in particular, if you once supported the opinion, the proposition that there was insufficient data to support a conclusion and you're now supporting a conclusion, you need to explain what has transpired since then to cause you to change your mind. If you once used Model X and you're now using Model Y, you need to explain why you've now changed from Model X to Y. Again, these are your personal opinions under oath. And so, such explanations as my boss made me change my mind or I needed to keep my job are not a very good explanation as to why your thinking changed. If you have any reservations, at all, about your testimony, they should be discussed with the trial team and trial counsel well in advance of the hearing. If problems arise at the last minute, it's really a result of a failure in preparation.

Then, you should be able to express yourself orally, clearly, and succinctly. You should be able to answer cross-examination questions by yes or no followed by an explanation. You should relax and set your own pace. Don't let the cross-examiner set that pace for you. Now, I've told people that when I've done cross-examination, I used to have a practice of trying to follow the witness's

answer with another question within seconds so the witness didn't have much time to relax and think about what was going on. But, that's within the control of the expert witness. He can pause and think after each question and the witness has within his or her power to control the pace of the proceeding, as does the presiding officer. And so, relax and set your own pace. Pause and think before you answer. If you don't understand the question, say I don't understand the question. I need a clarification. There's nothing wrong with that, whatsoever. Nor is there anything, at all, wrong with saying I don't know the answer if, in fact, that's the case. Don't guess. Just say I don't know the answer. Obviously, don't be cute. Don't be a wise guy. If you think you've made a mistake, correct your testimony. If you've been excused from the witness stand, talk to trial counsel and he or she will arrange for a time for you to correct the record. There's no reason to leave that standing the way it is.

You can't confer on the witness stand. Usually, you're up there by yourself. It's possible you could be testifying as a panel of witnesses, in which case there could be some consultation permitted kind of off the record among panelists, but it is always open to cross-examination for you to disclose what the consultation actually was. So, in effect, there are no private conferences once you get on the

witness stand.

Ideally, you should have no biases or predispositions. It's obviously okay to have been paid for your testimony and for your work, but so long as the amount of your compensation doesn't depend on whether the application is granted or denied. But, you should be reviewing prior speeches and the like to see whether you can be accused of reaching premature conclusions. I mean, obviously, if you've been giving stump speeches since 1990 on how Yucca Mountain is the greatest thing since sliced bread before a lot of data was compiled, you're going to be attacked as having a predisposition and having reached premature conclusions. If you believe you have been pressured in any way into reaching any particular conclusion, you should be consulting with trial counsel very early in advance and get that straightened out.

Finally, there's a natural talent to being a good expert witness. You can be a good expert and not be a good expert witness. However, you can't be a good expert witness without being a good expert. And, it does take some natural talent and I think, as you do more and more of it, you get to acquire more experience, and it takes some self-confidence. Going into a hearing room as an expert, you should be of the belief that you know as much or more than anyone else in the hearing room about what you're about to testify to. That's

probably going to be the case if you've been selected properly and if you've prepared properly for your testimony.

DR. BREWER: Good, Marty. Thank you very much.

We're pressed a bit for time, but there is one general question that keeps coming up and we talked about it at the break. Would the procedures which are nicely and concisely spelled out in the presentations for which--thank you; I mean, it was very useful. Would these procedures hold in the case of interim storage if we had interim storage at reactors or interim storage at an existing facility like Hanford or Savannah River or interim storage at Yucca Mountain even?

MR. MALSCH: Well, if there were to be a licensing proceeding involving a separate interim storage facility, the process would be essentially the same. The only difference is we have special rules for a so-called general license. If a nuclear power licensee wishes to use a previously approved storage design like a dry cask storage or something--

DR. BREWER: Right, at site.

MR. MALSCH: At the site, at the reactor site. There are special rules for that which involve generally no licensing proceeding, at all. A person who is a reactor licensee is already licensed under the regulations to store fuel in an approved cask design.

DR. BREWER: Right.

MR. MALSCH: But, putting that aside, a contested hearing on an interim storage facility, an MRS, or a so-called ISFSI would be essentially the same as I've outlined, not much difference.

DR. BREWER: Okay. Thank you very much and thanks to all of the NRC presenters today. It was a useful thing to do.

We would like to now turn to Steve Brocoum to begin to present the DOE response to the licensing application process. Steve, of course, is well-known to members of the Board. He's a regular.

DR. BROCOUM: I'm just going to kind of give you an introductory presentation. It will be followed by a presentation on the annotated outline by April Gil which will then be followed by a presentation on our integrated licensing schedule which we're developing this year.

DR. BREWER: After lunch.

DR. BROCOUM: That's right, after lunch.

DR. BREWER: So, it's Steve and April Gil before lunch and then--

DR. BROCOUM: Before lunch, that's correct.

DR. BREWER: Okay.

DR. BROCOUM: The very first viewgraph I had here was just some of the requirements of the Nuclear Waste Policy Act relating to our interaction with the NRC. Some of these have

already been talked about. So, I'll just go over them quickly.

The first one is that it required the NRC to establish criteria for approving or disapproving construction, operation, and closure of repositories. Those criteria would invoke by a standard by the EPA, 40 CFR 191. As you all know or most of you know, the Nuclear Energy Policy Act of 1992 said those criteria did not apply to the Yucca Mountain repository. The National Academy of Science was supposed to issue a report and the EPA was supposed to issue a new standard and the NRC was supposed to update their regulation. We are still awaiting--that was 1992. It's 1995 now. We're still awaiting the report from the National Academy. We are told the end of July. A lot of issues there; dose release and the amount of time, all that stuff.

The Act required us to issue site characterization report and for the NRC to comment on it. That's been done. The Act requires, as I said, for us to issue a semi-annual report on the progress of site characterization. We do that twice a year. Joe Holonich mentioned already the Act requires for the NRC to provide preliminary comments on the sufficiency of site characterization to be included to the recommendation from the Secretary to the President.

And, the Act requires the NRC to act on our application within three years, possibly four years if

there's justification. This has a lot of spinoffs including all the pre-licensing interactions we're doing today and the requirement of the LSS. Every time I think of LSS, I think of a comment that the former chairman of the Commission, Mr. Selin made to Dan Dreyfus, "No LSS, no license." And, Dan has repeated that several times.

DR. BREWER: That's pretty straight, isn't it?

DR. BROCOUM: Yeah. And, finally, requires the NRC to adopt our EIS to the extent practical that they can.

The second viewgraph just quickly summarizes our program approach. Let me just say one more point with this viewgraph. As we all know, there are several bills in Congress. If any of those bills get passed, some of these requirements may change, go away, or be replaced by other ones.

The program approach, we believe, realigns the program with what we thought was the original intent of the Nuclear Waste Policy Act that allows us to provide sufficient information to make the proper decisions in a manner--and, this is one of Dan's--he kind of repeats this statement all the time--rational cost and schedule expectations. You know, the program has--the cost of the program has been inflated through time. Prior to the program approach, we were estimating a total cost of $6.3 billion for the license application. The program approach is approximately $5

billion for the Yucca Mountain license application and some of the discussions in Congress might make that even lower. Our program approach would have had us making a decision on the suitability of the site in what we call technical site suitability decision in the '98 time frame which is a sort of investment decision that we ought to be going on and the site recommendation report in the year 2001. And, it would also provide in the license application so the NRC could make findings on the construction and then later operation and closure of the repository with additional information. The program approach basically reflects our views of the information we needed and our interpretation of what information is needed to support NRC's reasonable assurance finding and allow the free licensing interaction, revolve about that issue right there.

Now, let's talk a little bit about our licensing paradigm. Dan has been giving us a lot of thought. Dan has had this in his Commission briefing on the 9th of June. He had it in his briefing to the Congressional committee on the 30th of June. His view is that using the reactor model may lead to expectations that detailed regulatory requirements and guidance are necessary and can develop now up front. This is a quote from his testimony. "Unlike a reactor which is largely a manufactured product, the predominant aspects of repository design and its relationship to the geologic

setting cannot be determined in advance of information gained from site characterization, testing, and analyses." Again, that's from his statement to the Commission.

Another quote, "The development of a first-of-a-kind geologic repository cannot be undertaken in the same manner as the siting and construction of a nuclear reactor." The reason he believes that is we have had over 100, closer to 120 probably, licensing proceedings and a lot of the guidance and the regulations were put in place as experience was gained in reactor licensing proceedings, so that the applicant knew they had done it. The NRC had done it many times. We can't expect to do that for the repository. Joe Holonich says we'll only apply the regulation once. Maybe, we'll apply twice. No? If we ever get to a second repository.

Our licensing approach. It's very important for us to define our program and to develop the information we believe, DOE believes, is necessary to address the issues in a manner again that meets rational cost and schedule expectations. What society is willing to pay and how long society is willing to wait. So, basically, we will describe what can be done within the constraints; the constraints being mostly what society is willing to tolerate, if you like. So, therefore, the evaluation of the repository and the design process is a heuristic process. It's an iterative

process. We will learn as we go along.

We are now at a point where we can confidently set forth our compliance argument today. We did present, for example, to the Board in January in Beatty our waste isolation strategy. We are developing that strategy in more detail and we will have that strategy, I believe, by the end of this fiscal year. However, again, as the NRC expects, we will, when we submit a license application, demonstrate consistent with NRC's reasonable assurance standard that our repository design and its geologic setting will protect public health and safety and the environment.

So, how do we view pre-licensing interactions? We will obviously plan and conduct our program. We will inform the NRC of our plan. We will present our best case for evaluation by the NRC. We seek regulatory feedback and resolution of issues. The annotated outline and topical reports are the main mechanisms for getting information to the NRC; mostly, the annotated outline. The NRC, as Joe discussed earlier today, is developing pre-licensing evaluation reports. We have yet to receive one, but I think several are coming in a short time frame. So, we regard timely feedback regarding technical adequacy of our submittals will be more helpful to us than detailed guidance up front on meeting a particular standard.

What do we expect from the NRC? Obviously, the NRC

is our regulator. They'll comment on our plans and submittals in a timely manner--that's very important--and will evaluate the sufficiency of our information in the context of their licensing requirements. We are very concerned that there will be expectations regarding the level of proof that cannot be satisfied in this kind of facility when we're talking about 10,000 years or maybe longer into the future. This is a first-of-a-kind facility. We know there will be uncertainties in demonstrating waste isolation over thousands or tens of thousands of years. The NRC itself realizes that in 10 CFR 60 and the whole concept of reasonable assurance.

So, in summary, we know our program is dynamic. It changes and we're involved in that kind of a process. There are not only changes in our program, but there are changes that may be imposed on us by Congress. We will maintain sufficient flexibility to accommodate new information and understanding. No matter how we proceed, when we go to operate the repository, if we get that far, we'll have more information and then we submit the license application. We go to close it, we'll have more information yet. I mean, that's just the way it is. We will not be driven to premature conclusions concerning major strategic issues. Dan made a big point of this the last time he was in front of the Board. We will define our approaches, investigate them, and

refine them as we gain new information. We will modify our program on the basis of information we obtain and feedback we get from the NRC and of the oversight and interested parties. And, again, we will describe what can be done within the constraints--again that is schedules and costs and what Congress is willing to give us--and then it's up to us to say that's enough and for the NRC to decide if it's good enough.

That's kind of a philosophical approach that Dan--and this is really Dan--has presented several times in public forums.

DR. BREWER: Thank you, Steve.

Are there questions from the Board about license and the program approach?

DR. LANGMUIR: This really is a question which I think I mentioned it to Joe at the break. This is a logical place to get his feedback, I think, on what Steve is proposing; namely, that we're going to have a licensing process which is staged with certain aspects that cannot really be licensed at the front end until you know what the effect of thermal loading is through long-term testing and corrosion through long-term testing. You can't license the full repository in the sense of being able to comfortably argue what its proponents will be; at least, not early-on, you can't, not in three or four years. I guess, I'd like you both to react to that and how you're going to operate--work on it together to

make this happen?

DR. BREWER: Can I direct traffic to Joe first and then Steve?

MR. HOLONICH: Okay, that will be fine. I think, listening to what Steve has said, I don't have a strong disagreement with it. The way the rule is structured and what we're looking for is for DOE to be able to show us that the repository will meet the regulations with some degree of reasonable assurance. The way we approach that is to look at the data DOE is collecting today and say to DOE whether we think they have the right plans in place and whether they will be collecting the correct data to be able to make a demonstration with reasonable assurance. In addition, the regulation, Subpart F, has a performance confirmation program in it that, once the license application arrives and DOE believes it's made the case with reasonable assurance, we want DOE to continue to collect data on, for instance, thermal loading through the operational lifetime of the repository.

And, it also has in 113(b) a retrievability requirement so that if you get into performance confirmation and you find out the repository isn't performing the way you predicted during the license application and you're getting data contrary to that to performance confirmation, you can actually pull the waste back out because you're not getting

the performance out of the repository you expected.

And so, what we would look for from DOE at this point is some demonstration of compliance with our regulations within a reasonable assurance definition given in 60.101. And, we would fully expect during the 100 years of operation DOE would continue to collect data on the thermal load and confirm what they believed was reasonable assurance, actually they're gaining greater confidence on it. So, that's why Subpart F is there in the regulation in Part 60, performance confirmation, is to require DOE to continue to collect the data because we recognize at the time of licensing and at the time of the construction authorization, we're going to have to base it on a limited amount of data and it's going to be seven or eight years worth of site characterization data and there's an excellent laboratory right there for the next 100 years to continue to collect data. And so, the rule is structured to say get what you can now to give us reasonable assurance, continue to collect the data, and there's a provision that says if you find out it's not performing the way it should, you've got to have the ability to remove the fuel from the repository.

Does that answer your question, Dr. Langmuir?

DR. LANGMUIR: I guess, it brings me to another question I had which is related. It's clear to me you're going to have to accept large uncertainties in predicted performance

because that's what they're going to be in the absence of long-term testing results. Things like bounding analysis and expert judgment are going to be very large in the scheme of the material you're provided. And, you'll have to judge it because you can't predict without these long-term test results where things are going to go. So, maybe, that's enough. This could go on, but--

MR. HOLONICH: No, I agree with you. That's correct. Part of what DOE is going to have to show us is that they have, at least, some reasonable assurance based on the tests they've done that they believe this is how the repository is going to perform. And then, we'll have to look and see whether we agree with that.

DR. BREWER: Steve, did you want to add anything at this point?

DR. BROCOUM: I just wanted to say they have two, I want to call them, philosophical approaches. On the one hand, you recognize that when you go down and you're in the repository, you're going to get a lot more. You have 100 miles of tunnels versus 10 or 5 or 15. So, you have a lot more information. And, you'll have that other aspect of time. You'll have a lot more time to watch the effect as you load the repository. That's something we don't--even the long-term thermal tests aren't the same as decades of time and putting the waste packages in. So, in reality, you will have

a lot more information when you close it. And, technology will have advanced, science will have advanced, modeling will have advanced. You'll know a lot more then. But, the fact is you're investing billions and billions of dollars and so I think--I believe, I don't really know, but the license structure--was structured the way Joe describes it is because, you know, before you put this big investment in, you want to have reasonable assurance. What we're arguing about is what is what is reasonable assurance? It's not absolute assurance.

DR. DOMENICO: Two things I read, Steve. One that says--by DOE, interpretation of information is needed to support the NRC's reasonable findings. So, DOE will make that interpretation. And then, it says that you prefer to have timely feedback as opposed to guidance. I would never suggest that there's a beginning of a turf battle going on here, at all, never in a million years. But, I would think that there would be some agreement as to what those key issues are and I would think that DOE, as the investigator here, would be the one to investigate those key issues.

DR. BROCOUM: Correct. That's up to us to investigate it. It's up to us to make the case. Therefore, it's up to us to make the submittals and for the NRC to react. Let me just make a couple of comments. If you go back and you look, we've now been interacting with the NRC since--I don't even

know when. Say, at least, since 1987 when we submitted the SCP. How many significant technical issues have we resolved? I would say that's zero. Okay? So, we've been interfacing with the NRC for at least eight years and we've resolved zero issues.

DR. DOMENICO: Well, do you recognize--is there a commonality between what you recognize as--

DR. BROCOUM: I'm not trying to point fingers. I'm just trying to give you a fact. Now, Joe and his people are working very hard, I think, to come up with a methodology that they can give us feedback and make clear to us what they expect and allow us to resolve issues. He made that point himself. Unless we start to resolve these issues, we'll never meet this three-year licensing requirement. So, I'm giving you a fact of the last eight or more years. And, I'm trying to say that we can't go on the next eight years the way we went the last eight years. Okay? I think Joe recognizes it. I think the NRC recognizes that. He has struggled very hard and four of these people from NRR who have experience in licensing issues. And so, I'm more optimistic because until--whenever you made this presentation to us which was in April, I believe--

MR. HOLONICH: May.

DR. BROCOUM: May. The first time we heard the NRC give this kind of a process that gave you today that laid out

their philosophy on how we ought to proceed. So, to me, this is a way to work to move forward. But, I just want to also make clear though that it isn't the way we worked in the past.

DR. BREWER: Okay.

DR. CANTLON: I'd just like to get a little bit sharper recognition of the distinction between the license to construct and the license to receive spent fuel. You commented on the fact that once you begin putting fuel in, you're going to learn a great deal more and you've got many years to do that. But, you do have that two different licenses and DOE has an opportunity to present two different applications and there is a time period in there. I didn't see--

DR. BROCOUM: We're trying to take advantage of that time period.

DR. CANTLON: Right.

DR. BROCOUM: But, the process, the main decision is the construction--that's when the hearings occur.

DR. CANTLON: The first hearings.

DR. BROCOUM: The first hearing. That's a key decision and that's exactly what we're struggling with is putting together a license application that is--to the NRC is factual and one that allows them to reach a final and reasonable assurance.

DR. CANTLON: And, I guess, what I'm really trying to get some measure of is reasonable assurance ought to be much more reasonable at the time you license to receive spent fuel than at the time you construct. I don't detect any sense that there's a distinction there.

DR. BREWER: Let's see, Joe, would you like to comment?

MR. HOLONICH: I'm not sure our thinking is that evolved yet, Dr. Cantlon. We have just started through the review plan in the past year to begin to build how we're going to conduct our review. That's really a thought that hadn't entered into what we've been doing. So, I think we're evolving at this point. You know, part of what we've got to do, like Steve said, is the Commission's requirements at 60.31 spell out what's got to be done to get a construction authorization and we've got to make a decision with reasonable assurance. And then, 60.41 says what's to be done issue a license. Part of it's got to be construction substantially complete and a number of other things. I'm not sure we've viewed whether reasonable assurance was a different threshold for a construction authorization versus a license action. And, that's a good thought. I'll have to put it in my hip pocket and take it home with me at this point.

DR. BROCOUM: We've had some discussions in-house on this. And, if you think about the risk to the public at

construction, there is no radiological risk to the public. The risk is that you'll be building something you can't use. It's a monetary and a time risk. The real risk to the public begins when you start operating the repository. So, some of the people apparently have been arguing that you should have a different standard for construction authorization versus operation versus closure.

MR. MALSCH: Yeah, I just wanted to add a thought. Early, and it must have been in the mid-'60s, there was a special process developed for issuing licenses for nuclear power plants. It actually expressly contemplated the issuance of construction permits with major safety issues left unresolved. In fact, the very first Supreme Court case involving a reactor involved just such an issue. We issued a license for the PRDC facility without resolving whether the facility should be designed to withstand a core meltdown accident which was the major design issue in the case. You do not find in Part 60 a process like that. The process in Part 60 was designed to more of a front loading of the decision at the construction authorization stage which is not to say we could not have constructed a different process, but we didn't.

DR. REITER: The specific question about resolution of issues, let's get very specific and let's look at topical report on erosion. That was supposed to be the first topical

report resolving some issue. Essentially, what happened was DOE had submitted a report that NRC and many other people felt was--put forth the wrong kind of evidence in the wrong way. At the ACNW meeting, Paul Pomeroy asked both parties including the NRC if they thought this was an important issue and nobody thought it was an important issue. So, one, has the DOE learned a lesson of how to put the information correctly, and two, has the NRC made a statement that this is not an important issue? I've seen lots of statements about putting the data together correctly.

DR. BREWER: I think I'll start with Steve this time and then go to Joe. Steve, would you like to respond?

DR. BROCOUM: Well, when that whole issue resolution process was started and it was before the time I had my position here, erosion was chosen as a first topical when we thought we'd do a lot more topicals because it was an easy issue. You'll notice that Joe said it's not one of their key technical uncertainties. I mean, that's the statement he's made. And, yet, we've been going around this for several years and spent a lot of time, had field trips. We may have done this wrong. I think we've responded to their latest round of questions, but the fact is we've put in a lot of effort, good effort or bad effort, for an issue that we're told is not a very important issue by many different parties. So, there is something there, a lesson to be learned, and we

ought to be focusing and I think we're working on that. I think we may get some of that from Tom today that we're working to find and reach agreement on the key technical issues and uncertainties so we can focus our efforts in the future on the things that are really important.

DR. BREWER: Joe, is that consistent with your sense of things?

MR. HOLONICH: Yeah. I was going to say I have to agree with my distinguished colleague from the Department. We don't--

DR. BREWER: Mark that down in the record.

MR. HOLONICH: We don't view extreme erosion as something that will have a significant impact on the performance of the repository. I think what the extreme erosion process taught us and the lessons learned was, number one, we finished the review plan on extreme erosion so that we had our objective evidence that we could begin to use to do the review and we think that will help address the issue. And, number two, it demonstrated to us the importance of having active interactions with DOE during this pre-licensing consultation phase because if we're not getting information we need on issues that don't significantly impact performance, can you imagine what we're going to get into in volcanism and other significant issues. And so, from our perspective, this kind of demonstrated the need for us and

DOE to get very active on having interactions and getting regulatory feedback to them because it's an easy issue. And, if we can't fix this one, what are we going to do on volcanism?

DR. BREWER: Yeah, very good. Thank you very much.

DR. BROCOUM: Can I make one point on volcanism?

DR. BREWER: Yes.

DR. BROCOUM: Because that's the next big issue coming up. We've had some discussions and we're planning now to update the annotated outline in September of '96 in the area of volcanism and submit that to the NRC on volcanism, so that they then can respond in their pre-licensing evaluation report on volcanism. So, we can raise it from the technical staff's arguing to the overall staff of the NRC's response to the DOE position.

DR. BREWER: Maybe it was just as well you had a trivial issue to learn how to interact.

DR. BROCOUM: Right.

DR. BREWER: Thank you very much, Steve, as always for a good crisp presentation.

Our next presenter from DOE is April Gil. There's been a lot of discussion this morning about the annotated outline and how it relates to the license application process. In fact, the last question was a good segue right to the next topic. We are remarkably pretty close to

schedule. Must have been in a time warp or something.

MS. GIL: Well, thank you for the introduction. I'd also like to thank the Board for the invitation to speak. This is the first opportunity I've had to speak in front of the Board and I appreciate following Steve and Mark and Joe. I think that they've given a good introduction to what I'm going to be talking about. I also wanted to thank Mark for his kind remarks. I can say in about the last year and a half that I've had the position that I currently have, the level of interaction between our two agencies, I think, has gone up substantially. And, part of that has been a reorganization both on the part of DOE and NRC. So, we are in very active communication.

What I'd like to talk to you about this morning is the license application annotated outline. Specifically, I'd like to talk a little bit about the objective of the annotated outline. I'd like to give you some background on the document. I'd like to talk about the process, the way we actually put the AO together. Talk about activities results that we've had with the annotated outline to date. Then, I'd like to talk a little bit about some future plans that we have, talk about how the resolution process that we've just discussed fits into our overall licensing strategy including the annotated outline, and then some conclusions.

The objective of the license application annotated

outline is development of an acceptable and complete license application for submittal to the NRC. We believe that it's essential that we maintain communications between our two agencies to allow us to provide the information that the NRC needs in the annotated outline to allow them to meet their statutory review period for the license application. I would agree with what Joe said. We think that the annotated outline is a powerful tool to allow us to get information in front of the NRC in this pre-licensing phase. We're constructing the annotated outline by a process that we think will insure the acceptable information for the license application.

The annotated outline process allows us to identify information that's necessary for inclusion in the license application. Now, the license application, as you have heard, must be complete enough to be able to support NRC's reasonable assurance findings concerning the performance objectives and the technical criteria which are set out in 10 CFR 60, Subpart E. These are site and design criteria which, if satisfied, will support a finding of no unreasonable risk to the health and safety of the public.

Now, this next diagram is not meant to be comprehensive nor is it drafted to scale nor do you see any dates on anything. So, please, bear with me as I go through this.

DR. BREWER: What is it?

MS. GIL: Well, Dr. Brewer, my intention in putting this together was to show a schematic representation of some of the events that will lead to the license application submittal by DOE to the NRC. What I wanted to illustrate here was some of the complexity of the process and I think it does that rather well. What I'd like to do is just kind of lead you briefly through this maze, and then I'm going to talk about the top part of the diagram in some more detail.

It starts with site characterization, design, analysis, evaluation, of course. It leads into a final EIS, a site suitability determination, and ongoing is the license application development that you see there. We also have a requirement for LSS certification and this is a determination by the LSS administrator that DOE has complied with the regulatory requirement for the content of the LSS. Then, we have the DOE decision to recommend the site approval to the President and submittal of the license application to the NRC which is shown in the red box.

Now, if the NRC review shows that we have demonstrated compliance with the regulatory requirements including, of course, Part 60 and NEPA, then the construction authorization would be issued. This would be followed by construction and then an update to the construction authorization to obtain a license to receive and possess.

And, we talked about that briefly earlier this morning. This would be followed by operation and then a license amendment for closure. There's one more step that I didn't put on here that's outlined in 10 CFR 60 that talks about termination of the license. DOE may apply for an amendment to terminate the license following permanent closure and decontamination of surface facilities.

Now, what I'd like to do is focus on the license application development portion of this which is really that third box in the second group over. I'd like to give you a little bit of background. We fully understand it's our responsibility to document compliance with the NRC requirements, the statutory regulations in the license application. It's also our responsibility to prepare a license application that is as complete as possible in light of information that is reasonably available at the time of submittal. And, that's a quote directly from the regulation.

Now, the NRC has suggested that we prepare what they call a bracketed license application that would allow the document to be prepared as information was acquired from site characterization, design, and performance assessment and they thought that this would also be a valuable mechanism for us to be able to identify the information that was required for the license application. So, we took them up on their suggestion. We initiated the development of a bracketed or

what we call annotated outline for license application in 1991.

The first three revisions of the annotated outline were M&O documents. They were done on a semi-annual basis. Currently, the annotated outline is a DOE document. It is controlled and we are planning annual revisions. However, as Steve mentioned earlier, we're also planning to use interim revisions of specific sections of the annotated outline to be able to communicate progress in different areas to the NRC. And, also, we're very interested in these pre-licensing reviews that Mark and Joe talked about. So, we want to give them the opportunity to give us substantive guidance by these updated sections. And, as Steve mentioned, volcanism is one that we're planning on doing that with.

Some of the benefits of constructing the license application using the AO process include the ability for us to evaluate existing information and also evaluate that information that we don't have available at the current time and plug those information needs into our planning process. The AO is also a very valuable mechanism for us to be able to get feedback from the NRC on our interpretation of their requirements and guidance, and it also is a method for us to be able to tell when we have sufficient information for inclusion in the license application to meet the regulatory requirements.

Now, I've given you a brief introduction of the AO including some of the background, some of the benefits that the process affords our program. What I'd like to do is show you the relationship between the AO and other parts of our licensing strategy. I'd like to discuss each of these parts in more detail beginning with the process itself.

As I have already stated, the AO process captures existing information in text, tables, and figures. Missing or incomplete information is identified on what we call information needs forms, and I brought some examples along in case anyone is interested in looking at them. What this allows us to do is present current information, our current understanding on specific areas in the license application to the NRC to be able to facilitate discussion back and forth. It also gives us the method to build the license application as we proceed with the technical program.

Each revision of the AO references information from again site characterization, design, performance assessment. It undergoes interdisciplinary reviews both at the M&O, the USGS, and the DOE prior to submittal to the NRC for review and comment. I don't know if any of you were at the technical program review that we had back in February, but Bob Craig who is the TPO for the USGS in Las Vegas stood up and said he wanted to be more active and involved with the annotated outline and I was really pleased to hear that. I'm

pleased to report to the Board that we have very active participation on the part of the USGS, as well as the national laboratories. So, it really is coming together as a consensus position on the part of the project.

As I mentioned earlier, revising the AO results in information needs and those are areas that we don't yet have the information needed for a complete license application. Those information needs are used to focus our annual and long-range planning initiatives, and Tom Williamson who will be speaking right after lunch is going to discuss this aspect of the process in much more detail.

On to the blue box on the left hand slide, the NRC has provided us with guidance and Joe and Mark both talked about this guidance. It's for the format and content of the license application. Of course, in addition to 10 CFR 60, we have preliminary guidance the NRC provided to us back in November of 1990 in the format and content for license application for the high-level waste repository or the FCRG. Now, the FCRG is a draft document. It remains in draft form and I understand that the NRC does not have plans to issue it in final form, but rather will be concentrating their efforts on the next document that you see, the license application review plan for a geologic repository, the LARP. That was first issued last fall. We were able to incorporate some of the guidance provided in the LARP in this Rev 0 of the AO

that went to the NRC last March, but obviously we're very interested in these NRC documents and we follow their development of these guidance documents and we try to follow the guidance provided in them as closely as we possibly can.

What I'd like to do is just very briefly bring you up-to-date on the current status of the AO. As I mentioned, the fourth revision which was Revision 0 because it has now been issued as a DOE document was submitted to the NRC in late March. To date, approximately, 1200 information needs have been identified on the basis of fleshing out the AO. These information needs have been provided to the program planners. And, they run the spectrum from requirements for simple maps or requests for drawings--for example, a drawing of the ventilation intake shaft to something that's extremely more complicated and difficult to produce. For instance, the description of processes and events considered for undisturbed performance in each performance assessment of the system. So, you can kind of see the spectrum there that information needs run the gamut from something that's pretty simple to produce to something that's much more difficult. Now, we are currently working to tie each information need to a specific deliverable date, and Tom Williamson is leading that effort for us.

I'll put this next slide in just to show you kind of graphically what the content of each chapter is, The

license application starts out with the facility description in Chapter 1, the safety analysis report in Chapter 2, the geology is in Chapter 3. That's my personal favorite chapter, by the way. Geologic repository operations area in Chapter 4, EBS in Chapter 5, and as you can see, it's a very comprehensive document. I think a truck is probably going to be needed, although we're talking about doing something on electronic format. So, we'll see what happens.

Some of the future activities that we have planned are submission of Revision 1 of the AO to the NRC in January. And, this will be what we're calling a full passthrough through the AO. This would be an update of all text to insure that we have a complete development of the information needs necessary for our planning purposes. And, again, the results of the site characterization program, the total system performance assessment, available design information, a description of the QA program that would go in Chapter 10, and any specific chapter information that's available, we plan on putting into the annotated outline.

The program plan--and, I do have a copy with me if you all are interested--lists the specific deliverables for each revision to the AO. Those revisions are planned on the schedule shown here with the eventual submission of a license application, if the site is found suitable, to the NRC in June 2001.

Now, briefly what I'd like to do is discuss our issue resolution process because it is an important part of our overall licensing strategy. I know that the Board is very familiar with our activities in this area including the topical report on erosion, also the volcanism program, seismic hazards program, the calcite silicate technical report. All these came under the auspices of what we call issue resolution. Now, the issue resolution principle--and Dan McKenzie talked a little bit about this yesterday--is based on information in the SCP which simply involved identifying areas where regulatory or technical clarification was necessary to be able to demonstrate compliance with the regulations. The issue resolution process, very simply, involves issue identification, performance allocation, data collection and analysis, and in my mind, most importantly, the documentation of resolution of issues.

Now, you've heard Steve say that this documentation can take the form of topical reports or sections in the annotated outline. We plan on using the annotated outline as fully as possible to put forth our compliance arguments to the NRC. And, as you heard Joe say, the NRC thinks that the AO is a powerful tool to provide issue resolution information. They've also agreed to a small number of topical reports, four to be exact at the current time. Semi-annual site characterization progress reports, I want to

expand just a little bit on what Mark said about the progress report. The delay in the progress report is just the nature of the beast. The progress report, as you know, is produced semi-annually and we're working very hard to streamline that process and to be able to get the progress report out to interested parties just as soon as possible, but about the quickest we're able to do it is about four months. So, the NRC is very concerned that the program has been changing so rapidly, they need a more timely method of keeping up with changes in the program.

Also, the responses to NRC's site characterization analysis or the SCA, these were the comments that the NRC had on the site characterization plan. We are carrying those as open items ourselves. I will use this forum to say we're very interested in seeing the NRC's open items tracking system and comparing the open items that they're tracking to licensing with those that we're tracking. I'm sure you can understand how interested we are in that and make sure that we have the same open items that we're working on.

So, we plan to use the AO process to provide the NRC with the information that they need to resolve these issues. And, quoting from one of their viewgraphs that they used back in May--and, by the way, I'd like to tell the Board that that technical exchange was standing room only. We had it in the largest DOE conference room that was available and

it was packed. I've had numerous requests for the handouts that the NRC provided. So, it was heartening for me to see the engineers and the scientists that were so interested in the licensing process. So, I think that we're all seeing the end result of our efforts. It's critical that we resolve technical disagreements early as much as possible during this pre-licensing phase to allow us both to have success with what our respective agencies are tasked to do.

In conclusion, the annotated outline process is being used to develop a complete and acceptable license application that will allow review and docketing by the NRC within their statutorily mandated review period. The AO is going to be the focus of our issue resolution activities and it also will serve as the primary mechanism for communication between the two agencies on these issues. We must be able to focus our resources on the development of a complete license application and we believe that the AO process provides us with a valuable management tool to allow us to be able to do this.

That's the end of my formal presentation. I'll be glad to try to answer any questions the Board might have.

DR. BREWER: Yes, questions from the Board?

DR. DOMENICO: On Page 12, the license application contents, that is the weight lifters' edition, isn't it?

MS. GIL: Well, you know, if you look at the FCRG, Dr.

Domenico, it's really a very slim document.

DR. DOMENICO: Lean.

MS. GIL: Yes, lean document.

DR. DOMENICO: My serious question is on the issue resolution. Is there agreement--we've heard what the NRC's position is on some of the major issues, 11 of them I believe. Is there agreement with Department of Energy that those are main issues or are there others or different ones that perhaps the Department of Energy has in mind?

MS. GIL: Well, we have just recently completed a preliminary comparison of our issues, if you will, with the 54 KTUs, key technical uncertainties, that the NRC has put into, I think, it's Appendix E of the LARP, the license application review plan. And, this comparison has indicated again on a preliminary basis that there aren't any holes between the two. There's not a one-to-one correlation, but as far as I'm aware, there are no new issues out there that have been identified by the NRC that aren't covered somehow in our program plan.

Does that answer your question?

DR. DOMENICO: Yes, thank you.

DR. BREWER: Other questions from the Board?

DR. LANGMUIR: This would look very much to me like a license driven program the way it's currently--clearly so. I guess my question, April, comes to we've all talked a lot

about systems analysis within the DOE program, total system performance as a driver. How does total system performance at TSPA tie into this whole program activity here? How is this being interfaced constructively and usefully since it's obviously a key activity within DOE and continues to be?

DR. BREWER: Steve Brocoum, do you want to answer?

DR. BROCOUM: I think you'll see when Tom gives his presentation, he has kind of a more detailed logic diagram which shows how the PA and the various iterations of the PA, particularly '97 and I think he said 2000--I think there's also a '98 that show on your diagram--you know, fit into the logic of developing--

DR. BREWER: This is the licensing schedule discussion--

DR. BROCOUM: Remember, the end goal is to submit a successful--I mean, the end goal of the program is to submit a successful license application.

DR. BREWER: Okay. Any other questions from the Board?

(No response.)

DR. BREWER: Questions from Board staff?

DR. BARNARD: I have a question that's related to this presentation, but also related to Joe's presentation this morning. Joe, this morning, you indicated that in the past your budgets have been somewhere on the order of $22 million a year for staff support and research and whatnot. What happened with House Appropriations? How did you come out of

that process this year? If that goes through, what implications will that have on DOE/NRC interactions and the progress on license application, the development of the annotated outline, et cetera, et cetera?

MR. HOLONICH: I don't know what happened in House Appropriations, Bill. I was out of the office for the past couple of weeks and people have been looking into it and I'm just not ready to talk about that. If we get cut, what we would have to do is step back and look at what the program is and decide what do we need to do to be able to continue our licensing function? And, we may find that we will not do as much model and code development as we're doing today. We may just have to rely upon the staff review of what DOE is doing. We may keep just the overall system performance with maybe some hydrologic modeling. But, we're not going to do all the model and code work that we've got laid out. We may do the license application in a different manner, maybe not as detailed as we anticipated. We may cut back and not rely on quality assurance audits. We would have to look at those kinds of changes in the program.

DR. FEHRINGER: I have two questions for April. On Slide 9, you said the information needs identified through this process are used to focus your planning. Could you give a couple of examples of changes that have occurred in your testing plans as a result of information you found you needed

in this process?

MS. GIL: Well, maybe Tom Williamson could help me out after I start on a preliminary answer here. The way the information needs are fed into the program is through the planning process that Tom's going to be talking about. As far as I know, the site characterization program that we've outlined is extremely comprehensive. I'm not aware of any major disconnects between the information needs and actual plans to gather that information. Now, the timing may be disconnected somewhat. But, Tom, perhaps you care to expand on my answer.

MR. WILLIAMSON: Yes, I think that's correct to date, April. I believe what I'll be talking about this afternoon is the first formal step in establishing the linkage between these information needs and the planning process.

DR. FEHRINGER: Okay. And, a second question involves the way the annotated outline is put together. I took it from your presentation it's purely an internal process. Do you have any external peer reviews of this process or any external input to it?

MS. GIL: No, we do not, not external to the program. However, some of the information that's included in the license application very well may have undergone a peer review or expert judgment process and Ardyth Simmons will be talking about one area in that this afternoon. So, the AO,

itself, doesn't undergo an external review.

DR. BREWER: Okay. I have a somewhat, I think, related question with respect to the open items tracking system. The NRC has talked a lot about openness and the processes. Is this open to the public and open to DOE or sort of is it internal procedure? It wasn't real clear in the presentation.

MR. HOLONICH: The open item tracking system?

DR. BREWER: Yes?

MR. HOLONICH: What we will do is once we get the system loaded, we will provide that information to DOE in hard copy and on a CD-ROM so that they can electronically disperse it throughout their organization. The actual getting into the computer is not going to be allowed. There are fire wall problems, there are virus problems, things like that, but we intend to give them the hard copy, give them the electronic version, and at least annually give them a complete update of where all the open items are.

DR. BREWER: So, when will this be available? I presume that if it's available to DOE, it's available to the public, in general, if they were to ask for it.

MR. HOLONICH: Yeah, it will be--when we send it to DOE, we will send it to the 18 or so folks who are on the CC list. Bill is one and all the state and local governments and everybody.

DR. BREWER: When is this going to happen?

MR. HOLONICH: We're loading it right now. We're hoping to have it loaded and be able to print a report sometime around the end of the year, first of next year.

DR. BREWER: I would presume that this makes the AO process and the issue identification an easier proposition for you?

MS. GIL: Well, I think it will really help us both, both agencies. We've got a database. I don't know if the Board has ever heard a presentation on that. We have a database that we set up when we were responding to comments on the SCP so that we would be able to keep track of what the comments were to help us and to make sure that we maintained consistency in our responses. And, also, to keep track of commitments that we were making in those responses to comments and that's been around since 1990, our database has. It has evolved now into a commitment and management system, but it's pretty sophisticated. The M&O maintains it for us. So, we're very interested to make sure that the two agencies are in synch in this area.

DR. BREWER: Thank you very much.

Don Langmuir had a question from before, and in my management of the flow of things this morning, it got lost. So, Don?

DR. LANGMUIR: No, you did just fine. It didn't get

lost. We ran out of time.

But, this is for Marty Malsch and this is perhaps a question I could have asked of the GS themselves apart from this meeting. But, Marty was talking about evidence that was available and could be used as part of the licensing process and would go to the hearing. In the past, the DOE has had real problems with QA and approving the QA status of peer review journal articles which most of us as scientists routinely accept as part of their process of accumulating information for licensing. They've also had problems--and this has driven me crazy--with accepting well-established computer models which could do the same calculations that the program's own models internally have been allowed to do and have been QA'd to do. What's the status at this point of NRC's acceptance and DOE's acceptance of peer review, out of the program literature, and computer models within the program and in the licensing process? I guess, that's the question.

DR. BREWER: Marty, before you begin, April, let me thank you very much for your presentation. There's no need to hang around. This is a question for Marty.

MS. GIL: Okay. Thanks, Dr. Brewer.

DR. BREWER: Right.

MR. MALSCH: I'll have to give kind of a contingent answer. It depends if it's challenged. I mean, normally,

things that are generally accepted scientific techniques, codes, models that are in common usage, they could even be officially noticed, you know, not even the subject of testimony or cross-examination, the problem comes about if there's a controversy about them because then if there's a genuine factual controversy about the adequacy of what it is you're talking about, then you're stuck and you have to have testimony. And so, you say generally established codes. Well, that suggests there won't be any controversy about them and, therefore, there won't be any contention in the hearing about them. But, if for some reason, let's say, an intervenor or the host state does an evaluation of some otherwise commonly accepted model, let's say, a computer program, and offers a contention to the presiding officer challenging the usage of that particular program and supports it with some testimony or literature, well, then the fact that it in another context has been commonly accepted sort of goes by the board and if there's a genuine factual issue, it becomes the subject of expert testimony.

DR. LANGMUIR: This could be entertaining because there's as much contentiousness to the internal codes that DOE uses as there are to any outside. So, this could go round and round. But, yeah, thank you.

MR. MALSCH: Well, in fact, it's easy to imagine in any-
-I mean, a reactor case is the same. I mean, in a way, if

you think about it in the abstract, you can imagine there are hundreds of thousands of issues that could be raised at which there would be no end to the proceeding. But, as a practical matter, people try to prioritize the issues they want to raise. There are limits in terms of everyone's resources and so people try to focus on what they think will be, you know, the really important issues. That will be especially important if you're operating under a statutory time deadline because then you can't waste your time. You can't waste two and a half of the three years litigating some site issue. You've got to really get to the important points.

DR. BREWER: Okay. Thank you very much.

DR. REITER: I have a question for Marty Malsch. Marty, this has to do with expert witnesses and it has to do with the flexibility of the presiding judges. Now, this is just based on personal experience. In General Electric test reactor, the judge there decided to incorporate this expert witness, an intervenor who took one course in geology and claimed he had absorbed geophysics through osmosis and he accepted it. In the San Onofrio hearing, the judge dismissed an expert witness who had published in refereed journals on the topics at hand, was a staff member, not a faculty member, of the University of California. But, his problem was all he had was a bachelor's degree from that hack institution, MIT. There's a tremendous amount of difference in what the judges

included and not included. How does that play?

MR. MALSCH: Well, there is no handbook or detailed guidance document offered to presiding officers on who is an expert and what are an expert witness's qualifications. So, you will see some variation. That's why it's very important. Perhaps, the most important decision the Commission will make up front will be the selection of the presiding officer.

DR. BREWER: Any other followup questions to anything from this morning?

(No response.)

DR. BREWER: If not, I would like on behalf of the Board to thank the presenters for a very, very interesting morning. It's very, very useful to the Board. Thank you very much.

We will reconvene promptly at 1:45.

(Whereupon, a luncheon recess was taken.)

A F T E R N O O N S E S S I O N

DR. BREWER: Lades, gentleman, colleagues, let's reconvene, please.

This afternoon's session will continue with specific DOE presentations on licensing. One of the formal presentations will be by Tom Williamson of the M&O on integrated license scheduling. That will be followed by Ardyth Simmons on peer review of thermohydrology issues as an example of the peer review process which is integrated into licensing application from the point of view of DOE.

Let me remind the public and anyone who would like to make comments, please sign up in the back of the room with Linda Hiatt who is there in the flowered dress. We will have an opportunity at the end of the two formal presentations to listen to public comment.

With that, we're all ready to go. I'd like to turn it over to Tom Williamson of the M&O.

MR. WILLIAMSON: Thank you very much, Dr. Brewer. Like

April, this is my first opportunity to brief the Board and I'm looking forward to that having participated in responses to Board's recommendations in the past.

This title represents responsibility within the M&O for developing the progress report and the annotated outline. I'm currently on a temporary assignment to develop the detailed FY-1996 implementation plan for the project. This briefing about the integrated licensing plan is--it relates to my new temporary assignment in the planning area.

I want to talk to you about what we mean by licensing plan in the context of the overall planning process. I'll talk about the objectives we have, the methodology that we're using to develop the plan, and its current status. This work is in process. The final plan will be submitted with the FY-1996 project implementation plan to the DOE August 31.

The integrated licensing plan defines project activities needed to complete the license application. In simpler terms, it defines who needs to do what when to complete the license application. It builds on the program plan, the project summary schedule, the licensing strategy, and the license application annotated outline, Revision 0, that April briefed to you before lunch. What we're going through, I think, is a logical process that a project goes through when direction is changed at the highest levels in

the form of the program plan to go through the steps of updating the project summary schedule baseline activities and then driving down for the more detailed elements in the annual planning process.

I put the third bullet on here because in Dr. Cantlon's letter to Dr. Dreyfus on December 6, the Board identified the importance of the waste containment and isolation strategy as it relates to prioritizing site characterization activities. And, this activity that we're involved in in planning FY-1996 is in direct response to our commitment to follow through on our response to the Board. Basically, we agree with the importance of the waste containment isolation strategy as it relates to prioritizing activities in the site characterization design and performance assessment activities that comprise the site characterization program.

Our integrated licensing plan will plan the completion of specific subsections of the license application and it will address the resolution of remaining SCA open items, other open items, and will address each and every NRC key technical uncertainty. And, I'll talk about that in more detail as we move through.

The most immediate objective of the integrated licensing plan all the way up to submittal of the license application is to provide a framework for the FY-1996 annual

plan. It will identify the critical path to license application integrating across all products that have been identified in the program plan and across all third level work breakdown structure elements. It is, in effect, a management tool that will assist in prioritizing activities as we go through the process of allocating funds to specific activities for FY-1996. As I indicated earlier, it facilitates project integration across products and across WBS elements. And, perhaps most importantly, it provides the logic and the framework to validate the license application submittal date and I think that will become obvious as we move through the presentation of how it does that.

The methodology we're using is not unlike that used for any integrated scheduling activity. We're starting off with pure logic and then we provide the rationale for the work scope, and then based on decisions we make going through Steps 1 and 2, we quantify programmatic risk. I'm going to talk about each one of those individually.

The logic network consists of these four elements. First, we identify the work activities needed to complete the license application. And then, we specify the relationship among those work activities. We're using the program Primavera (phonetic) as our scheduling tool. And, by logical relationships, I'm talking about finish/start, finish/finish type of relationships. Again, who needs what

from whom when to complete their portion of developing the information that's needed to complete the license application.

We then assign responsibility for each activity and I've often been asked what level of detail are we producing this integrated licensing plan? And, there's really no consistent answer other than we are producing enough detail to facilitate assignment of responsibility to individual managers throughout the project.

Once we've done those steps, we define a duration for each activity. Again, this is pretty much independent of any framework such as submit license application in 2001 or any of that. This is just pure logic on who does what when for the license application and it's a first step only.

What I'd really like to do and what I'm eager to do in the near future is present the actual status of the integrated licensing plan. Due to the preliminary nature of the work, however, I think that would be inappropriate at this time. The current status is that we've identified 270 activities in our logic network and I'll talk that in a little more detail exactly where we are. But, we currently haven't gone through the management reviews that would be appropriate before we present this to the Board. But, I came up with this to illustrate primarily the integration that we're trying to accomplish with the integrated licensing

plan.

These are representative of the work breakdown structure third level elements; systems engineering, waste package design, site, repository design, regulatory, ESF, and so forth. And, working back from the submit license application to NRC, we put in things that we know we have to do and we can estimate fairly accurately to determine when we're going to need other information from throughout the project. And, again, we have a 270 activity network now and I pulled out a few things here just to illustrate how we all have to work together to complete the license application. The license application design report is led by the systems engineering organization and they produce an integrated design from waste package repository. As we work back, you can see that we're starting to focus in on those things that we need to accomplish in 1996 in order to be able to submit a license application in 2001; such as develop our concept of operations, identify our design basis events and accidents so that we can perform the accident analyses that are necessary to develop our Q-list which is a list of those system structures and components that are important to radiological safety which are prerequisites to major design activities such as license application design. We have identified inputs from the performance assessment area here to illustrate the process.

We will complete the TSPA-1995 at the end of this fiscal year, perform a performance allocation function that will feed into these activities. One thing that's missing from here that we believe is a significant change in the way we've done planning is that we have identified three points in which we need to do specific technical baseline updates on lower levels of detail leading to that level of detail that's necessary to submit the license application. Again, this is not all inclusive by any means.

You start to see the feeds all the way into the testing programs at the bottom of the chart here with process model coding, completing it a certain time and feeding TSPA-1997. We're making an attempt to separate the coding aspects of the process models from the data synthesis and report writing aspects to clarify some terminology that's resulted in some confusion over the years. We have decided to call further activities with process model development and process model qualification. For example, if we need additional information from C-well tests in order to support our overall licensing strategy, then we will gather that data, identify a specific activity that will help us qualify the saturated zone process model and then feed that up in the total system performance assessment and roll it on up into completing specific license application sections. And, you see the heater test activities here similarly updated the thermal

near-field model which would feed on up into the TSPA and on up into the license application. So, this basically just gives an idea of how we're breaking things down to the point where we are in a position to specify explicitly what we need from each other in order to complete specific sections of the license application.

Now, I want to talk about Step 2 because I believe Step 2 represents the biggest challenge in developing an integrated licensing plan. I also believe that it represents the greatest opportunity to add value throughout the project because what we are attempting to do in Step 2 is define work scope in the context of our licensing strategy which includes, among other things, the strategy we're using for the waste containment and isolation. And, this is the linkage I mentioned earlier where we believe there are certain things that are most important to a successful license application and we intend to focus the project on developing our case around those.

We are going to address the question, how much is enough as we write up these activities and we're estimating now maybe a paragraph to a page per box of what currently is a 270 activity schedule that will basically say in very clear terms what stage of completion does each activity need to be in before we proceed through the next step in the process of developing a license application. And, I believe that that

represents a great challenge, but I also believe that we will be in a position to address questions like are you schedule driven, for example. I think putting the underpinning logic as part of our overall plan will put us in the position to answer those types of questions.

We will define criteria for deliverables associated with each activity using the information needs April talked about before lunch. We have a set of 1200 that were produced in time for distribution to NRC in March, but the basis for our schedule in March was so that those would be available to support this FY-'96 planning process, closing a loop on introducing the information needs formally into the planning process. Some of these, as April mentioned, they really are a wide range of information needs. Some, mainly just checklist type items that we've got to produce information for docketing; others are a subset of information needed to address the key uncertainties in the licensing strategy. And, here's another element that we're going to try to accomplish. We're going to link appropriate activities to NRC key technical uncertainties, the 54 that were talked about quite a bit this morning, and also to the site characterization analysis open items. We're using a database to do this which will allow us to--it's a relational database that will allow us to sort this information in ways that would permit us, for example, to identify the specific

activities in the plan that we're using to address the volcanism key technical uncertainty, as an example. Because we believe that we need to not only address all of the information that NRC has identified the need for, we also need to be in a position to resolve these open items prior to submittal of the license application.

This third step, I don't really want to get into this one too much because we haven't entered Step 3 yet. But, what we will do in Step 3 is evaluate programmatic risks in terms of scopes and schedules--scope, schedules, and cost. And, schedule risk really has been discussed in three different ways; technical risk, schedule risk, and cost risk. What we're talking about here in programmatic risk, of course, has nothing to do with any potential impact on public health and safety. Rather, it is a compilation or documentation of those decisions we had to make as we balanced these three elements of risk completing the final plan.

The current status is that we've developed a preliminary logic network and that we're working on Step 2 which is defining the work scope statements. And, the reason we're saying preliminary here is because we don't expect to complete Step 1 before we've completed Step 2. We fully recognize that when we go through the process of specifically identifying what is expected at the end of each of these

activities, we will need to make adjustments in our logic network as a result of that. And, again, we plan to issue the integrated licensing plan as part of the annual project implementation plan on August 31. I believe this briefing is a good example of providing updated information to the Board because this work is truly in process.

In conclusion, the licensing plan focuses project activities on completion of the license application. We heard a comment earlier that it appears that we're licensing driven. I believe that this plan is a natural progression beyond the program planned level of detail to get very specific on just what those activities are. I think, NRC made the comment that we've got to do more with less and we've got to get real focused in our site characterization phase of our program. Our goal is to do just that relative to the license application. It provides a management tool for prioritizing work activities and, again, it facilitates integration throughout the project. I think we made a good step in that direction in the program plan and project summary schedule. However, our goal here is to specifically identify how information, which in many cases is the same information, feeds the three products in the program plan leading to a license application if the site is suitable. And, again, it's kind of a sanity check. Annually, we will update this based on information that we receive from the

site characterization program and comments from NRC, et cetera, to make sure that we have a logical and sound basis for the license application submittal date.

DR. BREWER: It's not clear to me how would this be used? I mean, could you give me a scenario or sort of tell me a story about who would use this and when they would use it and kind of what it's all about?

MR. WILLIAMSON: Yes. I think I addressed that when I indicated that this will become the framework for annual planning. Specifically what that means is that we are producing a multi-year approach to annual planning such that we will understand what those activities are on the critical path to completing the license application. We will be able to prioritize activities based on their relationship or closeness to that critical path and we will be able to extract from this multi-year plan the FY-1996 activities that are most critical to keeping us on course for 2001. And, in the mode that we're in right now, we have integrated planning leads for each of the third level work breakdown structure elements. And, we will provide this package to those planners who will plan down to the summary account level in the planning and control system. So, they'll specifically use this to prioritize what they do in each fiscal year.

DR. BREWER: So, say, Steve would have on his desk access through a local area network? He could kind of dial

this thing up and figure out where all the pieces are? Would you use it? It's a real question. I just don't know how this thing is going to be used.

DR. BROCOUM: A lot of this planning information is being put on in our Lotus Notes and databases. So, we can access it today. We can tell where they are from our terminals at our desks right now.

DR. BREWER: Okay. Well, that's what I was trying to get at.

MR. WILLIAMSON: But, I really think it will be part of the whole plan that provides the rationale for the fiscal year 1996 project level plan.

DR. BREWER: Yeah, because this has been a concern of the Board as sort of how the pieces get all put together and this, obviously, is I would hope a major help.

DR. BROCOUM: Historically, I mean, license application is way out in the future and we never had a clear vision of how we were going to get there.

DR. BREWER: Okay.

DR. BROCOUM: And, we started out with the annotated outline. I think this is the next step of actually defining all activities that need to be done to make sure you get there when you say you're going to get there.

DR. BREWER: Okay. Other questions from the Board?

DR. LANGMUIR: Looking, Tom, at the Overhead #7 which is

the logic network, it's tough to absorb it rapidly. But, looking at the arrows and thinking about it, I asked a question earlier and it was deferred to you and it had to do with the link between TSPA and licensing. Looking at this logic network, I'm even more concerned than I was because what I see is the only connect between licensing and TSPA occurs in the year 2,000 where the arrows start coming up from a LAD report to the complete license application. That's one concern I've got is I don't see enough connect all the way along which is what I would expect to see if we're really going to use TSPA. That's the first part of the question.

MR. WILLIAMSON: Right.

DR. LANGMUIR: And, the other one is--rather than a question, I'll make a statement and you can comment on it. Looking ahead to the time of licensing and the hearings that we've been discussing and the impact to the public and so on and all the stakeholders, I personally view TSPA as the logic by which you explain to the public how the system is going to work. I don't think the public is going to be happy with simply looking at the license--the concept of license that the NRC has conceived that is being implemented by the DOE, hopefully, and approved as the only thing that the public is going to be thinking about when it comes time to approve this repository. They're going to be thinking about the logic of

the whole system's performance as embodied in a TSPA. I'm not sure how that's all going to play out. I guess, I'd like some thoughts from you on how that will fit in the scheme of things and how those two will play together? I don't see them playing together until 2,000, in terms of one working with the other, but I'm sure they are working together. I'm not sure how and when.

MR. WILLIAMSON: Absolutely. I'd like to just repeat that this is a cartoon and it's not really representative of all the linkages that we've got in our logic which is now the 270--

DR. BROCOUM: Let me make one comment here. See where it says the process model zooming in to feed TSPA in '97? In planning, at least the PA people have issued fairly detailed information of what they think the process models are, what they expect for each one, who they think is responsible. That kind of guidance has been issued by the PA people to both the scientific programs and the engineering side of the house to make sure we are communicating back and forth. I mean, there are holes that show up at the last minute. So, that kind of is going on. Plus, this diagram doesn't show you all the TSPA iterations. There's also one in '99 and there's--in addition to the one in 2000. So, there's one iteration missing on that chart.

MR. WILLIAMSON: Right. I think one thing that we've

tried to do--I agree with Steve 100%, that process is working. We're trying to basically enhance the way it works by specifically identifying what all the linkages are among the requirements of the technical baseline updates when we allocate performance within the technical document hierarchy to lower levels and moving towards the level of detail needed for the license application and what these activities have to do to support each step in that process. So, for example, we've introduced performance allocation followups to each of the total system performance assessment iterations to feed into that process. Where this is one technical baseline update, this is another one. In our current status, we have three. We're trying to understand how we're going to allocate performance using TSPA and performance assessment methodology and, I think, take it a step further in the way that we communicate how we're doing that. I think we're doing it now. I think that we've probably not communicated how those interactions work among one another as well as we could. That's what we're trying to address in this integrated plan.

Question #2, I might want to defer that to Dr. Brocoum, although I have my own opinion about how TSPA relates to licensing and how licensing relates to the public participation and overall assessment of the ability of the site to comply with--or to protect the health and safety of

the public. I believe that provisions for protection of the health and safety of the public are built into that process that started with the Nuclear Waste Policy Act and resulted in the promulgation of 10 CFR 60 in which the NRC was given specific mandate to be the public surrogate to a certain extent. I believe the participation of the public was provided for in that overall process.

Steve, would you like to add to that?

DR. BROCOUM: The only other thing I would like to mention, you'll note that the PA and the LA are in the same color because they're under the same manager over at the M&O. The manager for that whole activity is Jean Younker who reports to Dale Foust. Also, in the DOE side, those are under the same manager, myself. So, they're integrated and that they're under the same manager both on the M&O and the DOE side. So, April is responsible for licensing, for example, and Abe Van Luik is the new team leader on PA, as an example.

DR. BREWER: Okay. Additional questions?

DR. BARNARD: Tom, are you familiar with the systems work that the folks in Vienna have done?

MR. WILLIAMSON: Yes.

DR. BARNARD: The N-squared chart, do you know what that is?

MR. WILLIAMSON: I'm not really familiar with that one.

I've heard of it.

DR. BARNARD: Because there should be some correlation between that chart and the activities that are charted on that plot and the kinds of things that you're doing here.

MR. WILLIAMSON: Could you explain that chart?

DR. BARNARD: I can't explain it. I think, as I recall, Jim Crane is the one who developed the chart and I think a lot of the activities they have plotted on that chart are the same ones that you're dealing with.

MR. WILLIAMSON: Well, I'm sure there's a similar planning activity going on in Vienna and we are integrating across the M&O. However, this is pretty much a project level plan that will show feeds from the programs that support waste acceptance and transportation. So, yes, those are identified in our preliminary draft. They're just not shown on this for when we're going to receive the Westinghouse design for MPC and so forth, when we need to have that to support the next step in what we're trying to do, to write the MGDS license application.

DR. BREWER: Okay. Other questions of Tom Williamson?

(No response.)

DR. BREWER: If not, thank you very much.

MR. WILLIAMSON: Thank you.

DR. BREWER: Our next presenter is Ardyth Simmons. One of the issues of interest through all of this has to do with

peer review of the individual items that end up in the license application. We've asked Ardyth to talk about one specific area and this particular case, as is reflected in the title of her presentation, thermohydrology issues.

Ardyth?

MS. SIMMONS: Thank you, Dr. Brewer.

The Board may recall that I gave a presentation at your November meeting last year on the status of this peer review. So, this talk will be a followup to that.

At the time of last November, the project had a plan in mind, a scope for a peer review, but we did not have funding for it. And, I'm happy to say that since our mid-year review, we were able to provide that funding and to actually get the peer review off the ground. The peer review committee will have its first meeting tomorrow actually in Las Vegas.

This is an outline of what I'll be talking about in my presentation. First of all, I'd like to go over the reasons for the DOE convening this peer review. Thermohydrologic behavior, as you all know, of Yucca Mountain under a thermal repository load is a key factor in choosing that thermal load. The choice of the thermal load is one of the major programmatic decisions that we have to make. There have been many meetings on that topic. It still is a subject of continued discussion. One of the reasons why

thermohydrologic behavior is so important in the selection of a thermal load is because of the role that the thermohydrology plays in the performance assessment. And, the Department of Energy felt that it was prudent for us at this time to have a look at the models that are being used-- the process level models that are being used as part of the thermohydrology framework that would be provided to total system performance assessment. And, therefore, we thought that a peer review would be a suitable management tool.

Peer reviews are used by the Department as a number of different vehicles and for different purposes. One of them is expert judgment to evaluate data that has been collected. In this case, however, we are using the peer review as a tool for evaluating our approach, for evaluating the adequacy of the conceptual thermohydrologic models and the adequacy of our testing program, both the work that has been done to date and also the work that we are planning to do. That testing program is what we will use to build confidence in our models.

Yesterday, you heard a little bit from Ned Elkins about the thermal tests. The design of the in situ thermal tests in the ESF is currently underway and, therefore, it was timely for the Department of Energy to have a sanity check, whatever you want to call it, but an external check prior to our beginning these tests because it could prove costly if we

needed to redesign them after we had started them.

So, the objective of this external peer review is to evaluate the project approach to understanding the hydrothermal conditions at Yucca Mountain that would be generated by a repository thermal load. And, again, we're looking at the adequacy and the sufficiency of our laboratory in situ testing program and the design of those tests, as well as the adequacy and sufficiency of the conceptual models.

We are using a quality assurance peer review procedure to conduct this peer review and these are some of the evaluation criteria that the panel will include when it conducts its review. In other words, looking at the validity of the assumptions that have gone into the models, the conclusions that have come out of the modeling analyses, the adequacy of the requirements that we have for some of our tests and models, the applications that they've been put to, the various interpretations that have come out of the models--and this is one area where many of the models produced the same results, but they are subject to different interpretations--the accuracy of the calculations, the appropriateness of the methods that have been used, and the limitations of those methods, and also looking at the uncertainties that are resulting particularly from the models and also from some of the tests.

Earlier in our meeting today, it was mentioned that we're not going to be able to observe processes over the period of time that we need to for the repository and this is particularly true in the case of the thermohydrologic behavior of the mountain. So, no matter how long we conduct a testing program even into the performance confirmation, there will be some residual uncertainty and we need to understand the impact of some of that.

In order for the peer review to do its job, it will be using a White Paper that has been prepared by the Department of Energy and its participants. So, the scope will entail evaluating this White Paper and thermohydrologic modeling and testing including the key references that are included within it. This White Paper, I will talk about a little bit more in my presentation, but it's designed to assemble the relevant analyses and tests that have been conducted throughout the history of our program and to describe those tests that are planned to still be conducted to kind of put together the whole picture of the thermohydrologic modeling and testing program. The peer review will evaluate the adequacy of the experimental program and field program and evaluate the sufficiency of models.

The modeling approaches that are being examined are primarily those related to the thermohydrologic models, but to the extent that other processes, such as changes in

chemistry mentioned here or else changes in mechanical properties in response to heat as they impact that thermohydrology, those couplings will be examined, as well.

In our peer review procedure, what happens is that the Department identifies a number of key questions that we think it's important to have the peer review evaluate. The peer review looks at those questions and, most likely, will add additional ones to that list. And, the series of questions that is finally developed--and this will be part of the purpose of tomorrow's meeting to flesh out the important questions that will be addressed during the course of the peer review--those will then be asked of the principal investigators and other people participating in the project at the next meeting of the peer review which will be held in August.

Some of the key questions that the Department feels are important for the peer review to look at are listed here for you having to do with do the number and types of the tests and their spatial and temporal scales represent the range of conditions that are needed to build confidence in the thermohydrologic behavior of the site? Do the coupled processed that we've described in the White Paper and in its supporting references, do they reasonably encompass the range of effects associated with the influence of the repository? Are there additional parameters in the models that perhaps

have some greater sensitivity than the ones that we've already identified? Are there other parameters that need to be addressed? And, here's a rather significant one. They all are, we think, but this one is especially important because we're dealing with a situation where everything is to some degree or another coupled. The approach that the Department has taken because of the significance of the thermohydrologic behavior is to look at the thermal and hydrologic coupling first as a primary coupling and then look at the couplings related to the chemical coupling and the mechanical coupling to that thermohydrology subsequently. And, we want to ask the question whether it's reasonable to decouple some of these thermohydrologic processes from the T-M or the T-C processes. And, if it's not reasonable to do that, how might we best be able to accomplish that coupling given the fact that we're working under a constrained schedule for the license application and resources that have to be considered, as well.

In our peer review procedure, the Department of Energy selects the chairman of the panel. The chairman then selects the remainder of the panelists. Some of the criteria that are important for the selection of candidates for any panel, any external panel, are that they have to be well-known in their field and in this case we were looking for people that had a good solid background in groundwater

hydrology, thermal effects, particularly with boiling and heat transfer, multi-phase effects because we're dealing with both liquid and gas phases, coupled thermohydrologic processes, process modeling, and experimental and field test design and analysis. We were looking for people that were acknowledged experts in one or more of those fields. Also, we needed to insure that they didn't have any contracts with the NRC and that they were independent from the work that is being reviewed, that they didn't have any part in performing that. And, that they obviously were able to commit to the time that would be entailed because it is a significant commitment.

So, this is the team that has been drawn together. Our chairman will be Dr. Paul Witherspoon. He's a Professor Emeritus at the University of California-Berkeley and has his own consulting firm. And, I have listed here for you beneath each of the names some of the areas in which these experts are acknowledged to be experts. Each of them has his own area of specialty and some of them are overlapping. Dr. Allan Freeze, you're probably familiar with because he was the chairman of a peer review that was conducted several years ago on unsaturated zone hydrology at the site. Dr. Francis Kulacki is at the University of Minnesota in the mechanical engineering department. Dr. Joseph Moore is at the University of Utah in the geology department. His

background is in geology and hydrochemistry of geothermal deposits. Dr. Franklin Schwartz is an eminent scholar at Ohio State University. And, Dr. Yanis Yortsos is the chairman of the chemical engineering department at University of Southern California.

Next, I'd like to go over some of the main ideas in the White Paper that was developed by the Department of Energy. This White Paper is in the process of undergoing a Department of Energy review right now, but it will be released and widely distributed once that review is complete and we'd be glad to make copies for anyone who is interested. I need to tell you to reverse these two pages. They got in your handout somehow backwards.

The Paper starts out by recognizing the need for building confidence in predictive models by doing testing at various time and space scales and through the use of natural analogs. We next then provide some background on our understanding of the current ambient hydrologic conditions of the site as a background and framework. After that, we go into the current understanding of thermohydrologic processes that we feel will occur under the repository load and the need to couple them in some degree with mechanical and chemical processes. I mentioned before the fact that we're starting with thermohydrologic first and will be looking at this in a step-wise fashion.

We discuss the coupled conceptual models today and mentioned something about the mechanical alteration of the fracture permeability and changes induced by mineral phase changes in the rock. Next, we review how numerical codes handle different conceptualizations of fracture-matrix interaction and this is a really key consideration that the peer review will look at because, to date, most of the modeling has used the equivalent continuum model and has not conducted any discrete type of fracture modeling, although some of our codes can deal with dual permeability and dual porosity. We need to look at what the uncertainties are which are entailed in using the equivalent continuum approach.

We describe the results of laboratory tests that have been conducted, so far, and the knowledge that's been gained from G-tunnel. And, G-tunnel is really our only experimental base of field testing, so far, although we are getting underway with the large block test and that should help build our confidence. We compare the repository and drift-scale thermal analyses that have been done and some of the conduction-only thermal analysis. We look at sensitivity analyses that have been done, the uncertainties of the modeling studies and analyses, and then finally we outline the project's approach to reducing those uncertainties. That approach entails conducting testing at various scales both in

the laboratory and underground. And, again, I would mention that we recognize that no matter what our tests are and how long they're conducted, there will be some residual uncertainty. The approach does plan to make use of building increased confidence during the performance confirmation period, and we're looking to identify processes that have the greatest sensitivity that we need to focus on and those tests that will optimize our confidence building.

So, that just gives you kind of a preview of what's in the paper. This is the schedule for our peer review. The plan has been completed. Our first meeting will be tomorrow and then the review team will hold a closed session on Friday. The second meeting where the principal investigators present the results of their analyses and address the key questions will be in August. The peer review report will be issued on December 15. Then, following that, we'll have a period where we respond to the report and answer questions and that sort of thing. Then, there will be a final set of comments that comes out from the review team and, finally, all of that will be assembled into a record.

So, that provides you with an update on where we stand and, as I said, we'd be glad to provide you with copies of the White Paper and keep you updated as these activities proceed.

DR. BREWER: Yes. I think I can speak for the Board.

We'd like to see the White Paper as soon as it's available.

Are there questions from the colleagues?

MS. SIMMONS: Well, actually, that's a good point.

DR. BREWER: That's a yellow paper.

MS. SIMMONS: This is a yellow paper.

DR. DOMENICO: We've seen that one. I have not seen the White Paper. Can we get copies soon?

MS. SIMMONS: Yes. You could probably have a draft copy, I would think.

DR. DOMENICO: Okay. Will the panel--not knowing what's in the--how long has the White Paper been available and who put that together?

MS. SIMMONS: The White Paper hasn't been made available yet because it is being xeroxed this afternoon as we speak, I think. We're trying to have it ready for tomorrow morning's meeting. So, it hasn't actually even been provided to the peer review. They've essentially received an annotated outline of it, to date.

DR. DOMENICO: Will the panel be restricted to those items discussed in the White Paper or will they be free to investigate any coupled phenomenon that they think might be relevant?

MS. SIMMONS: The panel is free to investigate any coupled phenomenon that they feel is relevant as long as it stays within the scope of the peer review in which we have

asked them to focus primarily on the thermohydrologic processes and then the chemical and mechanical couplings that are related to the thermohydrologic.

DR. DOMENICO: I don't know if this is news to you, but the Southwest Lab is also putting together a panel, as we speak, to investigate their reports on coupled processes.

MS. SIMMONS: No, it wasn't--it's not news to me, Pat, and I've talked to some of the people at the Center who are involved in setting up that peer review. My understanding is that it's of a slightly different scope than what we're doing. I believe that the review--and maybe Mark or Joe would like to add to this. But, my understanding is that they're looking at work that has been completed by the Center and that it primarily has to do with hydrologic and mechanical couplings under the influence of heat, obviously. What the Department is looking at primarily here is to check to see whether our approach is adequate and sufficient. And, I'd like to emphasize because April brought this up and I think Steve might have mentioned it earlier today that some of the data that will come out of the thermal tests and models will be used in our license application. However, this peer review is not going to be exclusively looking at the data that was generated, so far. We're asking them to look at whether they think we have an adequate approach laid out to addressing the uncertainties that we have in our

thermal program. So, it's going to be as much a looking forward to the future as it will be an examination of what's been done to date.

DR. DOMENICO: Thank you, Ardyth.

DR. BREWER: Okay. Other questions from the Board?

DR. CANTLON: Since you're going to have a very short amount of data because you have block tests and G-tunnel tests, will there be any attempt to look at burning coal mine data which would give you longer heat sources in various-- particularly, some of the western burning coal mine cases where you might be able to get some long-term geochemical events? And, also, over at the Nevada Test Site, you had some short-term heating events in exactly these kinds of rock. And, it would seem to me you could begin to get a little bit of a view of some of the, you know, processes you're not going to be able to get data on early-on.

MS. SIMMONS: I think that the panel will be free to investigate any kind of geologic information that they are aware of that might be able to help us get a better understanding of this problem.

DR. CANTLON: But, DOE could certainly assist them in getting access to some of those data on the test site?

MS. SIMMONS: Oh, certainly, yes. What we have done, to date, is to provide them with all of the references that we have from our program on the thermohydrologic work that has

been done. We'll make them aware of other areas that we know of. We have not included the short-term testing kind of things at the test site because, frankly, it was very short-term and we're looking at the long-term repository behavior.

DR. LANGMUIR: Just a few thoughts. I'm encouraged by this whole effort. I think it's a good idea. Looking at the people involved in the scheme of things, it struck me that--just one minor item or maybe not so minor--Yucca Mountain is an analog for itself, as we all know by now, and it doesn't look as if this is part of what they're going to be looking at. It might be very constructive for them to talk to Dave Bish and others at Livermore about what past heating of the mountain by hydrothermal activity has done to it that would extrapolate to how you might have measured it at the time it occurred.

MS. SIMMONS: Well, I would anticipate that Dave Bish and Levy and others from Los Alamos who are working on those aspects of past alteration would be called upon at this second meeting of the peer review to give testimony, if you will, to describe the work that they have done. Probably, what we will do is bring in people that have worked in the near-field environment, altered zone environment, the past alteration of Yucca Mountain, the modeling studies like Tom Buscheck and John Nitao, and the people who have been working at Berkeley on the thermohydrologic models and really provide

the peer review with as broad a base as possible for their understanding of everything we know about alteration.

DR. LANGMUIR: Is the timing--I hope the timing is right and the pathway has been laid so that if they make recommendations, Livermore folks would be in a position to implement recommendations as to different instrumentation or that sort of thing within the sequence of their planned block test as it currently is set up. It would be kind of foolish if we did all this and nothing could be done about it and the test work that we're about to start--

MS. SIMMONS: That was our urgency for wanting to get it completed this year. And, although the final report won't come out in fiscal year '95, we'll certainly have early indications from the peer review of what their recommendations will be, and we'll be able to figure that into any additional test design that we need to do.

DR. LANGMUIR: Something I haven't seen discussed yet and I'd be very interested in knowing about and Pat and I have talked about this some. I'm just trying to imagine how you can conceivably instrument the tests in the ESF, large-scale tests in the ESF, long-term coupled process tests, how you would instrument them and how you would interpret data you might collect which would tell you something about transport and chemical precipitates and their effect on the flow and the transport of radionuclides, that sort of thing.

It's totally new stuff. I can't imagine anybody has done this. I'd be glad to know if they have. I wonder if this group even has any sense of how you would do that? I'm assuming those are questions that will be asked.

MS. SIMMONS: We're certainly hoping that they have background in that area. The whole idea of instrumentation of the tests is one that we are very interested in looking at. My guess is that, overall, we're looking at some sort of an integrated data collection system that will come from the instrumentation. So, that at least addresses the part of how you get the data from that. But, as far as the best ways to instrument them and maximize the amount of information that you can collect, that's something that we're looking at getting guidance from them on.

And, there are several different groups within the project that are also working on this issue that I'd like to acknowledge. You know, this Yellow Paper that Dennis handed me is an in situ thermal testing program strategy that was prepared by DOE and its participants to try to get a better focus on the thermal tests. We're now evolving in our thinking so quickly that what's in here is becoming a little bit out of date. So, we're trying to see how much information we can get by the period of the license application. And, it's within that context that we're asking the peer review to help us.

DR. BREWER: Okay.

DR. PALCIAUSKAS: Yes, I have just a brief question. I noticed in one of the reasons for convening the external peer review, you had a choice of thermal load as a major programmatic decision. And, yet, when you go to the main ideas in the White Paper, nowhere do I see a connection between the White Paper and how it would influence you in making that thermal decision. It's almost like an implication that we're doing this basically to show that it can be done. It's safe, but we're not sure whether it's useful in actually making the thermal loading decision. Is this intentional or was it just left off? In other words, will the data eventually be useful in making that thermal decision?

MS. SIMMONS: The data that the program collects must eventually be useful in making that decision. One of the sections, albeit a brief section, that's in the White Paper discusses the thermal loading strategy. However, we did not want to have one of the primary focuses of the White Paper be looking at programmatic issues. So, the context in which the thermal loading is described is merely from the standpoint of the setting of the thermohydrologic modeling and testing. The systems group, as you know, has conducted--they've written their own papers and is looking at how you go about making the thermal loading decision. So, I would see that

the work that's going on in the modeling area and that systems effort going hand-in-hand, but it was not our primary focus to try to help make that thermal loading decision in this Paper. We were just looking at evaluation of the sufficiency of models.

DR. PALCIAUSKAS: Will you ask the committee basically to address that question in their peer review?

MS. SIMMONS: We won't ask them to address whether we should go with a particular thermal load--

DR. PALCIAUSKAS: No, not whether to go one load, but whether these tests will help make that decision?

MS. SIMMONS: Yes, we will definitely ask them that.

DR. BREWER: Okay. Other questions?

DR. CORDING: Well, just in terms of looking at the mountain scale with respect to the test is really what you're focus--you're going to be asking them to focus on?

MS. SIMMONS: Yes.

DR. CORDING: Thank you.

DR. BREWER: Other questions from Board or staff?

MR. MCFARLAND: Ardyth, yesterday in the discussion with Dennis, I believe, Dennis Williams, the discussion of the thermal test alcove that they would like to put in as soon as the machine gets near the TSw2, the discussion, if my hearing was correct, indicated that high priority would be put on thermomechanical and that the test facility design was to

look at thermomechanical. Did any of that--were those statements, those decisions, those discussions in any way influenced by your White Paper?

MS. SIMMONS: No, they were not influenced by the White Paper. That's really two somewhat separate types of things. The first test that will be done in this alcove does relate to the thermomechanical behavior because that is another issue which we must deal with. We were looking at both the preclosure aspects of the thermal load, as well as the post-closure.

MR. MCFARLAND: I'm speaking in terms of priority. Would that be the first test that should be conducted? Would resources be put into that early as opposed to thermohydrologic?

MS. SIMMONS: Yes.

DR. BREWER: I think perhaps you've got some help here in the back.

MR. WILLIAMS: Roughly, that piece of the presentation was in Ned Elkins' presentation. He was showing a typical layout, and when he was discussing it, he was talking about, I think, a first little alcove niche that we would perform some mechanical work in. I don't think that he put in a context of prioritization. I think it was just a matter that that was the first one we would get to and we could possibly start some thermomechanical work in that.

MR. MCFARLAND: But, you could also start some thermohydrologic work in that?

MR. WILLIAMS: But, he was looking at it from the standpoint of how we could conveniently field a test or one part of the testing in one alcove and another part of a coupled testing in another alcove. So, it wasn't extremely clear. I don't think it's still extremely clear in our minds, but we're not trying to prioritize one thing as being more important than the other at this point in time.

DR. LANGMUIR: A little clarification. If I'm right, isn't it true that the mechanical testing can be completed rather quickly? The rock performance in a mechanical thermal test is rather quick. Whereas the hydrologic testing, coupled hydrologic-chemical testing is a long time phenomenon that on a much larger scale is required to evaluate its significance? I think it's not a matter of priorities as much as efficiency that you can quickly do the thermal test, very expeditiously do it, and judge the quality of the rock, right? Isn't that essentially true?

MR. WILLIAMS: Yes. You'll get information a lot sooner on the mechanical part than you will on the hydrological or the chemical. I think that was a little bit in our thinking, in Ned's thinking, in Ned's contribution to the team that's working on that part of it which is Phase 2 of the testing strategy which has been called a White Paper, and we have

other White Papers rolling around, as is obvious from my confusion in this session.

DR. CORDING: Well, I think in terms of priorities, the hearing started on the thermohydrologic testing is the key issue and the key concern because that does take longer and that's the key siting issue. And, I think that one can run certainly static mechanical tests at any time in those and you can get that information. So, I think if it doesn't allow you getting to the thermohydrologic tests, then it's not a problem perhaps, but otherwise, I think the priority should be thermohydrologic.

DR. BREWER: Okay. Would you, please, identify your name and your organization?

MR. DATTA: Robin Datta, M&O. I just want to add to Russ one piece of information. (Inaudible.)

DR. BREWER: Additional questions, Board or staff?

(No response.)

DR. BREWER: If not, Ardyth, thank you very much.

Okay. At this particular point in the meeting, we pass from the prepared presentations to invite people from the public to make brief comments. We have four individuals who have signed up. Would you, please, starting with Hal Rogers--Mr. Rogers, come to the microphone here, state your name, and also if you represent an organization and where you live, please?

MR. ROGERS: Thank you very much. I'm Hal Rogers. I'm co-chairman for northern Nevada of the Nevada Nuclear Waste Study Committee also called the Study Committee for obvious reasons.

DR. BREWER: Thank you.

MR. ROGERS: We have about 3,000 members north of the 38th parallel and about 12,000 members south of the 38th parallel. There is much more interest in the south than there is in the north. I did participate in the June 15 meeting when the special independent study committee or task force gave their report, Jim Kelly and so on. So, some of my comments are related to that.

We, as an organization, greatly support the new program approach that DOE is using. We feel this is a very positive move on their part. It does need time to mature. It's not going to be 100% effective overnight and never will be 100% effective. But, it certainly is an improvement over what we've seen in years gone by. We do feel strongly that the Nuclear Waste Fund should be off the budget or outside of the budget. It's a trust fund, not part of the general fund. Or, as one of our members said, it's not a finger in the dike for the deficit. But, that's what it's being used for.

Stakeholder inputs and I, too, strongly dislike the word "stakeholder". Stakeholder inputs for consideration and decision making is a war cry that's going out. We certainly

feel that DOE could do a better job of taking these into consideration. The problem is if you've ever attended some of these stakeholder meetings, trying to extract serious recommendations, suggestions, and so on just is an impossibility. We have recommended that stakeholder recommendations, if they're serious about them, they ought to put them in writing and submit them to DOE and not leave the selection up to DOE. We've also suggested that a ombudsman should be established by DOE in the Las Vegas area, not in Washington--in the Las Vegas area to help stakeholders that have a strong recommendation and have difficulty writing it up or what have you and to facilitate the implementation of these things.

DOE should resume responding to attacks and false information that appear in the news media. I've been told that they did. At one time, they were doing this, but for various reasons they stopped. Well, we have found in our context is one of the things that the general public doesn't understand. If they're wrong, why don't they say--if these attacks--if this information is wrong, why doesn't DOE say something? Why isn't there some response from them? And, the lack of response gives credibility to some of the attacks.

Much has been done and much has been gained by DOE efforts over the past years. Few know this including,

evidently, Congress. And, these games and the work that has been done should be expressed in the public relations format. General communications problem, when you talk to people in small towns throughout Nevada, why here, what's the real danger to me and my family, what's been accomplished so far, when will a decision be made? These are common questions, particularly what's the danger to me and my family? And, the answer is practically none.

We support the chief scientist concept and the question has been where does this person fit into the thing? We believe now that he or she should be on a level with the director and, if there is a dispute between them, it's something to be arbitrated by the Secretary.

We also strongly support a peer review by the National Academy of Science or through the National Academy. We believe this is vital and the use of the National Academy has excellent support from the general population. That is, I should say, apparently has excellent support from the general population. We believe that the independent study that's been requested by some has shown another blue ribbon study is not needed, is not justified. Nothing is to be gained, much to be lost in time, money, and morale if we have to go through that again.

I have several things that have come out of this meeting yesterday and today that I intend to look into. One

is the lack of the use of topical reports. I've worked off and on with the NRC from the time it was formed through 1982 and topical reports have always been an excellent way of reducing the size of license application and particularly where they were talking about going into use of the electronic media to handle such things. I have questions regarding the basis for the thermal studies that are being made. What fuel are they assuming and so forth. You know, these are questions that I'll look into and relate.

One of the things that really bothered me was a couple of charts that we have from this that show a release of nuclide materials that seems to be almost instantaneous. You go 2,000 years out and, bang, here comes all this tremendous release. As I see it, it's not going to happen like that. It's going to be spread out over a long period of time. But, that's something else that I'd like to look into and, in fact, I asked a couple of questions of one of the DOE people yesterday, Joe--I can't think of his last name.

That's about all the comments I have at the instant. We thank you very much.

DR. BREWER: And, thank you, Mr. Rogers, for your input.

Our second member of the public is well-known to the Board. It's Steve Frishman. Nonetheless, Steve, would you stand up, identify yourself, your organization, name, rank, and serial number, please?

MR. FRISHMAN: I'm Steve Frishman with the State of Nevada.

I guess I'll follow along in the way I usually do at the end of these meetings where you try to bring out and point out some things that I think maybe by being looked at in a different context, you'll get maybe a slightly broader view of some of the things that you've been told over the last couple of days.

I want to start out though with asking Joe Holonich a couple of questions. One which is a question that was asked and he didn't really give a complete answer, and I know that there's an answer out there because I've heard it. And, that was the question of how the NRC staff is going to interact with the NAS panel looking at the technical basis report? You never quite got around to answering what that interaction is. I think Margaret Fetterlein has made some arrangement with the managers of the NAS panel about what that interaction will be.

DR. BREWER: So, the question is directed to Joe Holonich.

MR. HOLONICH: My understanding, Steve, is that we're going to go out and we will brief the panel on what issues pertain to the high-level findings and how we view those in our regulatory mission. That's all I know that we're going to do. I mean, we're going to keep cognizant of what the

panel does, we're going to see what kind of feedback the panel gives to DOE, and how that affects what DOE is doing. But, we're going to focus our effort in through the annotated outline chapters and give DOE feedback on that information that it presents in the annotated outline. Our involvement with the NAS is essentially going to be going out and briefing the NAS on what our view of this issue is and how we look at it in terms of our regulatory mission. Now, I'm not sure what else Margaret has said or what you've heard her say. You need to help me there with that.

MR. FRISHMAN: Well, my understanding from the last time I heard Margaret discuss it was that the staff was going to lay what information they thought was relevant and important that they had on the particular topic, in this case surface processes, in front of the panel just so that they would be aware of it.

MR. HOLONICH: Oh, yeah. Okay. Yes, that's correct. We would provide them all the information we had on that topic as we talked about--

MR. FRISHMAN: Okay. I didn't hear the part about discussing any regulatory interaction and, if that is in your plan, I think you probably ought to reconsider it because this panel is not there because of its regulatory expertise. It's there for one reason only and that's to review the technical basis report and we've raised this question before.

It's pretty hard to do that without knowing what you're reviewing it for. But, the program approach is expecting that to be done. So, I don't think that the panel needs to be burdened by what regulations are supposed to be met.

And, this leads me to the next question for you and that's what do you expect--and, I don't know the answer to this one. What do you expect that the NRC staff's involvement will be in the next stage which is the guideline assessment meaning where the Department looks at whether they believe that the guideline has been met or not? I think I've been through this, I know in at least one discussion, about where I think you ought to be. Do you have any idea what plan there is? And, I know I've suggested that you come up with some type of a plan before you're faced with the issues.

MR. HOLONICH: I guess, our view is that whether DOE meets the siting guidelines or not is DOE's call. We shouldn't be telling DOE whether we think they've met the guidelines or not. The thing we're worried about is that we want to make sure DOE doesn't do something in meeting the guidelines or deciding its met the guidelines that could preclude it from doing something needed to support its licensing case. And so, our look is going to be from that angle. And, again, it goes back to one of the things we asked DOE to do was when it gave out technical basis reports, as it made findings, give us that information in the

annotated outline and let us give them feedback on what's going on in terms of the regulatory piece of the pie--I should say, the licensing piece of the pie. What we want to make sure of is DOE doesn't come out with a high-level finding and say, okay, we're done and we've made the high-level finding when, in fact, we think they need more data to be able to make their licensing case.

So, we're not looking to be involved whether DOE meets Part 960 or not and whether we agree with that, but we're rather looking to make sure that whatever they do over there doesn't impact their ability to be able to meet Part 60.

MR. FRISHMAN: Okay. I think you've probably heard what I've been saying then. But, I think you also have another thing that I think you need to consider and that's that, under the Waste Policy Act, the Commission had to concur in siting guidelines and the Commission did concur with some conditions. I think that the Commission staff needs to look at the way the Department has applied the guidelines to make sure that those conditions have been met and that the guidelines have been applied in a way that was intended in the Commission's concurrence. I think, you have a responsibility there.

MR. HOLONICH: Yeah, in--

MR. FRISHMAN: And, we know already that that's going to

be an issue.

MR. HOLONICH: In our mind, we have. I mean, when DOE put out the program approach and they provided their Federal Register notices on how they were going to be implementing 960, one of the things we looked at was the Commission's statement on concurrence with 960 and we made sure that what DOE was saying it was going to do did not change the guidelines that the Commission laid out for concurrence in the 960 guidelines.

MR. FRISHMAN: But, you're not planning to look and see if they did what they said they were going to do in their application of the guidelines with each technical basis report?

MR. HOLONICH: I'm not following you, Steve.

MR. FRISHMAN: How they used the guidelines in making their determination? Did they apply the guideline, interpret the guideline as the Commission's concurrence intended? Because the basis of the Commission's concurrence was that the guidelines are not inconsistent with 10 CFR 60.

MR. HOLONICH: Uh-huh.

MR. FRISHMAN: Now, the proof of it is in the application of the guidelines, not just its words. So, you're not planning to look at, in fact, the analysis that goes in how the guideline was applied to the information to come up with a conclusion?

MR. HOLONICH: Well, I guess, my understanding--

MR. FRISHMAN: I think you should not be involved in whether the conclusion is right or not, but it's the application of the guideline meaning how do they interpret that guideline relative to the information available?

MR. HOLONICH: Well, I think that's what we're trying to get is to make sure the guideline is not applied inconsistently with Part 60.

MR. FRISHMAN: Okay. But, if that's what you're--if that's what you're trying to get at.

MR. HOLONICH: My understanding is that DOE has tasked the M&O--and, April, jump in if I'm wrong--at the last ACNW meeting when they briefed the committee. They tasked the M&O to write the technical basis reports in the same format as it would take to be in an annotated outline chapter, so that the information is directly transportable between the two, and that what we're looking for when we review that AO chapter and when they make the case is that what they've done is what's needed to address Part 60.

MR. FRISHMAN: Okay. Well, I wanted to have this exchange so that we could clarify that part of the process because I didn't think that came out in your discussion this morning.

DR. BREWER: Steve Brocoum, did you want to follow up?

DR. BROCOUM: The only comment I wanted to make and I

don't think it's that important in this context. The technical information in the technical basis reports and the technical information in the annotated will be the same information. Whether it will be the exact type format, that goes over to another issue. Probably the formats will be different, but the information will be the same. So that the information that goes to the National Academy for a peer review will then be that information which is put in the annotated outline.

DR. BREWER: Okay. Steve, do have more?

MR. FRISHMAN: Yeah.

DR. BREWER: Okay.

MR. FRISHMAN: One more thing for Joe and that's that you got a question this morning from one of the Board members about whether this sort of phased information approach to licensing and phased licensing is acceptable. I think you gave an answer that was pretty strongly that, yes, it is acceptable. Well, I think that's premature and we've been through this before. I know the past chairman has been very cautious in saying whether the program approach is acceptable or not saying that additional information about the program approach is necessary. What I'm particularly concerned about from your encouragement is the matter of the Department's intended use of performance confirmation. We don't really know what they mean yet. Now, they have described in some

words what they mean by performance confirmation and it certainly is not in synch with the requirements of 10 CFR 60. They have said some work that was intended for site characterization will be deferred.

All right. So, first of all, we have a definition conflict which is a regulatory conflict in my mind where I think you should be saying more information is needed rather than encouraging that it's probably okay to do. Now, just from the condition of the program itself, I think there's even more reason to be worried. That's that the program has not been rebaselined. There isn't a new technical baseline. We don't know what the site characterization plan is anymore. We don't know what's been deferred. We don't know what has been removed. And, we don't know what of that which is deferred is going to be called performance confirmation that otherwise would be site characterization.

So, I think there needs to be some real caution on your part to encouraging the use of performance confirmation when just from a definitional standpoint it doesn't look like what 10 CFR 60 intended performance confirmation to be.

There's also one other sort of incidental thing, aside from the lack of new technical baseline, It seems that the Department staff is having a very hard time getting new requirements documents relative to the program approach. And, that comes back to--at least, as I understand the

conflict, that comes back to some of the fundamental questions that I've talked with the Board about before and that's what drives what in the program? Is MPC driving the repository decisions and so on? So, there's an internal conflict going on that, as I understand it right now at the Department level, where requirements documents that must come out of a baseline and also out of interpretation of the regulations are held up for the fundamental reasons that the Board has been concerned about in the past and that's what part of the program is driving what because of the rush to completion and the schedule and because of the perceived importance of different parts of the system.

So, I think it's an important conflict that's going on and I know the Department wants to get it resolved very quickly. But, I think the Board maybe would be interested in how that gets resolved because I think it has some major impact in the application of the program approach relative to site characterization and site suitability determinations and a license application. So, I'm just trying to bring that out. I know it's something that parts of the Department are very uncomfortable about, but I think it's a problem that has long-standing interest to the Board.

Now, we've seen a program on licensing and a lot of the information that has come out today makes it more and more clear that there is a real difference in the program

approach between the amount and level of information that's going to be available for technical site suitability relative to the amount at a license application. Look at some of the things that came up today and just take as a simple example Ardyth's presentation of the plans that are still not even formulated to come up with some determinations about thermal loading relative to coupled processes which is only one of the questions about thermal loading and how within a couple of years Ardyth is going to have to be producing a technical basis report that theoretically is going to have some of this--or it is going to have this information in it. The Department in its technical site suitability is going to have to say something about thermal loading and is not going to have anything that it can definitively talk about and we're going to end up with a technical site suitability determination that in my mind is essentially unsubstantiated relative to the amount of information that the Department will think maybe it can use to substantiate a license application.

So, the technical basis reports, I think, are extremely important, but at the same time, the Department is essentially because of schedule giving them a degree of importance way, way below what they deserve and what they actually need for the Secretary ultimately to make a site suitability determination. The technical site suitability is

referred to on and off, and Steve did again today, in 1998 as essentially a business decision, the Department saying whether they think it's worth continuing on with the work. Well, you can imagine that they say no? And, the level of information, I don't think is going to be good enough for them to say yes, either. But, it's going to be a yes/no type question. So, the answer is, most likely, going to be yes. But, I think it does the program a real disservice when you look at the amount of work that is intended to be done between 1998 and the license application, none of which we see in any of the site suitability documentation is clearly going to be incorporated into any technical site suitability or the Secretary's decision on recommending the site which is the site suitability determination. I don't see any place in the program where that information that is aimed towards the license application is going to be incorporated into the Secretary's decision which you saw from the schedule is only going to be about 90 days before the submission of a license application.

So, I think the site suitability and technical site suitability is just sort of a gloss job right now. Somebody said it had to be done. Wes Barnes told you yesterday that one of his top priorities was to hold the staff accountable for getting to that 1998 technical site suitability. Sure, they can get there. It's just what information do they use?

And, finally, Steve, I can't let you off the hook. I always have to pick up at least one or two things out of your presentation.

DR. BREWER: It's not only on Steve's.

MR. FRISHMAN: On Page 4, your top bullet, you have a quote from Dan Dreyfus and you have translated that into something that sounds almost like the regulations need to be interpreted or maybe even redone to fit the cycle. I don't see how Dan's statement really translates into what you seem to be saying here which is you shouldn't have expectations that you can really apply detailed requirements until you know what the site is all about. I don't see that translation. It seems to me like Dan is talking much more about we need to have more information before we, the Department, can understand the extent to which this site might meet requirements.

DR. BREWER: Steve Brocoum, would you like to respond or clarify?

DR. BROCOUM: Yeah, I'll make a comment. Most of this page, the license paradigm, was taken--quotes were taken directly from his statement. The rest of the thoughts are almost paraphrases of things that Dan said. So, I did need to make that point. So, if you look at his statement to the Commission on June 9, you will find almost all the thoughts that are here in that statement.

I'd like to say one other thing. Dan has been very clear. If you look at his testimony on the 30th of June to the Subcommittee of Power and Energy or whatever that subcommittee is called, he was very clear that for him to go forward and to recommend to the Secretary and the Secretary to recommend to the President he needs to not only have a "site suitability", but a design to go with it. And, a lot of things that Steve was talking about, thermal loading, Dan addressed in the fact that we needed to have a design. So, Dan is focusing on a dual track. He's not just focusing on suitability. He's focusing on a design of what we would actually build. So, I think if you look at that testimony that day, I think you'll see that through his comments.

MR. FRISHMAN: I've seen that testimony, but I also know that it doesn't coincide with the work that's going on, for instance, in analyzing a range of thermal loads because a good part of that range would preclude your being able to say we want to go forward with a repository. It would result in a design that would be essentially an infeasible design; meaning one that nobody would build because of its capacity.

One other point that I wanted to make to the Board and that's that Steve has one sort of new and I think fairly dramatic reversal in the way the program has been doing for most of its years. That's on Page 6. This is something closer to what Pat brought out earlier. The idea of timely

feedback regarding technical adequacy in a regulatory context would be more helpful than detailed guidance would be at this point. Well, up until this time, the Department and the Commission staff have throughout their exchanges had this rub going back and forth with the Department trying to get the NRC to tell them exactly what they want so that they can do what the NRC wanted. And, the NRC rightly has resisted that because it's not their job to write DOE's program for them. Now, this is the first time I've seen in an presentation that there's been a total reversal of that approach. Now, the approach is one of the Department says what it's going to do, says what it has done, and tries to get the staff, the Commission staff, to say is this adequate? And, what they're trying to do is get a statement from the staff, is this adequate for not a license application, but for a license?

So, I think there's a fundamental switch here and I just wanted to point out that this is new, and I want to point out to Joe that and the other Commission staff people that this is--if you respond to this any different from the way you responded to the other initiative, I think, once again, you're outside the bounds of your role of pre-licensing, So, be careful one more time. But, I wanted to point out that this, I think, is a fundamental new approach. I think the Department is wanting to make decisions about what it does to put into a license application. I think that

is an improvement in its approach because they weren't going to get anywhere the other way. That's why in eight years you have no issue resolution even by the definition that we all use. So, maybe, if you make some decisions, then there--and the staff is careful about how they look at the results of those decisions, then we may actually have some technical exchanges where we can talk about the technical work rather than wrangle about whether the technical work being planned is going to be okay.

I guess, that's about it for now.

DR. BREWER: Okay. Thank you very much, Steve Frishman.

The next scheduled speaker from the public is Judy Treichel. For the record, please, name and organization?

MS. TREICHEL: Judy Treichel, Nevada Nuclear Waste Task Force. I'm based in Las Vegas, but deal all over the place.

I have two things that I talk about quite often. Well, one of them, I do. I talk about it all the time, but you hear the same stuff all the time anyway. So, it shouldn't bother you. And, that is public participation. I was amazed today when April was giving her presentation to see that we actually have a picture of the license application before we have a public participation policy. I think this is amazing. We've been in this program for well over a decade and the Department of Energy at headquarters has written and adopted a public participation policy. After

that, then OCRWM was to develop one using the top one as a guide and then the Yucca Mountain Project was to develop one. So, we're like two steps away and it's a race to find out whether you're having opening ceremonies at Yucca Mountain's repository or the actual institution of a public participation policy which is being put in according to the Secretary so that we will be allowed pre-decisional input. Well, at this point, I doubt that we're going to be organized with a formal policy in time to be able to choose the color of the binding on the application for the license. So, that's a very difficult thing.

And, I also heard again today that we in Nevada or possibly across the country--there are a lot of people who are concerned about this; members of the public that don't live in Nevada--that we really have nothing to worry about because the NRC is our surrogate. I don't remember anyone making that decision to accept that and I certainly am not making any sort of personal slam against either Joe or Mark. They're very nice. But, I don't know that you want to act in a role of surrogacy and it's absolutely inappropriate, I would think, when we've just heard now very carefully explained--and I liked that presentation. I have a much better understanding now what a licensing hearing is all about. But, there were some statements made. I disagree, Joe, that you should feel as though you've failed if they

don't come in with a good application. That's not your job and you should have no stake in whether or not they do. But, once an application is submitted and is accepted by the NRC staff, then you become advocates for it. I don't know how you can actually operate as our surrogate and an advocate for the application at the same time. I think that's probably a difficult thing to do. So, I don't really accept that and don't think it should be assumed that that can take the place of a real policy.

And, I guess, the other thing that bothers me and it has for a long time is the idea of schedules and deadlines. We are continually hearing that. We heard a lot today about NRC having to meet this three-year deadline that's been imposed on them. Well, I don't know that that's all that important. I know that the National Academy was supposed to come back with its advice to EPA years ago and they didn't get done and they haven't done it. They're supposed to be doing it soon, but they're taking their sweet time and getting done what they need to do. And, in something that has the sort of implications and the kinds of risk--and when I use that word "risk", I'm talking about risk to public health and safety and the environment--that whether or not you make your three-year deadline isn't a big deal. We see things that need to be worried about probably 100,000 years in the future depending upon which of the radionuclides

you're talking about and which kind of transport and that sort of thing. So, to think that we have to come screaming down into sort of shoving site characterization or site suitability to the side where it's probably going to be assumed at some point that because the thing was licensable, it certainly must have been suitable, but that kind of got shoved off to the side. And, we see this tremendous race to some kind of end point that nobody is too sure about. I think it's absolutely inappropriate and just plain silly.

So, I probably better stop there because a lot of that just feeds into what I've already said. But, I just think that this wild deadline thing and the lack of public participation are something that are very, very serious and need to be taken more seriously.

Thank you.

DR. BREWER: Thank you, Judy Treichel.

We have one more member of the public who has signed up, Mr. Jerry Frazier. And, as was the case with the others, sir, would you identify self, organization, and so forth?

MR. FRAZIER: Yeah, I'm Jerry Frazier. I'm on leave from Technology Resource Assessment Corporation. I'm a geotechnical engineer. I have spent some seven years with this project early-on as an advisor on how to deal with tectonic problems and was inside the project deeply. So, I'm

fairly knowledgeable about the project. And, I've done this before.

I stand up and I want to caution the Board on something that I think is a glaring omission in this project. I prefer not to be a licensing expert. I prefer to stay as a technical person, but it seems to me there's a glaring licensing problem here. To my knowledge, the most severe hazard to a nuclear waste repository is something like a hydrothermal system. I see nowhere in this program where that's being dealt with. Nowhere. It seems to me it's the number one hazard.

A couple of things just to say what that mens to me as I understand it. Now, I might be wrong and, if I am, I would be delighted to have that pointed out because I think it's a very serious problem and I've told people before I think it's a serious problem at this site. Ardyth is dealing with a panel that has to do with thermohydrology, but as I understand it, the heat source is strictly from the waste. The heat source coming from the earth at this site dwarfs what's coming out of this waste. And, yet, that's not being dealt with.

Now, I think an appropriate place perhaps to deal with it would be under one of the key issues. The first key issue which came up was this volcanism probability and consequences. Leon asked the question why is that a key

issue if the annual probability is something on the order of 10^{-8}? And, the answer, I believe--and again I'm not sure--but it seems to me the reason it's a key issue is because if there's a chance in 1,000 during a 10,000 year period of having some serious consequence, then we'd better look at it very carefully. That translates into about an annual probability of 10^{-7}. So, we're about an order of magnitude away from having a serious problem here with volcanism. It appears it's conservative, but about by a factor of 10. But, let me point out that this annual probability of 10^{-8} is a probability of a direct hit of a volcano right through that repository.

The problem of volcanism in my mind as a technical person is not a direct hit through that repository. That's a low probability event. The problem is that with volcanism in the neighborhood of this mountain, that tells me as a technical person that there is something--there is a geodynamic instability at this site. What a geodynamic instability tells me is that we probably have a hydrothermal system at this site.

Now, I have been involved in licensing nuclear power plants as a seismologist looking at ground motion. I've likened this problem to having a nuclear power plant, find a fault, look at the probability of faulting right through the power plant, and ignoring ground motion. That

makes no sense to me. Why would one estimate probabilities of faulting without looking at ground motion? To me, it's one for one the same thing. Why would one look at probabilities of volcanism as a direct hit through this repository and not look at this hydrothermal byproduct from this thing. So, I guess, what I'm trying to say to the NRC particularly, I would caution you severely to have your technical people look into this, see if there isn't something about activating a very serious hazard to the post-closure period from the volcanism, something besides a direct hit.

This comment, by the way, includes the review processes. The National Academy of Science looked into these veins and deposits and they simply assumed that the system is not hydrothermal. Well, I'd look into this. I mean, that's not my personal expertise. I'm more a seismologist and earthquake hazards guy, but I look around the world. Essentially, every place I can find volcanism, I find hydrothermal systems. And, yet, they assumed it isn't. So, it looks to me like that was not touched.

So, the summary is that it seems to me there's a very major gap here of a hazard that's extremely serious that probably exists, almost certainly exists in my opinion, and I think it should be addressed as a licensing issue.

DR. BREWER: Okay. Thank you very much, Mr. Frazier.

Are there other members of the public who did not--

we have a moment or two left in the schedule. Any other members of the public who would like to have a moment to talk to the Board?

(No response.)

DR. BREWER: If not, I would like to thank the panelists today. It was a very interesting and I think fact-filled, informative session. I'd also like to publicly acknowledge a couple of our own staff. These meetings are hard to put together. Russ McFarland and Dan Fehringer are the two staff members who really are responsible for these two days and for them, thanks. And, as always, to thank the two ladies in the back of the room who make it all possible and who take care of us, Helen Einerson and Linda Hiatt.

With that, I'm going to turn over the chairmanship to our chairman, John Cantlon, who will issue the benediction.

DR. CANTLON: Well, I would certainly state my appreciation on behalf of the Board for all of the participants and the audience for the discussion. As we've watched these sessions now over the years the Board has been in motion, we are beginning to see things coalesce and to come together. So, it is a gratifying feeling to see these things beginning to take better shape.

So, thank you very much and we look forward to the next session. We're adjourned.

(Whereupon, at 3:40 p.m., the hearing was adjourned.)

APPENDIX