DEPARTMENT OF ENERGY

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NUCLEAR WASTE TECHNICAL REVIEW BOARD

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MEETING

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VOLUME II

+ + + +

Wednesday, March 8, 1989

1000 Independence Avenue, N.W.
Room IE245
Washington, D.C.

The above-entitled matter came on, pursuant to notice, at 9:10 a.m.

BEFORE:

DR. DON U. DEERE, Chairman

MEMBERS PRESENT:

DR. CLARENCE R. ALLEN

DR. JOHN E. CANTLON

DR. MELVIN W. CARTER

DR. DONALD LANGMUIR

DR. D. WARNER NORTH

DR. DENNIS L. PRICE

DR. ELLIS D. VERINK

ALSO PRESENT:

WILLIAM W. COONS, Executive Director Designate

APPEARANCES (Continued):

ALSO PRESENT (Continued):

Department of Energy Staff Participants:

THOMAS H. ISAACS, Associate Director, Office of External Relations and Policy, Office of Civilian Radioactive Waste Management

GORDON APPEL, Chief, Licensing Branch, Office of Systems Integration and Regulations, Office of Civilian Radioactive Waste Management

GERALD (JERRY) J. PARKER, Chief, Environmental Compliance Branch, Office of Systems Integration and Regulations, Office of Civilian Radioactive Waste Management

CHRISTOPHER A. KOUTS, Chief, Transportation Branch, Office of Systems Integration and Regulations, Office of Civilian Radioactive Waste Management

WILLIAM J. DANKER, Chief, Integration Branch, Office of Systems Integration and Regulations, Office of Civilian Radioactive Waste Management

DONALD H. ALEXANDER, Chief, Regulatory Compliance Branch, Office of Systems Integration and Regulations, Office of Civilian Radioactive Waste Management

RALPH STEIN, Associate Director, Office of Systems Integration and Regulations, Office of Civilian Radioactive Waste Management

LAKE H. BARRETT, Director, Office of Quality Assurance, Office of Civilian Radioactive Waste Management

SAM ROUSSO, Acting Director, Office of Civilian Radioactive Waste Management Program

KEITH KLEIN, Deputy Associate Director for Office of Systems Integration and Regulations, Office of Civilian Radioactive Waste Management Program

STEVE BROCOU, Chief of Siting and Geosciences

APPEARANCES (Continued):

ALSO PRESENT (Continued):

Department of Energy Staff Participants (Continued):

JACK HALE, Chief Surface Facilities and Waste Package Branch

CARL GERTZ, Director, Yucca Mountain Project Office, Department of Energy, Nevada

I N D E X

M O R N I N G S E S S I O N

CHAIRMAN DEERE: Good morning, ladies and gentlemen. We will have shortly, when the representative from GSA arrives, a swearing in of Dr. Verink. So we may interrupt the proceedings a little bit later.

Also we would like to have a closed session to continue our discussions that we started yesterday at 4:30 and didn't get finished by 5:30, dealing with organization and personnel and space for our Board. So between 12:00 o'clock, when you finish your presentation, we will stay right in this room and continue in closed session until, let's say, 1:15, and then we'll be right back on the agenda. I guess we start at 1:30.

MR. ISAACS: 1:30 is fine.

CHAIRMAN DEERE: Right. So if that's all right, we'd like to do that.

MR. ISAACS: Sounds like a good idea.

CHAIRMAN DEERE: Okay, Tom. Thank you. So we're ready for your presentation.

MR. ISAACS: Well, good morning once again. It remains a pleasure to have the opportunity to continue briefing you on the program. As you recall, yesterday we spent the morning talk about the long and fortuitous history of the program that got it to the place where we are, and I tried to provide you with an overview of the

major elements of the programs, how we saw the program's objectives and how we saw the way we had characterized the program framework in meeting those objectives.

In the afternoon, we then, after Secretary Watkins addressed the group, tried to provide you with a beginning description of what a repository looks like and what it's intended to do and what our site characterization program is structured to do and why it's organized the way it is and what the major components of it are.

And that was followed by a description of the major elements of that site characterization program, the exploratory shaft facility scheduled for construction later this year and, finally, a description of the status of the waste package development and the repository design and development.

Today we will continue with a presentation this morning by one of our Associate Directors, Ralph Stein, who is responsible for a very important aspect of our program, bulk systems integration; that is, pulling together the various pieces that you heard about yesterday with regard to the repository, the monitored retrievable storage facility, and the transportation links into a unified system and, very importantly, in meeting the regulatory requirements of this program, which were mentioned on numerous occasions yesterday, and, in particular, the

rudiment to have an NRC license.

That will be followed by a presentation on our transportation program. You will then have your working lunch. And in the afternoon, Bill Danker and I will provide you with an overview of where we are on the monitored retrievable storage facility and the systems studies that we're doing to support that.

Then Bill will talk in a bit more detail about systems integrations and, finally, Lake Barrett will talk to you about where we are and what we're doing with regard to the implementation of quality assurance.

And with that, unless there's anything else that I need to be aware of logistically, -- I don't see anything -- let me turn it over to Ralph Stein.

SYSTEMS INTEGRATION AND REGULATIONS

MR. STEIN: Thank you, Tom. Good morning. It's my pleasure to be here today and to have the Office of Systems Integration and Regulations, the office to which I am Associate Director, make a presentation to you about our activities and our program.

This morning Jerry Saltzman, whom you met yesterday and who spoke about the activities in the facilities area, stopped by the office and said that you had a question related to land use relative to the NPS and to the Air Force lands and the BLM lands.

And let me pass on to you the fact that Carl Gertz, who is the Project Manager of the Nevada Operations Office for Yucca Mountain, is here in the audience, and he's prepared to talk about any questions that you might have on land use relative to the Yucca Mountain site, the NPS, the Air Force lands, and also the BLM lands. So he is here, if you'd like to talk to him separately, or he can come and talk to you collectively.

This first viewgraph is a chart that shows you, of course, the overall office, but it also describes organizationally the office that I'm responsible for, the Office of Systems Integration and Regulations.

There are two divisions in that office, the Systems Integration and Transportation Division and the Licensing and Compliance Division. Both of those divisions do not have a division director at the present time.

I'd like to introduce to you Keith Klein, who is at the viewgraph, who is my deputy. Keith is the Acting Division Director of Systems Integration in the Transportation Division, and I am the Acting Director of the Licensing and Compliance Division.

The next viewgraph is -- I should say next viewgraph and a half are basically a compilation, summary compilation, if you will, of the activities in the Office of Systems Integration and Regulations.

Let me try to summarize that viewgraph rather than read it down. Basically, my office is responsible for three things. The first, in no particular order, is transportation.

That involves safely moving the waste from the point of origin, either by high level waste from some place like Savannah River or the numerous reactors that are located throughout the United States, the repository, via the MRS if the MRS is finally approved by the Congress, to the repository.

The second responsibility, which I like to call the "glue," or the "systems integration," which holds the three components of the systems together, the transportation, the MRS, and the repository, in a way that, hopefully, will give us the most optimum and effective operation of the three components of the system.

And, finally, the third area that I have responsibility for is regulation. And let me just talk about that a little bit more for a moment. The regulation is another feature of the glue, if you will. Both the repository and the MRS are licensed facilities, and the transportation casks, which ship the waste from one point to the other, are NRC-certified.

For the licensed facility, let me just say and repeat with Tom, who said in his opening comments, that we

have not licensed -- we, being DOE, have not licensed a facility in the past.

And there's a counterpoint to this, and that is that the NRC has never licensed a repository in the past. So there's -- if I can digress for a moment, there tends to be a certain amount of a mating dance that is going on at the present time.

We haven't formally submitted a license application and nor will we until 1995. But, basically, there's an attempt on both parties, in DOE and NRC, to be sure that we understand what the regulation, 10 CFR 60, is really requiring of both the applicant and the regulator. And we have worked cooperatively and closely for some period of time.

The NRC, of course, is well careful to maintain its prerogative as a regulator and it does, indeed, look upon this pre-application period as a period where that we may be considered as an applicant.

The fact is much of the work that we do at the present time, they look at it as work that is of a licensable nature. So they expect us to perform our work in an environment in accordance with the regulation in a licensing mode, if you will.

Coupled with our licensing requirements and certification of the cask is a very important element of

the regulatory side, and that is that we have to meet the NEPA requirements.

Now, there is certain relief that the Nuclear Waste Policy Act has provided to us in terms of needing to meet the requirements, but when we go forward with the license application, as we go forward with the license application, we need to put together an environmental impact statement.

We are relieved of certain responsibilities. For example, the law says that we are to proceed with the mine geologic disposal, and we don't have to consider alternatives to mine geologic disposal. That's one of the areas that the law relieves us of responsibility for consideration.

They also, since the Amendments Act, have told us to focus on Yucca Mountain, and we don't need to consider alternatives to the Yucca Mountain.

In addition to NEPA and all of the requirements that we need for environmental activities on the site, we also have to meet a number of other -- numerous other regulations, like the Clean Air Act and Clean Waste Act, RCRA, CERCLA, and others, as appropriate. And we'll talk more about that in a little while.

Let me go on now more to the other elements of the organization. As I noted, the Licensing and Compliance

Division is managed by myself as an Acting Director for the time being, but the person who has responsibility for licensing activities, the Licensing Branch Chief, is Gordon Appel. He is sitting to my right.

He has a number of responsibilities, including developing licensing policy strategy and procedures. He identifies reviews, and interprets statutes, regulations, regulatory standards. He manages and coordinates interactions between DOE and NRC. And he manages all of the regulatory activities, including headquarters, project office, and contractor activities.

Advice that we got early on and advice that we have been implementing is that there needs to be a single focus for interactions with the NRC. You can't have a whole bunch of different entities talking without some cohesiveness in the interaction or you're not going to be successful.

Gordon is the one who has responsibility for providing that focus with the NRC. There is a bio for Gordon in the package.

And let me go on to the next one. The Regulatory Compliance Branch, in many ways, provides strategy. Don Alexander, who is sitting in the audience in the back and who will speak to you later, is the Branch Chief for the Regulatory Compliance Branch.

He will offer in his presentation a lot of the -- let me call it "science" that we do relative to interpretation of the data that comes forward and translating it via performance assessment and other analyses into licensing positions.

A very important aspect of the program, he does risk, safety, and, as I noted, performance analysis. He keeps the SCP administrative records. He assures that the models are verified, and he oversees the development of site screening methodologies for an MRS.

Don's bio is included in the package. Some of you may note he's a University of Michigan graduate. I don't know if that gets points or not.

MR. ISAACS: Not with this crowd. That was the wrong thing to say.

MR. STEIN: How about the University of Pittsburgh?

MR. ISAACS: No.

MR. STEIN: Does that help? Ohio State?

Again under Licensing Compliance Division, an Environmental Compliance Branch. The Branch Chief for the Environmental Compliance Branch is Jerry Parker. Jerry, raise your hand.

He's to my right. Jerry has, I think, one of the more difficult tasks. His work is now, and downstream he's

the person that's responsible for putting together the Environmental Impact Statement. He's the person that's responsible for the permits that need to be obtained for the site.

He's the person that's responsible for assuring that all of the environmental activities are performed in a way that is going to support an environmental impact statement.

He has a lot of up front activities. His major challenge is yet to come as he goes forward with the development of the environmental impact statement, and he'll be talking about what it is that he does, also what he does in areas like RCRA and CERCLA, and things of that sort.

Jerry's background is noted up here, and it's in this package. He, as you can see, was a member of the EPA for a number of years, and he has some of the right skills that I think are needed for this particular activity.

Moving over to the other division, the Systems Integration and Transportation Division, Bill Danker is in charge of the Integration Branch. And, as Tom said, a little bit later on today Bill will be discussing with you the MRS systems studies.

Bill, would you raise your hand? He will talk about the MRS systems studies, and he will also talk about

the integration activities that he is responsible for. As I say, Bill is the glue of the organization. And when he comes unglued, we all have a problem.

He'll cover all of the activities that are noted on the sheet under the "Integration Branch" in a summary fashion, be prepared to talk about his activities in more detail a little bit later on.

Bill's bio is noted on the screen and in your package. He has the special skills that are needed for systems integration. He spent some time in Europe at the International Atomic Energy Association as the Safeguards Inspector, which is an area that he has provided support to the office.

We have to be concerned with safeguards for the repository and the MRS as we go forward. Bill has that special skill that will enable us to do it in the right way.

Moving on to the Transportation Branch under Chris Kouts, who is in the back of the room, Chris is the Branch Chief for the Transportation Branch, and he also will be presenting the work that is being done right now on cask development, as well as the activities associated with transportation.

As Tom said, on our present schedule, we're talking about transportation to the repository in 2003. We

may be able, with the MRS, to have a transportation system available and in place a few years earlier, but we have to wait on that.

Nevertheless, there are a number of years still in front of us. We are wanting to make sure that our transportation activities are handled in a way that is going to be most effective for transportation and that we do the right institutional things to interact with the states, towns, tribes, reservations along the way so that everybody has an opportunity to interact with us on the transportation.

We want to hear from as many people as we can, and I'm sure that we will as time goes on, as we start to focus in on the exact routing that we're going to take and exact modal mix that we will have for transportation of the waste.

You can see Chris' bio up there, good background and experience. And I think that he will give you a good overview when he has an opportunity to present his background to you.

One of the branches that we did not address is the Systems Development Branch. There will not be a presentation on that branch today. That branch has responsibility for a number of areas, including things like rock consolidation; cask storage; special development, like

robotics; special other systems development, like attachment devices; and so on.

Charles Head is the Branch Chief responsible for that particular activity. And at the present time, he is working on an assignment to get a document that Admiral Watkins is waiting for. And if I saw him here, I would ask him has he gotten the document up to Admiral Watkins, and I would hope the answer is yes.

That pretty much completes my overview of the activities of the Office of Systems Integration and Regulations and an introduction of the people that are important to the success of that organization.

I believe the next presentation on the agenda, Tom, am --

MR. ISAACS: Go right ahead.

MR. STEIN: -- is Gordon Appel, who is sitting on my right. Gordon has responsibility for licensing of the repository, responsibility for the licensing of the MRS. So we will proceed that way.

In fact, he will focus on those activities that are licensing related activities. So with that, I think I'm right on time and I will turn it over to Gordon.

SYSTEM INTEGRATION AND REGULATIONS -- NRS LICENSING

MR. APPEL: Thank you. Excuse me. I have to wait a second for Don Alexander, who is going to help me

with my viewgraph.

(Pause.)

MR. APPEL: Good morning. My first viewgraph is simply who I am. I'm Gordon Appel, and I work for Ralph Stein in that I'm the Chief of the Licensing Branch in the Office of Systems Integration and Regulation.

We are the principal interface with the Nuclear Regulatory Commission in my branch. Ralph's point that he made earlier about wanting to maintain a single focus contact with the Commission is an important one.

Our object is not to restrain exchange of information with the Regulatory Commission staff, but to make sure that we understand what we're telling the Commission and to make sure that when we tell the Commission something, they don't hear five different things from five different sources.

I'm going to tell you this morning a bit about the regulatory and legislative requirements that apply to the repository program because much of the information that you received yesterday on site characterization work and the engineering work related to the repository has to be useful not only in terms of its scientific and engineering basis.

But it also has to be useful for application in the licensing process which, as some of you, I'm sure,

know, in the end is an adjudicatory process that is not solely based on the scientific or engineering merit of the matter at hand.

Let me explain a little bit about our objectives in the Licensing Branch and tell you some of the activities that we have ongoing in that area. I'm going to try and relate some of our accomplishments in the Licensing Branch. I'm going to discuss some future interactions that we expect to have with the Commission and Commission staff and try and just overview some of the major licensing issues.

As in most licensing arenas, the regulations that pertain to the licensing of the repository system are not as clear-cut and unambiguous as one might prefer they are. And so a large part of our effort is trying to make sure that work that is conducted will in the end be useful for application to answer the regulatory question, which the first thing that needs to be done is defining what the regulatory question is.

The overall legislation for the program is, of course, Waste Policy Act, as amended in 1987. And we are required to submit a license application for the repository system to the Nuclear Commission staff.

The Commission was required by the Waste Policy Act to develop its own regulations and criteria for the licensing repository system. And DOE was also required to

develop a set of guidelines to use in siting the repository.

DOE's guidelines, Part 960, were used as part of the process to winter the sites from what were more than a dozen sites in 1982-1983 time frame, so three sites that we were developing site characterization plans for in 1986 and '87 and the Waste Policy Act that identified the Nevada site as the single site to focus our efforts on.

Other key regulations that apply to the repository system -- and this is only a short list. In the more refined evaluation of regulatory requirements, there are significantly more than these, but these are the major ones.

Part 60 is NRC's rule that provides the criteria that they will evaluate our license application against and that they will evaluate the licensability of various components of the repository system against.

10 CFR Part 2 is the rules of practice and is the same rules of practice used for reactors, with the exception of a recent amendment to that which includes the licensing support system, which I'm sure you'll hear more about later.

Part 20 addresses radiological protection for workers. Part 50, Appendix B is the quality assurance requirements. Part 71 applies to transportation; 72 to

MRS.

Another very important regulation is 40, Title 40 to the Code of Federal Regulations, Part 191, which is the EPA's standards for high level waste and transuranic waste.

The Commission developed the criteria in Part 60, but it relies on Part 191, 40 CFR Part 191, to define the overall release requirements for the system. That particular regulation has currently been remanded for points which I'll address later.

DR. CARTER: I gather, other than the 191, the other one, obviously, that's still in books at least is Part 20 with a major revision. I wanted to ask you the rest of those, I guess, are pretty well set at the moment.

How does DOE interact in that process with the major changes in 20? Are you involved in the process? Because I'm sure that's going to take a number of years.

MR. APPEL: Yes, we are. We involve ourselves directly in the rulemaking process as another federal agency with the Commission. So when they propose changes to a rule, we typically comment on those changes in a formal transmittal to the Commission staff -- to the Commission and have discussion, if it's allowed with them. Because as part of their rulemaking process, they're not allowed discussion with parties that could overly influence their deliberations.

But we participate as fully as we can in that and have informal discussion with them prior to them getting to the point of them proposing a rulemaking, if at all possible.

Overall, the Licensing Branch's objectives are to make sure that we maintain an effective interface with Commission staff. And that means one that is a positive interface with Commission staff.

We are not currently an applicant, in the true sense of that word according to 10 CFR Part 2. However, as Ralph mentioned, many of the things that we are doing are viewed as so important down the road in the licensing process that they sometimes do tend to view us as an applicant.

Another one of our roles is making sure that the perspective of licensing is integrated with the rest of the program. That's more a matter of introducing awareness relative to the licensing process into pure scientific and engineering effort, if you will.

And we're also developing our framework for when we get to the licensing phase. We'll need a structure to operate within in order to demonstrate the licensability of the repository system.

DR. CARTER: Let me ask you a question about, I guess, the overall relationship of the NRC, which obviously

is quite important since you're going to have to have their license before you operate your repository.

I'm interested in the organic side of this sort of. How does it work? Is it sort of a legalistic procedure? Is it a working relationship, an informative kind of thing, or just what?

The other part of that I'd be interested in is whether or not the NRC has a single point of contact with the DOE.

MR. APPEL: Relative to your first question, the interaction between NRC and DOE is mandated. The Act says that we will consult with them as we will with the states and other interested parties.

In terms of the specific interactions between DOE and NRC, there is an agreement between -- which is commonly referred to as the "Morgan/Davis agreement," between the Department and the Commission. That agreement is one that focuses mostly on informal information exchange and promotes that aspect of our working with the Commission.

Procedurally, though, the process has evolved into three basic kinds of interactions, and those are management meetings. And by the way, these meetings are all open to the state and interested parties and, the Act says, participants in them.

The first level would be a management meeting

where we decide, the NRC, the state, and the Department, on taking a given approach usually relative to the interactions themselves. Okay? We're going to do them this way.

The second is technical meetings, where there's a small group. It's hard to maintain small groups in the program, given that you have so many interested parties. By the time you have several people from the Department, and the regulatory people from the Commission staff, and the state, and the utilities, and the other affected parties, you end up usually having small meetings of 30 people.

But those meetings are usually focused on a specific technical area. For example, in November and December, we had a series of the design control process for the exploratory shaft Title I design, where we -- NRC's concern was that because it was difficult for us to demonstrate to them now, demonstrate to them in a sense of a licensing process, what controls were in place on the Title I design, which is actually a very preliminary design, they were concerned that changes during the Title II design might impact their review of the SCP.

Because the exploratory shaft facility is an integral part of the site characterization program, they felt that they needed some confidence in the fact that that

design wouldn't change a great deal between Title I and the final Title II design, so that they could have a basis, a firm basis, for reviewing the SCP.

At those interactions, we agreed on an approach to evaluate the design in terms of their regulations and report back to them on it.

DR. CARTER: What degree of formality? I mean, are minutes always kept, or an agreement on major issues? Do you set aside issues that you disagree on, and this sort of thing?

MR. APPEL: For the management and technical meetings, there is always a meeting summary, which summarizes the discussions during the meeting and usually identifies, on the Commission staff's behalf, their points of concern relative to those discussions and any commitments that we make during the meeting for deliverables or to do certain things.

MR. ISAACS: I might also --

DR. CANTLON: Expanding on that, typically when you have a licensee coming to a regulatory agency, the licensee doesn't divulge things that are against its interest. You don't do the exploration and discovery for the regulatory batting.

MR. APPEL: Yes.

DR. CANTLON: In this case, you've got such a

national importance in coming at this with a high degree of accountability and credibility, it would seem to me that DOE ought to approach this almost in its old, ancient role of also being a regulatory body, as the old AEC was, in that you share with them essentially, in a candid way, the things that aren't contributory to getting the license.

In other words, if Nevada and the Public Utilities Commission and the antinuclear bodies are all interested in killing this thing, the level of candor between your scientific generation and fact generation system and the regulatory body throughout the process is going to be the chemistry of accountability, acceptability, and credibility.

And it does seem to me this Board's role is essentially to look at the quality of that interaction.

MR. APPEL: Well, I agree with you relative to the openness of that interaction. And the distinction between utilities' perspective in terms of the licensing proceeding is much different than the one that the Department can take.

The Department can't go into a meeting with the Nuclear Regulatory Commission and really stonewall them, as perhaps a commercial applicant might choose to do, for whatever reason.

So there is without a doubt a need for -- the

full and opening exchange between the Commission and ourselves has to be put in the context of a balance, though, because the one very important thing is that it has to be the Department representing it to the Commission itself.

There is a great tendency on the part of the program, let's say, to take the NRC's spoken guidance as, you know, the law. Okay? And the fact is we are responsible for managing this program.

This ties back to our earlier point, where our objective is not to constrain the information exchange with the NRC, but to make sure that that information exchange is appropriate and is the Department's view of how things are as opposed to individuals.

DR. CANTLON: Early on you commented that you make sure that you speak with one voice.

MR. APPEL: Yes.

DR. CANTLON: I think speaking with one voice, you as switchman, to make sure that all of the voices and all of the questions that you generate internally get put in together, so that there's no internal leakage.

The thing that kills these things is the fact that you have people who really don't believe in the Agency's final position on some of these.

MR. ISAACS: Let me follow up and reinforce a

couple of things that Gordon says. First of all, he said very well and very appropriately that we've got to have the initiative in this program.

We're not a licensee yet. We recognize the obligation, both legally and because of the way this program's conducted, to interact with them and to pay a tremendous amount of attention to what they're doing.

But we've got to be the forcing function in this program. We cannot allow NRC to drive our program. We have to be sensitive and work closely with them. That's the first thing, is we've got to be in the driver's seat, and I think we are.

The second thing I would say is that we are working with the NRC and also with the other interested parties, including the state, to develop what's called the "licensing support system."

That system will be a large integral database accessible in real time to all parties into which virtually all of the information that's developed through the program over the technical and scientific information -- and, in fact, I would venture that the Board will want to take a look at what its needs will be with regard to access to that system once it's up as well, so that we will have a real time system.

And 10 CFR 2 will be perhaps adjusted to realize

the implementation of that system when it comes into being, and we will have an open window to all of the scientific and technical information that's available in the program.

And the third thing that I want to mention, to follow up on one of your comments, is your point about making sure that all voices are heard is right on target. One of the things that would kill us certainly is to have suppression of dissension in the program.

It's going to come out in any event. The point you want to do is you want to channel it in an appropriate fashion so things get heard. For example, you heard yesterday someone mention, Jerry Szymanski in passing -- Jerry Szymanski is someone who works for the Nevada OPS office out there who had an alternative view of perhaps how the geologic/hydrologic regime might operate under certain kinds of upset scenarios.

And we were more than happy. We promoted the idea of making sure that that alternative point of view was considered and is considered in our drafting of the site characterization program to the extent that it was found to be credible. And, in fact, as Clarence knows, we hadn't -- Mr. Szymanski testified before the National Academy of Science Board on his views on that subject as well.

So all of those things are very much in keeping with the direction we have to take in the program. And it

will be very helpful to get an independent sounding, I believe, from this Board on how that relationship is working or not working when it's not.

The last point I would make, I just want to make clear one thing, in addition to the kinds of interactions that Gordon mentioned, there are some specific provisions where the NRC is intimately involved in the program.

For example, they have by law -- or I should say we have by law to wait for their comments, having given them the site characterization plan prior to sinking the shaft, so that there is a direct interplay that puts them essentially on the critical path in certain places in the program as well now, not just in the licensing phase.

DR. CARTER: The point I was interested in making, I think this discussion is reinforcing, this is a rather unique operation and, basically, there's a mandated interactive process involved. Because it's extremely important, and I think you all sense that who are involved in the process.

The other part of the question that I did ask you was: Are you familiar with how the NRC is organized in terms of their relationship now with DOE?

MR. APPEL: With us, yes. And I do have -- I do have a counterpart in the Commission staff that I talk to on a daily basis. I mean, part of some of the things that

happen between he and myself is that they have an on-site representative at the Nevada site and -- actually, they have two now.

And because of something that a program participant mentions to them or something they hear, because they have very open access to the doings of the project office in general, a question will come up, and I will get a call from my counterpart in NRC.

And we'll discuss about, you know, how's the best way to resolve the question that came up. So, actually, it works very well in terms of having a direct communication that's immediate.

We have several different kinds of interactions with all aspects of the Regulatory Commission, their attendant bodies as well as the Commission staff themselves.

Next, please. Our role is also to review program documents relative to regulations and to review and comment on NRC documents and their technical positions that affect the program.

And we're working on developing our framework for entering to use when we enter the licensing process. And licensing strategies aren't something that we necessarily have to develop. Many of those are exposited on in the site characterization plan.

Topical reports we view as serving the same role that they do in a typical reactive program, where you elaborate on the response to a specific regulatory criterion.

Next, please. We've had a large number of interactions over the last year, and we've had some recent efforts to evaluate what future interactions we expect. We expect them to expand considerably.

This is a list mostly of some of the NRC's proposed rules and technical positions that we've had the opportunity to review in the past year or so, and I won't go into the details of those unless you gentlemen are interested in asking questions on specific ones.

Okay. Next, please. And this is a list of our internal documents and activities that we have been involved in. The two that have taken most of our time and are legitimately and extremely important in our current time frame are the QA approaches and methodologies and the exploratory shaft design efforts.

CHAIRMAN DEERE: That design, I think, is of great interest to the Board, for the simple reason that is a piece of the project that's going to go ahead fairly rapidly and, yet, we're going to have to live with that for the next 15 or 20 years.

How far along is it? How subject is it to review

and suggestions?

MR. APPEL: Well, I can -- in general terms, the Title I design, which is a preliminary design -- okay?; it is not a design that the Department perceives with pursuing construction packages, and that sort of things -- was included in the site characterization plan.

We have not yet begun the Title II design, which would be the finalization of that design.

CHAIRMAN DEERE: And that would be done, presumably, in the next four to six months?

MR. APPEL: Yes, it would be.

Can you address that a little bit more?

MR. KLEIN: Yes. That is, in fact, a very good example. When we started the ESF Title I design, I don't think we really considered it to be a part of the repository as we would be licensing the repository once we are an applicant. We are not yet an applicant.

Yet, as we proceeded with our interactions with NRC, it became evidence that we really did need to consider the construction and further design of the ESF to -- that it was going to be part of the repository.

Once you consider it to be part of the repository, then all the QA requirements, qualifications of people doing the design, the design control process, requirements for design all take on a new meaning. And

there's a rigor associated with the design process, development of these requirements that needs, then, to be instituted and documented, and so forth.

We have just completed a very, very extensive analysis of the efforts that were undertaken prior to the time we came to view the ESF as part of the repository, to show how it complied with the 10 CFR 60 requirements.

And that was recently completed and sent to NRC in what we called a "technical assessment review," which is, again, a very extensive documentation and something that we would be glad to present additional information to you on as we proceed.

Basically, it's ratcheting up the basis for the work that we had done previously to comply with what might be a new understanding of the level rigor documentation, feasibility of the 10 CFR requirements that would be normally associated with the repository itself in the later stags.

CHAIRMAN DEERE: Did this include, perhaps, consideration of boring or raised boring for one of the shafts, something to prevent the breaking up of the wall rock around the shaft itself?

MR. APPEL: I can't address the specifics of the trade analyses that were used to arrive at the technique for construction. Okay? Because I'm not that familiar

with that.

The report that we just transmitted to the Commission addressed their concerns relative to three topics. One was impact on waste isolation of putting the shaft in. One was impact of somehow inhibiting the ability to characterize the site in the end. And the third one was on will this location provide representative data that's representative of the repository overall.

I'm not qualified to talk about the details of the design process, which is where they evaluate that, how they choose which technique they choose, Dr. Deere.

CHAIRMAN DEERE: Where would we go to get this information.

MR. APPEL: We could certainly get that for you.

MR. BROCOUM: I would guess the Title I design report, which was issued with the SCP, is one that lists the charts, Item 1 of the design report, the second report that was issued at the same time or about the same time as the SCP.

CHAIRMAN DEERE: But your technical review would be later than that; am I right, that you just mentioned?

MR. KLEIN: Well, the technical review was completed, and that's where we looked at the work that had been done previously and compared it more rigorously to all the 10 CFR 60 requirements, with particular attention to

the three things that Gordon had mentioned: impact on ability of the site to isolate waste; the representativeness of the data that would be obtained; test to test interferences of doing two shafts and these bore holes, would the bore hole or the shaft construction impact a result we'd get from the bore hole drilling such as we would misinterpret the results of that drilling, all these sort of things.

Is that -- you still look a little bit --

CHAIRMAN DEERE: Well, we'll want to make contact with a group of us with the people that are involved in it.

MR. ISAACS: Designing the shaft? And we can certainly make that --

CHAIRMAN DEERE: Because this is going to be pure facts, and we have --

MR. ISAACS: Sure.

CHAIRMAN DEERE: We'd like to make sure we understand what has been done. And if we have any input following the talk we had yesterday from the Secretary, we'd like to do it. And this is something, obviously, that has to be done fast.

MR. ISAACS: Sure. What we can do is get together to make sure we understand as well as possible the kinds of things that are of concern. Obviously, you'd like to understand the way I understand the rationale that went

into the preliminary design of the exploratory shaft for considerations that are being addressed right now in the finalization of that design, what options are available, what the implications are.

And we can bring together in short order, I'm sure, a presentation to you with the right people who are doing that kind of thing.

MR. BROCOUM: There's just one point I wanted to make. This technical assessment review didn't compare, I don't believe, different shaft construction techniques. What its approach was was a technique that's reposed, which is conventional, you know, blasting and mucking, and so on.

Would that be acceptable with regard to the three points that Keith Klein and Gordon Appel brought up, waste isolation, the way they characterize, and representatives?

CHAIRMAN DEERE: And we'd want to look at it from the point: Would you even want to consider that as a technique?

MR. BROCOUM: Sure.

CHAIRMAN DEERE: In other words, we'd say, "Look, we're being too cheap. We're not really looking at what we're after." There are better techniques that are more expensive, but for this thing, that's the way we should be going.

MR. BROCOUM: I think the point you're asking

should be in the Title I design report. It's a published document. Okay?

CHAIRMAN DEERE: Okay. Fine.

MR. APPEL: Dr. Deere, your question really is more related to the design itself, as opposed to this analysis of the design, because the analysis of the design was oriented at: Given the Title I design the way it is, -- okay? -- is it adequate in terms of meeting the Part 60 requirements?; not: It didn't evaluate options within the design.

CHAIRMAN DEERE: Correct. Yes, because if you blast a shaft, you can never reconstruct that with the damage that has been done.

MR. KLEIN: To give you an idea of time frames, we're hoping to get comments back from the NRC on the SCP, and parts of the SCP that pertain to the exploratory shaft facility include the analysis, so forth, that we've sent, in the mid-April time frame.

And we would not be expecting to start site prep for the exploratory shaft until May, the May, June time frame, and then the actual construction of the shaft itself to the November time frame, to give you an idea of how fast this train is currently moving.

CHAIRMAN DEERE: Yes.

DR. ALLEN: Let me ask you a question here, and

my question is: The Nuclear Regulatory Commission, due to financial stringency, is having more and more difficulty meeting its own internal deadlines for review process, and so forth. Do you expect that to be a problem?

MR. APPEL: Yes. It's a point of considerable discussion between the two of us right now because, you see, originally, Dr. Allen, our original agreement with the Commission was we give you an SCP; 90 days later, you give us back your important comments on the shaft.

And they've sent us a number of leaders in the recent past since we sent them the SCP data to say that's not true. Okay? We're still telling them, "Look, we want you to give us your comments as quickly as possible," because there's a provision in the Act and Part 60 that we consider their comments before proceeding to sink shafts. Okay? And there's a reason for that.

MR. ISAACS: I think it wouldn't be fair, in my mind, Clarence, to characterize it that they're not getting adequate funding for the program. They are needing to take, in their views, perhaps a somewhat longer time to review certain aspects of the document than we might like, but I don't think it's for lack of funding.

And, in fact, now they will apply directly to Congress for their funding. They will not come through the Department for the appropriation of those monies, and that

has been worked out, I think, to the mutual satisfaction of the Department and the NRC.

MR. ROUSSO: Let me just add something to that, Clarence, in the fact that through '88 and '89 we signed an MOU memorandum with the NRC to fund their work, and we set out in broad terms what areas we agreed they should be focusing their effort on without dictating to them what they could do.

And there was no fixed price to that. They were to do the work they felt they needed to do, and we were to fund it. Now, that's separate from a people resource.

They may well have constraints on what people they have to do the particular job they want done, but as far as monetary, they had an open book, essentially, to go forward and do what they wanted to do. And they did, in fact, exceed the $15 million we had guesstimated in our budget to support them to the tune of some $23 or $24 million.

But in 1990's budget, which is on the table now with the Congress, the NRC is going forward separately and individually for direct appropriation, still out of the waste fund, but not under our control and not under our tabulation of numbers.

So they are free to propose what they want to do, defend what they want to do to the Administration and to

the Hill. And, as I say, dollars are not always the full picture.

CHAIRMAN DEERE: If I may add another statement, and then I will be quiet so you can get on with your program -- I know this is interrupting, but since I know we have an audience here --

MR. APPEL: This is what we're here for.

CHAIRMAN DEERE: -- we know will hear. Let me just give you an idea of something that might be considered. I know it's late, but at least I would like to bring it out.

If the boring -- you have two of them for the shaft, and this is very good. We always like to have a boring at a head of a shaft. If you had the boring right in the center of the shaft, you could still get the finest boring that you want and recover all you want to recover. It could be a six-inch with four-inch core, or whatever you would want, but you would have a hole there.

After the first shaft is sunk, one would be able to drive a drift over to connect with that, bring in a raised boring bit of the size that you want. Now, you'd have two methods. One would bring in about an eight-foot diameter bit. And you would raise-boring that to the surface in less than two weeks. It's a terrific time-saving.

And let's say it was eight feet. Then you put in an ALIMAK elevator, and you have the opportunity to seeing, in an undisturbed situation, any fracture, any bedding plane, any zone, and you should just look around the shaft that has not been widened by blasting. And it's a marvelous place to get the in situ characteristics.

And you can map the thing in detail and even stop at a given place and say, "Well, let's get a boring of that right there or let's drive in about 10 or 15 feet for a little gallery, which we'll come back in later and check it out."

And you have a terrific time-saving. Plus, can you think of anything better than putting a geologist down a bore hole? Instead of bringing a rock up to him, --

MR. ISAACS: Several of them.

CHAIRMAN DEERE: -- you put him down the bore hole.

(Laughter.)

CHAIRMAN DEERE: Now, I was asked to do this at Amchitka, where we had a 4,000-foot deep bore hole. And I happened to be at the Nevada test site when the problem came up.

And I just felt I was a little too short and fat to fit down that four-foot diameter hole that went 4,000-foot deep, but I had a very tall, thin geologist, and

he went up and he went down it. But it is extremely of value. You cannot get better information than a bored raised boring.

Now another possibility. Instead of using 8-foot diameter, we go to the full 12-foot diameter. And you'll again do it in two weeks. So now you not only have the chance, but you've got the full hole. And these we do easily to depths of 400 meters -- or from depths of 400 meters. But, of course, you have to have access to get your thing in.

If one were really particular about it, even the first shaft could be drilled. It's blind drilling, but they have this capability, of course, or they've had it at the test site.

These are all more expensive, but in the end, you have much less disturbance to the rock. You have joints, and you can see them in their natural openness, incontinuity and irregularities.

So the results that one can get, the less disturbance in creating a zone of permeability around that is much better with the drilling than, of course, it is with blasting, because every time you open it up, you've decrease the modulus. You have increased the permeability. And you can never recover it. You cannot, even with chemical grouting. You can bring it back part way.

MR. ISAACS: Let me just say that, obviously, we don't have here the technical rationale that went into that detail of a consideration. I do recall, for example, when we were going to characterize three sites that, at least at one of the sites, we were going to do a second shaft with raised borings.

So it was considered in the design process. There must have been a rationale for why they decided to go this way in the program.

I think the best thing to do is to take advantage of the expertise of the Board here and to work to try and link up to provide both -- a two-way communication, both a presentation to you on where we are and why we're where we are, and then to have some interaction with some subset of the Board on a real time basis to see if what we're doing makes sense when you consider all of the parameters that we have to operate under, including fixed funds, and schedules, and requirements of NRC, and such.

And if it makes sense, that what we're doing, great. If it doesn't make sense, it'll be a great opportunity for the Board to have positive impact on what we're doing. So that would be my suggestion.

CHAIRMAN DEERE: Well, I'm sure that what you have and has been developed makes sense. It's just a question: Is there another technique --

MR. ISAACS: Sure.

CHAIRMAN DEERE: -- that could be better? And perhaps it has been considered by someone along the line because they say the tunnel's too short for that or it's too deep for that or the time schedule's too late.

And we simply say, "Well, we're all newcomers here." And we're just saying possibilities that we know are practical and can be done. But is it time? Is it worthwhile to do it?

So we'd like to raise those questions in real time to your group.

MR. ISAACS: That's fine. Sure.

DR. NORTH: I think a very important point being made here is the information that you get from this kind of a shaft as opposed to the blasted shaft. And I'd be very interested in the process, who it was that proposed that design, and to what extent did the question of information really get addressed, as opposed to: We need a shaft.

MR. ISAACS: I can tell you this was not been done in a cavalier fashion.

DR. NORTH: Oh, no.

MR. ISAACS: It's been done with arduous discussions back and forth with the NRC and the USGS and developing, obviously, from the site characterization plan itself of what information do we need on the way down in

order to go forward with our program.

The exact technical details, we ought to get you in touch, plug you in to the people who made those decisions.

DR. LANGMUIR: There's a residual concern, too, --

MR. ISAACS: But I certainly agree with you, Warner.

DR. LANGMUIR: -- that when you blast, you create blast chemicals, substances of various kinds which can go out into the rock pores around the hole and permanently contaminate them. So that's always been a concern related to the blasting approach.

CHAIRMAN DEERE: And the raised boring is just dry. You know, you start at the bottom and you just come up and get out of the way because the cutting or just falling down at the bottom, you take them out. In two weeks, it's all done.

And if you haven't had that thrill of inspecting the inside of a raised boring after it's done and being able to see, there's just nothing like in really seeing and being able to do your mapping, your measurements, and your choice of where you want to do your test and the kinds of tests.

I've had a chance to do that on several

occasions, and it is extremely valuable.

MR. ROUSSO: I suggest, as we go through the proceedings, that issues of this type, we take note of and we try and get back in smaller groups or however is appropriate and delve further into what has been done and what we can do from here on out.

CHAIRMAN DEERE: Yes. It's late and we know that. And we appreciate it, but --

MR. ROUSSO: Well, I don't know that it's too late for this.

CHAIRMAN DEERE: It may not be too late.

MR. ROUSSO: Yes.

CHAIRMAN DEERE: It's late, but maybe something can be considered.

MR. ISAACS: Sure.

MR. APPEL: We've also initiated several activities, like preparing to petition the Commission for rulemaking on an accident dose guideline, which is currently not addressed in the regulations.

Next, please. Quickly, I'll go through the future interactions we expect to have with the Commission. They are on various topics, ranging from approach to tectonic and seismic investigations to complete involvement in our ESF Title II design process.

Some of the other topics we'll discuss relate to

regulatory terms that need definition. One of the key ones here is substantially complete containment. The phrase "substantially complete containment" is used in the regulation and it's obvious that it's less than exact in terms of what that means.

There are several regulatory positions that will need to be reviewed in our involvement and also review of internal documentation that's upcoming.

I mentioned this before, but there are a number of things that we need to develop in order to be prepared to move into a licensing phase.

Major issues that we see coming up relative to licensing are things such as: the definition of high level waste; an accident dose guideline; seismic hazard evaluation, because the current proposed approach is not the same as that contained in Appendix A, Part 100.

Next, please. Okay. Thank you.

MR. ISAACS: That's it for you?

MR. APPEL: Yes. I'm sorry I've taken so much time.

MR. ISAACS: No.

CHAIRMAN DEERE: No. It wasn't your fault.

We would like to have the swearing in now of Dr. Verink, if we may.

(Whereupon, Dr. Ellis D. Verink, Jr. was sworn in as a Presidential appointee to the office of a member of the Nuclear Waste Technical Review Board.)

CHAIRMAN DEERE: Very good.

MR. ISAACS: What I would suggest is we ask Jerry Parker to give his presentation and then perhaps have a coffee break or, if you would rather --

CHAIRMAN DEERE: No. I think it would be good, but we have one question --

MR. ISAACS: Sure.

CHAIRMAN DEERE: -- for Mr. Appel.

DR. CARTER: Yes. Gordon, let me ask you one thing. You mentioned entering a licensing phase, and I presume you consider that something different than you're in at the moment. I presume you become an applicant when you actually make the license application to NRC.

But how about explain what the licensing phase means? How different is that now than what you're doing at the moment?

MR. APPEL: In real terms, it probably isn't a whole lot different, and certainly we have to institute the kinds of approaches appropriate for a license in a real sense before we actually submit the license application because --

DR. CARTER: But I presume you're really working

on that full-time already.

MR. APPEL: I'm trying to work on it as much as I can do any other requirements of our interactions, yes. It's not something that I'm delaying until 1995, when we would submit the appreciation.

DR. CARTER: It's just a mental condition, rather than anything else?

(Laughter.)

MR. APPEL: Yes, it is. It is a mental condition.

MR. ISAACS: In fact, your point is very well taken, Mel, because the laws, as I reflected yesterday, say that NRC should license this facility, if possible, in three years, and we want them to license it in three years.

And the only hope we have of licensing it in three years is if we've done an awful lot of up-front good work through Gordon's office to prepare the way and to have resolved many of the technical issues ahead of time.

Jerry, you're on.

SYSTEMS INTEGRATION AND REGULATIONS --

SITE CHARACTERIZATION PERMITTING

MR. PARKER: Thank you. I am Jerry Parker, the Chief of the Environmental Compliance Branch. I should tell you a point of protocol. I'm very sensitive to suit protocol. I notice we have six suit coats on, six shirts,

and one sweater. And I am getting warm. Is that all right?

(Laughter.)

CHAIRMAN DEERE: I'll take my sweater off to get backward and forward.

MR. PARKER: I certainly welcome the opportunity to speak to the Board about our Environmental Compliance program. As Ralph Stein indicated earlier, my branch is responsible for several environmental compliance functions.

He mentioned in the long term the challenge facing us to produce an environmental impact statement in the '93, '94 time frame, which would accompany the license application to the NRC.

My presentation here, though, this morning is a slight shift in focus to that that I think you heard yesterday afternoon and certainly Gordon's in that what I want to address is those activities that we must undertake now to ensure that our site characterization program itself, all the activities that we'll be conducting in the field, will meet all the environmental protection requirements.

I think Ralph mentioned my 23 years of experience in this field. And I personally -- I've been in the program four or five years -- have been very impressed by the commitment, top to bottom, of Carl Gertz, our Field

Project Manager, and all the principals here in the DOE headquarters office as well, to ensure that we are good neighbors. It sounds like a little commercial here, but, hopefully, we'll present a few facts which will bear it out.

What I'd like to do is somewhat quickly go through two topics, that is, that our environmental program has addressed, we believe, some specific environmental stipulations in the Nuclear Waste Policy Act itself.

We have complied with the internal DOE guidelines. The Assistant Secretary for Environment Safety and Health has a series of orders which we feel that we have more than met.

But of most importance to our getting on with the task at hand in terms of site characterization is securing all the necessary regulatory approvals and permits to allow us to get into the field. And that is a challenge at this point. I'll be covering all of these.

The challenge on this last point is that it has been made clear to us that the state regulatory agency folks have decided to implement the policy of obvious opposition on the part of the State of Nevada by not being cooperative. I think that's the kindest thing I can say at this point, and I will describe that in some detail.

So in terms of the statute itself, the first

point there I think is significant. The Nuclear Waste Policy Act says that we do not have to produce an EIS. We did not have to produce an EA or an EIS pursuant to the Nuclear Waste Policy Act, that we merely had to produce -- I say merely -- an environmental assessment that met certain content requirements that were specified in Section 112 of the Nuclear Waste Policy Act.

The final EA, as I've indicated there, was issued in May of 1988, and I will follow up with a bit more discussion about the significance of that document on my next viewgraph.

The second key requirement out of the Act was that we consult with the State of Nevada and any affected Indian tribes about the impact that our site characterization activities may have on the environment; ensure that if such potential impacts exist, we have a program in place to monitor impacts; and to trigger changes in our characterization program, if warranted, so that that those impacts do not occur.

And the second revision of this consultation document, this environmental monitoring and mitigation plan -- I apologize for the wealth of acronyms that we've constructed and that we have.

And I should also say at this point, parenthetically, as I go through this and I describe the

documentation of our environmental program, I'm more than willing to make available all of these documents to the Board as you see fit.

The final statutory provision of significance is reclamation, the restoration of disturbed areas. There was a content requirement in the site characterization plan itself, and you can see it refers to it here, Section 8.7, where we had in some depth discussed the way we would go about restoring disturbed areas and the specific plans, these three different focused plans that will deal with the issue of restoration and reclamation at the site.

Moving then to briefly describe, I think, the pertinent points about these documents, I said "merely" produce an EA. We went about the production of this environmental assessment in an extremely rigorous fashion.

In December of '84 we produced a draft, as we did drafts for nine other sites which were under consideration at the December 1984 time frame. Ultimately, we produced only five final environmental assessments, for the five sites that we decided were suitable for nomination.

And, as you're aware, from that, we screened down to the three sites that we would have been pursuing had it not been for the Amendments Act, which focuses on the Nevada site.

We received over 13,000 comments on the

environmental assessment. The final EA for the Yucca Mountain site was over 1,000 pages in length. Over 300 pages of it we devoted to comment response documents, the entire Volume III, where we specifically addressed those comments we received; most importantly, from the affected parties and the State and also from the public at large.

DR. CARTER: Jerry, could I interrupt you a moment? I know you, of course, originally had a number of sites to look at, and so forth, but are all activities now DOE-ceased as far as those sites are concerned, or are there still some lingering activities?

MR. ISAACS: Do you want to answer that, Jerry? Are you ready?

MR. PARKER: Tom, why don't you go ahead, if you've got a --

MR. ISAACS: Yes. We are virtually out of the sites, as I think I reflected yesterday, in Hanford and in Detsmit County (?). The only thing that's left, I believe, is a very small amount of reclamation of -- at the Hanford site of an environmental attractiveness point of view.

I'm not aware of any -- I think we've filled all the bore holes at all the soft sites now, so it's pretty well over, no active progressing work, certainly, at all, only reclamation.

MR. PARKER: And the Amendments Act actually

stipulated a time frame by which we had to cease activity.

The second compliance document I mentioned was this monitoring and mitigation plan. The thrust of this document was to identify activities that had the potential for significant impact.

And, as indicated there, the EA concluded that there would not be any significant environmental impacts if we conducted our site characterization activities in the manner that we had portrayed in the EA.

The EMMP does identify six potential areas, dealing with some terrestrial ecosystems, air quality, historically important resources, Native American concerns that we have committed in this EMMP to monitor, collect data. It sets some general trigger levels.

If we see certain degradations of air quality, we would then trigger modifications, as appropriate to whatever might have caused that environmental impact.

We also will be producing six-month EMMP progress reports or updates, whereby we will present the results of our monitoring program and any actions that we had to take as a result of them.

And then, finally, reclamation, a very important area for us. The reclamation program plan deals with some major policy level decisions we had to make. Since we're dealing on various parcels of land, NPS land, the Air

Force, BLM.

We had to establish what we viewed the appropriate reclamation practices at all three. BLM, for instance, stipulated specifically in our right away agreement the way we would have to go about reclaiming that area.

It also deals with varied levels of reclamation requirements; that is, should the site be found unsuitable, it would be obviously in a wholesale process of reclaiming the sites, even should the sites be found -- we would have to reclaim those test areas which were no longer of use and for which reclamation was required.

The reclamation feasibility plan deals basically with defining vegetation and soil studies. So we get a handle on the nature of the reclamation that can take place at the site.

And then, finally, the reclamation implementation plan deals with specific procedures and instructions for how to carry on our activities to ensure that we do restore these areas, such as, right there in the near-term, providing guidance to bulldozer operators so that they know how much topsoil they must graze and where they would -- places for locating that topsoil pile, how to stabilize it, and those sort of restoration-oriented considerations.

I'll quickly discuss this 5000 series of

environmental orders that DOE has promulgated. Generally, it requires, for good environmental practices, the need for an overall management plan, the need to define the field activities, processes for dealing with issues of environmental regulatory compliance.

And in response to that, on the right-hand side of this viewgraph, you can see the documents that we have produced, plans and reports. And, again, I'll expand a bit on those in the next viewgraph.

We issued this environmental program overview, EPO, in 1988, along with the site characterization plan, a revised version of an earlier environmental regulatory compliance plan, again, along with the SCP, and these detailed field activity plans. They're field study plans for various environmental disciplines.

I have listed there and mention in this order 4700.1, which is the overall edict for all projects at the Department of Energy in terms of organization and management. And, again, I will discuss that.

Our SEMP, systems engineering and management plan, was actually issued in 1985. The RIB is the reference information base.

And let me move to the next viewgraph. This comprehensive management plan, this environmental program overview, presents a summary of the activities in site

characterization, begins in its substantive chapter with a clear listing of requirements: the National Environmental Policy Act; the various federal, state, and local environmental regulations; the need for reclamation; this environmental monitoring and mitigation; and shows how we have developed management plans to address fulfillment of those requirements; then flows through the various environmental data-gathering planning documents, environmental field activity plans, reclamation, feasibility plans, and ultimately produces topical reports and compliance documentation that feeds into the permit applications and permit reports as well as, ultimately and importantly, that environmental impact statement that we have to produce in 1993.

The environmental regulatory compliance plan is a fairly standard beast, similar to any major project the Department would understand. We had to develop an approach and a strategy for dealing with the vast array of environmental statutes and regulations, such as the Clean Air Act and the Clean Water Act and Historic Preservation Act.

The plan, again, discusses those activities that may trigger these specific Acts and regulations; describes in some detail our interpretation of those requirements; and then, finally, our approach to compliance with these

environmental requirements.

The field activity plans, which are driven by these higher level management plans, are able to comprehensively present our approach to these studies in the field, first, describing the rationale for whatever study we may be covering in that particular document. And they are environmental discipline specific, one for the air quality aspects, one for water, historic preservation, and the like.

After describing the general rationale for the study and the approach, it gets into data-handling and reporting and we believe, with the interaction that we're able to have with them on the state, provides a real good basis for getting on with environmental data collection.

I mentioned in the previous viewgraph the systems engineering management plan and the use of systems engineering methodologies, and we haven't employed that in devising our environmental activities.

And most importantly in this comprehensive repository of data, this reference information base, will be all the environmental information that we gather as well.

Okay. Let me use, I guess, the remaining half of the allotted time to talk about what is the current challenge. I mentioned this earlier. I might as well

start with some successes.

And I think the common thread throughout these four successes is that we were dealing with a federal agency. The Endangered Species Act, under Section 7, we have completed our consultations with the Fish and Wildlife Service, determined that there were no federal threatened or endangered species at the Yucca Mountain site.

No surprise. There was no unique or prime farmland in the desert, no wetlands. And of some significance, because here the National Historic Preservation Act gave some significant authorities to the Nevada State Historic Preservation Officer and a tedious set of regulations that could have been used to thwart an early program, we dealt with the Advisory Council on Historic Preservation here in Washington and were able to prepare a programmatic agreement, which stipulations to protect historic properties, archaeologically significant properties, properties of significant American native tribes, and are about carrying out those stipulations, things like pre-activity surveys, consultations with the Indian tribes, producing a worker video to better acquaint the workers with the significance of some of these resources.

Of course, there's a down side. If you tell them of the significance of the resources, sometimes there have

been opposite effects, but we've decided to tell them and hope that they don't go out and hunt on us.

Pending actions. And I mentioned the challenge and the immediate problem at hand is the air quality registration certificate for surface disturbance. Back in January of 1988 -- it's not a typo; in 1988 -- we filed the application under the Nevada state regulations. And since the State of Nevada has been delegated authority by the U.S. EPA, their enforcement authority is that of the federal government.

This surface disturbance certificate is required because we will be operating on greater than 20 acres, which is the basic requirement. The pollutant of interest, by the way, is fugitive dust. As we pave roads, construct drill pads and parking lots, we will be generating fugitive dust.

In response to our January '88 submittal to the state of our application, there was an exchange of letters between the Air Quality Officer from the state and the state's Department of Environmental Protection that appeared to be proceeding on a normal track.

And, in fact, in May of last year we were given indications from the environmental protection regulation side of the state government that they thought the application was ready for processing and we would be

hearing.

And the regulation I'm referring to, the state regulation, actually has time frames defined. It says: within five days, they had to tell us whether the application was complete; within 15 days, they make a preliminary determination; and then within 75 days, had to either issue or deny the permit.

So you can see our chagrin about midsummer last year, at which point we wrote a letter to the Governor and indicated that we felt that the time lines were not being followed by the state regulators and wanted action.

We have had several other meetings and discussions at the executive level with the Governor. We have written a letter recently to the Government.

We have met with the federal EPA to see if they had any counsel or advice they could give us. They indicate that, because the delegation of authority has been granted to the State of Nevada, they are in no position to assist whatsoever.

And pursuant to another part of the Clean Air Act, federal facilities must comply with this state requirement.

DR. LANGMUIR: Is there any way to override that, to require the Congress to override them? Well, I suspect it would be against regulations.

MR. PARKER: Excuse me?

DR. LANGMUIR: The question had to do with whether there was any mechanism to override that decision by the state to stonewall on this issue.

MR. PARKER: Well, the course of action we're now pursuing, in the way of an answer, is perhaps a suit which could be brought against the state. And I think we've preliminary indicated we're considering that for writ of mandating the site, which is the legal construct here, which would order the state to comply with their own regulations.

I think Carl Gertz has described that to --

DR. ALLEN: This is a Technical Review Board. And serious as these problems may be for all of us, that's -- I mean, I think we have to consider the technical issues --

MR. PARKER: Okay. Fine.

DR. ALLEN: -- as best we can.

MR. PARKER: Sure.

MR. ISAACS: I agree.

DR. CARTER: What is the technical issue as far as the fugitive dust? Has the state -- have they made their views known?

MR. PARKER: I don't think that there has been an assertion that the levels of ambient fugitive dust,

particular matter, actually fine particular matter, PM10, is really an issue. That would be my technical assessment of the data and the air quality situation at the site.

We're basically in a procedural hang-up at this point. The state's position at this point is that they want to wait for the completion of the site characterization plan comment period and review and process before they want to act on the permit.

And I fully understand your --

MR. ISAACS: Yes, I think we ought to just leave it at that, Jerry. We need to just give the status of those other ones.

MR. PARKER: Fine.

DR. CARTER: I presume there are going to be others of these if they're raising this as an issue.

MR. PARKER: Yes. And that's --

DR. CARTER: Obviously, there are a lot of permits required.

MR. PARKER: Right. And, as a matter of fact, that is the message of the remainder of these Acts and, again, as Tom has indicated, there's no need to go into any gory detail on the regulatory hassles that sometimes keep me up.

Groundwater appropriation is a key one in that we need the water for dust suppression at the site.

Moving on, then, to the very last of this list of these permits. And the key point to be made here without any specifics as to the whys and wherefores of these regulatory requirements is that all of these except one, again, have the state governments making a decision with a federal authority.

DR. CANTLON: And dragging their feet on all of them?

MR. PARKER: Well, those that we have proceeded with so far, yes. The track record is such that we're not optimistic at this point.

DR. CARTER: Let me ask you a question about the mode of doing this. Is this a Government Bryant, an administration decision, or do they have the support of the legislature, or just who? Do you understand the nature of the --

MR. ROUSSO: Let me try and respond to that one. I think what we're dealing with is an open extended position by the state government that they are not in any way in favor of this repository.

Now, they are taking due concern for the health and safety of their own citizens. We have to comply with all their rules and regulations. We think we are doing that.

It's a much bigger arena than the technical

sensitivities or the items on the table. And we have to work it out in any way we can, and we will proceed to do that.

MR. PARKER: Yes. Thank you. To summarize, then, I believe the program has been responsive, more than just responsive to the technical, legal requirements.

I think we are, as Carl Gertz has said several times to the folks in Nevada, in the process of being a good neighbor on the environmental front. And the last message and the last subject that we discussed at the state's lack of cooperation could, indeed, cause delays in the site characterization program.

And unless there are any other questions, I appreciate the opportunity to talk with you.

CHAIRMAN DEERE: Thank you.

MR. ISAACS: We're not far behind schedule and I think if -- I don't see Chris Kouts here, but I'm sure that I can talk Chris into paring down his hour presentation to get us back on schedule.

So if you would like to take a short coffee break?

CHAIRMAN DEERE: Let's take it.

MR. ISAACS: Why don't we do that?

(Whereupon, a brief recess was taken.)

MR. ISAACS: You're on.

SYSTEMS INTEGRATION AND REGULATIONS --

PERFORMANCE ASSESSMENT

MR. ALEXANDER: Okay. Let's go to the first slide. What I'd like to do this morning is I'd like to go over the first five bullets very quickly so we can spend a little bit of time on some of the results that have come out of the performance assessments that have been performed over the last couple of years; and then give you a short summary of some of the outstanding issues that we have to deal with. And by no means will that summary address all of the issues that we have to deal with in this particular area.

Performance assessment is comprised of the strategies and analytical techniques which, when applied to relevant site laboratory and engineering data, can be used to determine whether a regulatory requirement is met and, ultimately, whether the site at Yucca Mountain is suitable for long-term disposal of high level waste.

Next slide. This particular slide lists some of the requirements that we have to try to comply with. These are the major requirements. There are a number of detailed requirements in 60, as many of you know, that we have to comply with.

And I'll go right to the next slide, please? I'm going to try to spend a minute on this particular slide and

the next slide to give you a feeling for the constraints that we have on us in the performance assessment area in terms of providing the input that is needed by the Licensing Branch, Gordon Appel's branch, and, as well, Jerry Parker's branch in support of their efforts to develop a license application and an EIS as a part of that license application.

Next slide. The major milestones of the program that we focus on right now are the beginning of in situ tests and the tests that will take place during that period. Interim surface-based test results become available for our use in performance assessment.

We, in the 10-93 time frame, have to produce a draft EIS and a final EIS and a safety analysis report in the 1-95 time frame. In order to do that in performance assessment, we have to have certified plans for our safety analysis codes.

In order to do that certification, we hope to complete that certification by this time frame, about here, in order to produce the draft EIS and in some later time frame, about here, in order to produce the SAR.

By "certification," we mean that we need to document the codes. We need to verify the codes and make sure that they are valid. We need to validate the codes. And then we need to QA them as appropriate. And so there's

a tremendous pressure to get this job done in a hurry.

Next slide.

MR. ISAACS: But I think it can be done.

DR. NORTH: What plans are there to do what I'll call a "top-down integrated analysis" of performance, similar to what we saw on the multi-attribute utility analysis for the five sites?

MR. ALEXANDER: Okay. That's an excellent question. There are two major documents that you can look at. The biggest document, the most important document is the site characterization plan itself.

If you look at Chapter 8, in particular 8.3 of that document, there's an issue, 1.1, which deals with the total system performance assessment.

And in there, there's a extensive and detailed strategy for demonstrating compliance versus the EPA standard, which I'll talk about in a minute.

DR. NORTH: Okay.

MR. ALEXANDER: There's also a performance assessment management plan, strategy plan, that I'm currently developing in order to do that.

MR. ISAACS: At some point in the not-so-distant future, Warner, I think that's a perfect one to get the right subgroup, if you decide to manage yourselves that way, for us to go through our performance assessment

program.

MR. ALEXANDER: I'd like to focus -- in this particular slide, I'd like to draw your attention to the complexity of what we're trying to do in performance assessment. Because we're feeding every area, design of the repository, design of the waste package, as well as site considerations, we have a very broad-based effort in performance assessment. And, again, it's a support effort.

Because of that, it's highly complex and it's interdisciplinary. I wanted to underscore that.

Okay. Next slide, please. There are two parts to the regulations I'm going to focus in on for this particular presentation, 60.112 in this particular viewgraph, and then later 60.113.

60.122 is perhaps the most important requirement that we have to meet for post-closure purposes. 40 CFR Part 191 probablistically specifies quantitative cumulative release limits for radionuclides through the geosphere to the accessible environment for 10,000 years.

And, as a part of that effort, in terms of showing demonstration of compliance with 191, we will be developing a complimentary cumulative distribution function, which I'll discuss in a moment.

And we also have other requirements, such as the last one that's shown on the slide, which is to predict

maximally exposed individual dose for 1,000 years.

Next slide. This slide provides a schematic that shows conceptually how we're trying to approach the problem. As the field and laboratory data are produced, we construct parameter distributions. I'm going to talk about their application in one of the examples.

These then are used by contaminant transport models operated over a range of scenarios, both normative and disruptive, in order to produce a set of scenarios that are summed together to produce a complementary cumulative distribution function in order to demonstrate compliance with the EPA standards.

Because of the uncertainties in the analysis, particularly at present with the limited amount of data we have, we iterate on this process numerous times and, as part of that iteration process, we get feedback to site and design.

Next slide. There are three other objectives, performance objectives, of Part 60 that are particularly important to the program as well. First, 10 CFR 60.113 specifies a minimum time period during which containment within the waste-package system must be substantially complete. And you'll hear a lot more about that.

Second, maximum rates of radionuclide releases from the engineered barrier system after the containment

period are also specified, the so-called 10^{-5}, the release rate constraint.

In addition, a minimum pre-emplacement ground water travel time from the disturbed zone to the accessible environment is specified. So these are the three other performance objectives that we have to show compliance with.

There are a whole bunch of additional requirements, siting criteria, for example, in 60.122, that we also have to comply with.

Next slide, please. Schematically, then, very much in the same way, we collect field and laboratory data for these particular objectives, develop parameter distributions for them.

In the one case, we go through a source-term model, and there are a number around that we are looking at right now -- the arrest code is one -- to identify waste-package life and engineered system release rate.

In the hydrologic area, with respect to the condition on ground water travel time, we do the same thing, and we're developing right now models to evaluate the flow fluids through the unsaturated zone. It's a very difficult problem that we're dealing with there.

And, likewise, because of the uncertainties, there are considerable numbers of iterations in the

process.

Next slide. There are a number of levels of detail that involve performance assessment. We went through a presentation in great depth on this particular topic with the ACNW several weeks ago.

At the highest level of detail, experimental and laboratory work are used to create mechanistic models for processes, as practicable. What we're talking about here are the physical and chemical, in particular, processes that need to be understood in order to be enveloped or dealt with in the subsystem or total system model levels that I'll be talking about.

At the lowest level of detail, the total system model, based to a large extent on subsystem and process models, are used to address the probabilistic system standard that's in 60.112.

And at an intermediate level of detail, subsystem models, based to a large extent on process models, are used to address engineering and design needs, and that comes out of 60.113.

Now I'm to the examples. I can slow down a little bit. Okay. What I wanted to do is give you a feeling for where we are with respect to the calculations that have been done to-date. I think it's important that you have an appreciation for the outcome of some of the

analyses that we've been doing.

In the total system area, the question that Dr. North asked a moment ago, we have been developing methodology for construction a complementary cumulative distribution function. That alone has been a single topic of discussion with the NRC in recent weeks.

We have also been looking at the identification of the explicit set of scenarios or scenario classes, actually, that we need to address as a part of the construction of the CCDF and the final finding against the EPA standard itself.

If you'd go to the next slide, then I can go over how this was done schematically as well. Those PDFs that I talked about a minute ago, those parameter distribution functions that I showed you, are pulled together on a scenario by scenario basis.

They are then compiled into a CCDF for each of the classes. And there are a large number of classes. They're also listed in the SCP, and they're found in that section that addresses Issue 1.1.

Those individual classes, then, of PDFs are then summed to give us a total summation for the overall system, and that finding is plotted against the EPA standard CCDF.

In the meeting with the NRC, we showed such a plot that was constructed based on the availability of the

data at the time. The curve that the EPA standard would show was well above the releases that we were showing at that time based on that analysis. And I can share that package with you if you're interested.

DR. NORTH: Yes.

MR. ALEXANDER: I figured you'd like to see that.

DR. NORTH: Could you explain to us how this current analysis that you have is likely to be changed, both in terms of time scale and in terms of data you expect to get with the shaft borings phase that was explained yesterday?

MR. ALEXANDER: I think that I can to a limited extent, but I think it would be worthy of a whole session on the subject. It's clear that we're going to find things when we get underground that we didn't expect, number one.

Number two, for example, we're not certain of the mode of fluid transport with respect to the partitioning of fluid between the matrix and the fracture systems. We need to explore that very carefully.

And that plays a major role in the outcome of the overall CCDF. And our assumption that I'll be talking about in a second as one of the examples does not take that into consideration.

So I think if there's any place that we're very vulnerable right now, it's in that particular area. Does

that satisfy your concern?

DR. NORTH: Well, it seems to me that's a very important issue for some of the things we were talking about before the coffee break in terms of should you blast the shaft or should you do the boring?

MR. ALEXANDER: Yes. I think I'm going to give you a different feeling about all of that and the importance of all of that in the next couple of slides.

DR. NORTH: Great.

MR. ALEXANDER: Okay? I've been focusing on, given my background -- let's go to the next slide. I've been focusing on over the years, as some of you know, the field of geochemistry.

And so I approach the problem of waste disposal from a geochemist's point of view and, therefore, I attack the modeling problems that we have to deal with from that same point of view.

When I came to DOE about five years ago, I wanted to look into the question of transport from the source. There was at that time no really good code to deal with transport from the source.

And so in the first three years of my staff participation here, we developed an arrest code to do some calculations with respect to releases from the source. And I want to tell you a little bit about those results. Okay?

If I can see the next slide, please, they can read this one. Spent fuel, as you know, is really not a simple single-phased source, but rather is a multi-phased source.

I want to tell you that there are multi sources within the fuel rods themselves: the crud which adheres to the surface of the rod; the gap which collects gasses, in particular, and soluble radionuclides; thirdly, the grain boundaries within the pellets, cracks within the pellets that also accumulate soluble actinides and fission products as well as the gasses.

But I want to also point out that about 98 percent of the actinides and fission products are within the last of the UO_2. And then, again, there's C-14 that's activated within the cladding itself. And so there are multiple sources, actually, of actinides and fission products that we have to deal with.

Next slide. I just want to give you a taste for some of the results. There are large reports that have been written on this particular subject. In this case, we make the assumption that there is point failure at 1,000 years for all of the containers. Now we're talking about the containers that house all of these fuel rods.

In the one case, if you consider that there is point failure at 1,000 years; that is, that everything

fails immediately at 1,000 years, none before and none after, then you've got a curve that looks something like this. (Indicating.)

And for the grain boundary and gap radionuclides, you see that you can for technesium, in this particular case, exceed the EPA limit, 10^{-5}. However, I point out that that's unrealistic, and so when you do it with a normally distributed failure at the 1,000-year interval, you get curves that look something like this, even for these very mobile nuclides.

Okay. In the next slide, I wanted to point out that the type of source is very important with respect to the releases of radionuclides. If we have an unstable matrix, the UO_2, crystalline lattice is unstable. If that lattice is unstable, then you get curves that look something like this for some of these multiple radionuclides that were contained within the lattice itself, if that lattice is unstable. (Indicating.)

But, based on my knowledge and that of many who work with us, we feel that there's a high probability that that lattice, that UO_2 lattice, is very stable and, therefore, we're likely in reality to see results way down here, seven orders of magnitude or more below the EPA standard. (Indicating.)

And so some of the calculations that have been

done show that we can meet the EPA standard, not to mention the other limits at the end of the engineered barrier system, not five kilometers out at the accessible environment.

Now, all of this is based on preliminary data, and it would have to be strengthened through the site characterization process. But this is an inkling I think we'll find in the end.

Okay. Next slide. Now, in the next two slides, I'd like to show you some of the output of the ground water travel time calculations that I've been talking about. So let's show the first one.

If you were to do a simple deterministic calculation of ground water flow across the site, you might find that the range of travel times to accessible environment from a point here on the site, a point over here on the site might range anywhere from 25,000 years to 60,000 years. (Indicating.) Now, again, that's based on the assumptions of this particular sample calculation.

Yes?

DR. NORTH: Let's try a scenario where rainfall triples as a result of climate change and we find there are some fairly substantial fractures; for example, fault lines.

MR. ALEXANDER: Yes. In that particular case, if

you look at the flux right now, we're looking at a very low flux. I believe it's five millimeters per year or less. Actually, it's much less than that. If we were to triple that, I don't believe it would make much difference. I really don't.

Now, on the other hand, your point about a localization of fluid flow through a fracture could be significant. And that's one thing that needs to be examined very carefully.

And, in fact, in my opinion, it's one of the major reasons why we need to drive the shaft down, get over to one of the faults, such as the go spans fault, and take a look at whether or not the assumptions we're making about fluid flow through those fractures are true or not. And that will really help us in pinning down the end result.

But without getting down there, you know, we can only speculate at this point in time.

CHAIRMAN DEERE: Based on the statement that you just made and on the graph that you're showing here, which has the limits, the area, I would like to ask if it wouldn't be worthwhile to consider driving a perimeter drift immediately when you get done with your shafts.

Because we know there are three faults that are being projected to be in that area. And so we're going to look for them. But there may be others that we don't know

about, so we're not necessarily looking for them.

And wouldn't this be the appropriate time to get the tunnel boring machine down and send it out around the perimeter? Again, the time that we're talking about, with high speed tunneling, is very small.

And to me there is no better way to protect an underground structure than to get out around it, and you intercept every through-going fracture. Because I think the ground water flow through the fractures are going to control everything, because they're being fed -- I mean, the general flux through the matrix and everything is being fed from the ones that have the permeability, and those are the ones we have to intercept.

And it would seem to me that this would be a very great thing to have that information as early as possible.

DR. NORTH: I'm not sure that the simple deterministic calculations are going to tell you anything very useful. I think it's these extreme scenarios you need to explore.

MR. ALEXANDER: Right.

MR. ISAACS: It's a combination, I think, that tends to be fair. What we're going to have to do is we're going to have to understand, under the expected range of conditions, what is the performance of that repository like, whether it be to show that, under that expected

range, the performance meets the requirements, in addition to which, we're going to have to look at a range of credible unexpected events, let's say.

And the range is if something has a probability of occurring greater than 10^{-4} and 10^{4} years, that might be the threshold if we're looking at credible events. And we're going to have to look at what the consequences are of those unexpected events.

DR. NORTH: Tom, I think the key word is credible.

MR. ISAACS: Right.

DR. NORTH: And if you can go out and get the data for a modest investment in money and in time by, for example, drifts, drift tunnels around the perimeter, it seems to me you're a tremendous amount better off in terms of being credible.

MR. ISAACS: Yes. Again, I don't want to speak for the people who have, in a systematic way, developed the characterization program. And I don't know all the trade-offs that were made in coming up with the drifting scheme.

And those folks aren't here right now, but we can have them sit down with you and see if what we've developed makes sense or not or whether or not some of these very creative suggestions are a better way of spinning this cat.

We're certainly willing to do that.

CHAIRMAN DEERE: Well, the end product is better. The question is: Can they be worked in in a reasonable way at this stage of the program or should it be in a construction stage, the first area during construction, or something?

We know every suggestion we're making is probably upsetting planning. There's no doubt of it. And it's because we're new to the program.

DR. NORTH: One of the things that troubles me is here you had a situation a few years ago, when I last looked at this problem, where you were going to have three horses in the race.

Now there's one horse in the race, with a possibility of letting another one enter with a long delay. And it seems to me it changes the kinds of trade-offs you want to make about some of this exploration.

You'd really rather not find out at the beginning of the construction that you've got another fault out there. You'd like to know about it and be able to assess the potential impact of it.

And I'm thinking of this not just as a technical problem, but in terms of the perception and the political amplification you're going to get of some new data that appears just at the beginning of the construction, as

opposed to getting it earlier.

MR. ISAACS: I don't think there's any resistance on the part of the program. Let me say, number one, it's not too late, in my mind. It doesn't mean that there wouldn't be constructive criticism. It's not too late to consider these things.

And, number two, if it makes sense, we would do it. I think it's important to recognize that we have taken a disciplined look at what we ought to do early to see if there are potential disqualifiers out there and the program was constructed with that in mind so that there is a rationale for why the program was designed in the way it was designed.

It was done in interactions with the NRC, who also has a large role to play here, and we need to portray for you that process of how we came to that decision, why we decided to do what we did, listened to the suggestions -- they've been very creative suggestions here -- and see whether or not they make sense for the program when we look at all the implications of it.

And if it does, I think the answer is we ought to do something about it. If it doesn't, we ought to satisfy you that we've thought about it. That would be my answer to those kinds of suggestions.

CHAIRMAN DEERE: Right.

MR. ISAACS: And I think we need to establish some kind of mechanism to make that kind of connection very quickly.

CHAIRMAN DEERE: Yes. And this suggestion is based on some good and bad experiences of the past. There are a number of underground caverns being built around the world for power projects. And it's almost a rule that if you don't have an access shaft, an exploratory gallery around the area, you're going to have a major surprise that's going to upset the program.

And almost every time when that program has been cut short or hasn't been done, for one reason or another, they have run into a fault or run into a water situation that has really cost millions and millions, tens of millions of dollars and upset the program by one or two years.

I don't think we can afford to that here. I think we have to go in and circle the area. And it's right within the realm of possibility. We're sitting on the top, and we're projecting faults and we're drilling holes, and all of this you have to do, and looking at the air photos. And this has all been done, and you're looking at the worst features when you're going after them.

And I think this is all great. All we're saying is it may not be enough. For credibility, you circle the

site, and you know there's no through-going permeable feature that you haven't seen or intercept, because you've intercepted the whole line.

MR. ROUSSO: Well, I think these are very valid comments, Don, and I think the entire membership will from time-to-time be voicing, I think, similar suggestions or recommendations.

It's probably too early for a recommendation without understanding what's come before, but I think what we need is to, first, advise you, as we're doing with these two days of where the program is and where it evolves -- some of you have different levels of knowledge of where we are and what we've gone through -- and then develop, as Tom suggested, a working mechanism where individual concerns or group concerns or subconcerns can be fleshed out, both from understanding the problem and developing recommendations, and then learning the trade-offs and where we are in the program to see what makes sense.

And we're practically willing to do that.

CHAIRMAN DEERE: Right. And we're bringing them up now not always having a -- well, in every case not having sufficient background on what has gone on to say whether they are or are not feasible.

But we're bringing them up now so you know the types of things that --

MR. ROUSSO: That's fine. Sure.

CHAIRMAN DEERE: -- that we were looking at.

MR. ALEXANDER: Well, you know, just a one-liner on that. It's clear. It's clear from those of us that have been looking at the problem in depth. Steve Brocoum and myself, in particular, in our particular areas have emphasized the need to get underground to get to some of these key faults.

And so it's -- there's no doubt that we need to get that information. And the -- you know, from my point of view, the more of that kind of information we can gather, the lower the certainties are going to be in the licensing --

CHAIRMAN DEERE: Absolutely.

MR. ALEXANDER: The other point I just wanted to emphasize is that because of the low solubility of the UO_2 in this particular setting, given the low fluid flux that we're going to encounter -- that we believe we're going to encounter, this may be a savings grace.

And I want you to keep that in the back of your mind because it's very, very important. If the water flux is as low as we think it is, if it's only localized because of faults, we stay away from those faults, it could well be that we don't have much of a problem. Okay?

DR. NORTH: But I think you've got to convince

people that there are no faults.

MR. ALEXANDER: I agree with --

DR. NORTH: You're really got to be convincing in that, --

MR. ALEXANDER: Right.

DR. NORTH: -- because I think the sensitivity analysis would show you that if you got a big fault, you're not necessarily in that range.

MR. ALEXANDER: That's right.

CHAIRMAN DEERE: And the fact that you're off is like 10,000. You know, I mean, it's not one or two.

MR. ALEXANDER: Next slide. We have been moving towards the more probabilistic, stucastic type of representation in the modeling that we've been doing. This figure is a representation of some of the calculations that are more in line with what I think Dr. North is looking for.

In this particular case, we're considering a number of variables, both spatially across the area and at depth. And so we're trying to construct a three-dimensional grid, if you will, of parameters as distributed through the site so that we can sample those particular parameters along various pathways.

And so we're -- in this particular simplified case, we're looking at veracity, permeability,

conductivity, et cetera, and in order to try to calculate velocities, but in this downward fashion.

And, again, as I said, this doesn't consider faults.

DR. NORTH: Yes. Well, I think that's a very, very important qualification. I would much rather have the exploration of what faults could do to you than this kind of push the state-of-the-art probabilistic model, which has to be driven by a lot of data, which I suspect you're going to have great trouble getting, at least precisely.

And I suspect that for many of the parameters in this, the sensitivity is very low. And if you don't have faults, if you don't have a major source of flow where you're going to change things by many orders of magnitude, I suspect the model is going to tell you that the travel time is extremely slow, you know, with or without all this complexity.

MR. ALEXANDER: There have been presentations made in the past on the question of the partitioning of the fluid between the matrix and the fracture. And it's also in the site characterization plan itself.

We believe that it's a matrix-dominated flow system. That's our assumption going in. And everything that we've looked at indicates that. And so because of that partitioning ratio between the matrix and the

fracture, it's our belief that any fluid that moves into a fracture will move right back into the matrix.

Now, that will have to be demonstrated through the testing programs that have been laid out. But that's a key assumption that underscores everything that we're doing.

Steve?

MR. BROCOUM: That's one of the reasons they think the two shafts feet apart will interfere with each other. Any fluid that goes to the fracture, it's believed will get sucked up by the matrix before it has traveled more than a few feet or a few tens of feet.

So the presence of a fault or the presence of a fracture doesn't mean that you're going to have fractured flow.

MR. ALEXANDER: Right.

MR. BROCOUM: You will fractured flow only if the rock is very close to saturation. Okay? And the best we know, the rock is about .27, saturation about .27, 70 percent saturation.

MR. ALEXANDER: The point is for updating .85.

DR. NORTH: That's why I would like to see this whole analysis rerun with an assumption of change in the climate to give you much more precipitation at the site and a very different balance in terms of the evaporation loss.

MR. ISAACS: Yes. I think those kind of sensitivity cases are part of the calculation. It would take -- my understanding, again, to be proven out, it would take a pretty dramatic change in climatology, greater than the one you're indicating.

For it to make a difference, we have those kind of sensitivity cases, but we need to understand how much of a change it would take before the flux would get to the kinds of concerns you're talking about, and that's part of the site characterization plan. It's included in it.

DR. NORTH: I look forward to learning more about it and had better stop asking questions so you can get back on schedule.

MR. ALEXANDER: I just wanted to peak your interest to some of those calculations and thought it would be interesting.

DR. NORTH: You've done a good job.

MR. ALEXANDER: So, anyway, although our preliminary calculations indicate that we don't have a problem with respect to meeting these particular objectives, there's a considerable amount of work that has to be done.

And with respect to the 60.112 issue, our selection of scenarios for the construction of CCDF and the construction of the CCDF itself is a large problem that

we're wrestling with right now. And we've had a number of discussions on that subject with the NRC.

There's another subject that I would touch upon with respect to the scenario that allows human beings to interfere with the site.

And then with respect to 60.113, we need to evaluate our capability to model corrosion and project that corrosion process out over the time frames of interest, 300 to 1,000 meters, and that's a very difficult problem that's been heavily debated in the arena.

Skipping down to 113(a)(2), with respect to ground water travel time, we need to define what we mean by the "disturbed zone," because, according to the regulation, you can calculate ground water travel time from the edge of the disturbed zone to the accessible environment.

And, of course, we need to continue to develop capability to model the partitioning of fluids between the matrix and the fractures. I'd say that's a number one objective. Thank you.

CHAIRMAN DEERE: A question. When you showed one of the models with the space and crud, and a few other things --

MR. ALEXANDER: Correct.

CHAIRMAN DEERE: -- around it, --

MR. ALEXANDER: Right.

CHAIRMAN DEERE: -- wouldn't there be some benefit in thinking of the bentonite sand or the bentonite balls around it as a potential there, like you've already considered in some of the other sites which were below water?

Because I don't think that the bentonite will degrade. This is the geochemistry, and perhaps this question should come from our geochemist. But he can answer it.

If we're looking for a 10,000-year life and the potential for perhaps some perched water or perhaps change in climate, if you had a bentonite around it, a couple inches of saturated bentonite does marvelous things in preventing water flow.

You don't have to think of its capability to absorb ions or cad ions. It's just its ability with such a low permeability material that I think that it can keep you entrapped there for a considerable length of time and slow down the overall flux.

MR. ALEXANDER: Okay. Recognize that what I'm pointing out here -- this is a schematic of a rod --

CHAIRMAN DEERE: Yes.

MR. ALEXANDER: -- which is inside the container.

CHAIRMAN DEERE: Yes.

MR. ALEXANDER: Okay?

CHAIRMAN DEERE: I see.

MR. ALEXANDER: Now, there have been considerations for filler materials that would go right inside the container that would do just what you're talking about, would allow us, by the way, to model transport of a nuclide from any of these sources through that filler, such as bentonite, and use diffusion modeling capability in order to make our case. And because diffusion modeling is standard practice, I think we could use that very effectively in making a case.

I'd also like to point out, though, that outside the container, our current design takes advantage of a very important attribute of the site, and that is the air gap. Okay?

When the water comes down to the level of a container, we expect, because of the partitioning of fluid between the matrix and the fractures, that it would be whipping around, like in a sponge, around the package and down to the water table. So it would be actually whipped around.

Now, that's being debated as well, and there are some people who would like to see a packing material in place within that particular air gap zone, if you will.

MR. KLEIN: As we get into the next phase of our overall design efforts, including repository and

waste-package design, we will, by virtue of the regulations, need to consider alternative waste-package designs.

And when we talk about the waste-package, we're really talking overall engineered barrier systems. So it may very well be that that could be or would be one of the alternatives, in addition to alternative packing, package materials for the container itself, and so forth.

So we certainly have not precluded further looking at that, which is a concept that has been looked at for other waste-package environments, the wetter environments, in particular, that we were studying in the past.

DR. NORTH: Presumably, you're going to have some ability to test in the site this question of the partition.

MR. ALEXANDER: Yes. I think there are going to be a major set of tests focused on that very problem because it's central to a lot of the analysis that we do.

DR. NORTH: I think it would be very interesting to do if you haven't already done it, work out a package design contingent on how that test comes out. If, for example, there's more flow through the cracks that you had expected, maybe then you'd want to have a bentonite design all ready to go.

MR. ALEXANDER: Yes. I think that you need to

spend some time with Jack Hale on that particular issue. I think he -- I don't know, Jack, I don't want to misrepresent your views, but I see you sitting back there -- is not real high on the air gap concept.

Is that a fair statement, Jack?

MR. HALE: I think it's fair.

DR. LANGMUIR: Bentonite's not going to be stable at those temperatures right at the beginning.

MR. ALEXANDER: Yes. Inside the --

DR. LANGMUIR: That's one of the problems.

MR. ALEXANDER: That's why I said a bentonite-like material, Don.

CHAIRMAN DEERE: Yes. Okay.

MR. ALEXANDER: Because you know and I know that it's not stable at the temperatures that the end container is going to see, so the center line temperature is going to be much higher.

DR. NORTH: I think that's just exactly the reason why you have to go through some detailed design to construct an alternative. The question I'm really going back to is: Supposing the matrix partitioning doesn't come out the way you expect, but comes out, let us say, on the bad end of the credible range. What are you then going to do about it?

MR. ALEXANDER: Fall back. Okay. Thank you.

MR. KOUTS: I guess I'll introduce myself. Ralph Stein introduced all the Branch Chiefs in the Office of Systems Integration and Regulations earlier. My name's Chris Kouts. I'm the Branch Chief for the Transportation Program.

I've come prepared with a three-hour presentation, but I'll try to keep it so you can have a timely lunch. As you can see from the first slide, the Nuclear Waste Policy Act, besides giving us responsibility for the disposal of the waste, also gave us responsibility for transporting the waste from both the reactor sites and defense facilities.

We will take title at the reactor site and be the shipper of record. We are also directed to use the private sector to the fullest extent possible.

We made an internal policy decision that we would be using NRC-certified casks for transport. That was not required in the Act. And also the Act indicated that the cost of transportation would also be covered by the waste fund.

We're certainly glad that we made that policy decision, because the Amendments Act that was passed last year or the year before last basically directed us to use NRC-certified packages for transport.

It also required us to comply with other NRC regulations associated with prenotifying states and local governments prior to shipment. It also directed us to provide training and training assistance to local governments to deal with emergency preparedness, tribes' considerations, and also to do that also for Indian tribes.

Just a very broad brush associated with the regulations regarding transport of radioactive materials: It's one of the most heavily regulated areas, I think, in the government. We have very stringent regulations that we have to comply with. From a cask design and testing standpoint, there's 10 CFR Parts 71, 73.

There are also regulations related to the physical protection of the shipments, armed guards, those types of things, and also specific requirements related to prenotification that the individuals along the route or the governments along the route have to be notified registered letter, and so forth, by seven days prior to shipment.

The Department of Transportation also gets into the regulatory arena. They get involved, actually, in a variety of areas: operational procedures, labeling, placarding, and so forth.

In the truck area, they have issued regulations related to the movement of radioactive materials by truck. They have specific regulations for them. It's identified

in a docket called HM164.

There are no federal regulations at this time for rail routing, but that's something that DOT is considering potentially to do in the future. There are also regulations regarding driver training, and so forth.

The major elements of the transportation program -- or what I should say is the vast majority of our money at this point in time is going to the development of new casks, casks that have higher capabilities, casks that are more specifically designed to deal with spent fuel that has been aged over 5 years and, in many cases, over 10, 15 years.

We have identified -- several years ago we published a business plan that identified a variety of cask initiatives that we would be embarking on. The one that we're involved in right now is the from-reactor cask development initiative.

Along with the cask development initiatives, we have research efforts in the area of systems technology and development, which we'll talk briefly about later, and also regarding the testing of the casks.

DR. CARTER: Let me ask you a question about the design. Do you just go to the cask themselves? You're not worrying about, I presume, heavier rail cars or trucks to carry larger loads, and whatnot, or is that part of the --

MR. KOUTS: That's actually part of the contracts. For all the contractors who are developing casks for us, they have to also provide us a rail car or a flat bed truck that would meet the weight requirements.

So we're very -- we understand we're not doing this as just designing the cask and not worrying about the other parts of the vehicle or the conveyance that it would be used on.

And all that's part and parcel, so we are -- the cask certification regulations --

DR. CARTER: You're looking at the vehicles as well as the --

MR. KOUTS: We're looking at --

DR CARTER: -- casks?

MR. KOUTS: Yes, we are. We're looking at lightweight truck vehicles for truck or lighter weight vehicles for truck to get heavier payloads, higher capacities and so forth.

Rail, it's a little more fixed than on a truck standpoint.

DR. NORTH: Do you also look at the impact of overweight vehicles on roads or rail bed?

MR. KOUTS: That's something that we will be looking at. I think what you need to recognize is that the movement even of 70,000 metric tons of fuel from a truck or

a rail standpoint, when you consider all the movement of materials in this country, is a very, very minor fraction of that.

And the impact that we would have as an overweight vehicle, should we go to overweight vehicle for safer trucks would be minuscule. It would be -- it wouldn't even show up on a chart anywhere.

The amount of shipments that we would make by truck compared to the amount of overweight truck shipments that are made in this country on a daily basis is just absolutely lost in --

DR. NORTH: Who about in the State of Nevada?

MR. KOUTS: That's a separate issue.

DR. NORTH: There are certain key rail lines or roads.

MR. KOUTS: That's something that we --

DR. NORTH: If you take into account all the extra maintenance costs and implications for traffic accidents or, shall we say, temporary problems that could be caused by these vehicles that would take time to fix, is all of that relatively minuscule or at least with enough money put in to make sure the problems get fixed quickly?

MR. KOUTS: But --

DR. NORTH: Is that analysis all in place or will be in place as these designs proceed?

MR. KOUTS: The whole interaction with the State of Nevada is kind of a separate microcosm, if you will. The state is a special case. What I was talking about was on a national basis. There are --

DR. NORTH: Yes. But what I'm really thinking about is at the level of scientific issues confronting this Board. Are those implications for the transportation system in Nevada under analysis so that you can answer those questions?

MR. KOUTS: They're underway right now and they're being done by the Yucca Mountain Project Office right now in negotiations with --

DR. CANTLON: Even beyond Nevada, as you shift from the East where you're dealing largely with concrete-based highway construction as opposed to asphalt-based as you get into the air and climates, we need to make --

MR. KLEIN: We're assuming legal-weight truck casks and considering overweight trucks as more an option to be proven. We know we can design the cask and a conveyance, but there are also institutional problems. States regulate overweight shipments. And so that's another potential institutional barrier.

We have a number of activities underway trying to address this in, you know, a national framework. What it

buys you is fewer shipments, which is something that is also of interest to people. So there is a trade-off there.

But, in the meantime, we're just presuming legal weight truck with the overweight as something to be looked at and studied.

MR. KOUTS: When we get to the institutional program, we'll show you some of the -- one of the studies we have underway to look at uniform permitting on a nationwide basis for overweight shipments.

For a tour of the from-reactor cask development initiative that we have underway.

This program is managed through our DOE Idaho office. The major contractors involved besides the cask contractors, who I'll identify in a minute, are Sandia National Laboratories and EG and G.

Sandia is dealing with a lot of our research that cross-cuts all of our cask development efforts. EG and G is a support service contractor to our Idaho -- our Idaho office.

To give you some perspective, when we talk about increased capacities, what this slide will show you is basically what casks exist today and what their cask capacities are from the standpoint of carrying PWR or BWR, pressurized water reactor or boiling water reactor, fuels.

You can see that the legal-weight truck cask

today, it's one and two, which an overweight can carry three or seven. Rail, you're looking at somewhere between a 7 and a 10 PWR and 18 and 24 BWR.

When you take a look at that on what it would take specifically of those casks to move or how many shipments you would need to move all the fuel that we'd want to move in one year when the system is fully operational, you get some perspective in the final column.

The next slide will show you basically the range of cask capacities that we're trying to develop in our from-reactor cask initiative. As you can see, we're looking at at least a two to four legal weight truck, which will double or potentially quadruple what we could do for PWRs, and very similarly for BWRs, and we're going to be over double for our rail casks.

So we are -- we're developing these casks basically because we're dealing with older, colder fuel. It gives us then an ability to increase cask capacity, which will, in turn, reduce shipments.

We had a design competition several years ago. We selected five contractors. We've got five contracts underway. Two are truck. General Automics Technologies, Westinghouse Electric Corporation are developing truck casks, legal-weight truck casks. In each of those contracts there is an option, should we choose to exercise

it, to also have them develop an overweight truck cask.

Right now we have three rail barge casks under development by Babcock and Wilcox Nuclear Assurance Corporation and Nuclear Packaging.

I'd like to talk for a minute about what the design process is and where we are in it. Basically, a conceptual design was put together by the contractors who submitted bids on the contracts to give us a feeling as to the type of cask they would be developing. Right now they are all in the preliminary design stage.

And they are right now trying to narrow the design requirements, do a series of trade-off analyses to see, given changes in the burn-up of the fuel or in the size of the fuel, whether or not that affects cask design. And, again, they are trying to come in to a fixed design envelope that they would proceed with into final design.

The final stage of design would be to fix the design envelope and then crank all the numbers that you would have to do and come up with an integrated cask that would meet all of the requirements that we have in our RFP related to weight, related to capability to hold PWR, BWR fuel, a variety of burn-ups and sizes.

Yes?

DR. PRICE: To what extent do you have flexibility to consider changes in criteria, such as

testing criteria for fire, and this kind of thing?

MR. KOUTS: We think we have a lot of flexibility. What I mentioned earlier with Sandia Laboratory, part of the design process and feeding the contractors information, the latest information that we're developing from a research standpoint is also being fed into the contractor.

So I think we're getting kind of a real time feedback into the people who are designing the casks for those types of issues.

DR. PRICE: And do you also have a consideration for the manufacturing processes that the proposed designs may involve and the potential problems related to the manufacturing?

MR. KOUTS: That's fabrication, and how that would be done is a key consideration. And when we review the preliminary design packages that will be coming in beginning in a couple of months, that's one of the items that we'll be looking at, whether or not these types of designs would lend themselves to fabrication and whether or not the tolerances would be such that we couldn't do it easily or it would be difficult to meet. And all these types of issues are going to be looked at.

This will give you an idea of where we are and just a broad brush of two of the -- our two legal-weight

truck contracts. The General Automics cask is now -- it's actually a square cavity. It's looking at -- that's somewhat of an innovative approach by GA.

Most of the casks you've seen in the past have been cylindrical. This one is actually square. They're doing this to try to minimize cask weight and also maximize payload.

And they're looking at an array of eight three by three PWRs or two by two PWRs. The materials, the first material you'll see is a structural material, stainless steel. The second is a shielding material. Depleted uranium is what they're planning.

And there are a variety of features in each of the casks that are somewhat innovative. In the GA case, it's an aluminum honeycomb impact limiter. I won't go through all these at any great length.

Westinghouse recently came in for a change to look at a titanium alloy as opposed to the -- that's, again, for the consideration of getting structural integrity but reducing weight.

Of course, there's a cost-penalty also, because titanium is expensive. But we run life-cycle cost analyses on the casks to make sure that it's a feasible way to go. And we made a decision that, yeah, we'd like to see them look at it further. So they proceeded. They're proceeding

to look at that.

We have three rail casks under development. They're all cylindrical. You don't see any squares. They use a variety of shielding and structural material and, as you can see, also the capacities changed. Some are more optimistic than others as to what capacities they'll be able to get into them. And it's kind of a wait-and-see process.

One other point about these contracts is we've taken somewhat of a hands-off attitude as to how these casks are developed from the standpoint that the certification that NRC will give for these designs will be sought by these individual corporations. We will not as a Department go forth and hand in a license application. We leave that up to these manufacturers who have experience in the area.

So they will be meeting with the NRC. They will be submitting their application directly to NRC for the certification of the designs. We will, however, own the designs and be able to utilize them in a waste management system.

Again, it's part of this utilizing the private sector to the maximum amount possible. And it makes good sense. It gets us out of the position of interacting with the NRC when these contractors in the past have already

gone forth and gotten many casks certified.

DR. CANTLON: What about independent task statements as opposed to taking the manufacturer's testimony? Is that in the plan?

MR. KOUTS: That's also planned. That's what we plan to use Sandia for. And the contractors have an option of whether to use Sandia or whether to use their own testing.

Regardless of whether or not they do it, it will be heavily overseen by a variety of contractors and DOE personnel.

MR. KLEIN: There's provisions in these contracts for construction of scale models, as well as prototypes, that are basically at our option. The current plan is to do a full suite of testing and variety of testing, so we try to accommodate all that.

We started this early, also, to avoid a situation of getting all dressed up and nowhere to go. We're putting a lot of money and effort into a repository, obviously, and it would be easy to take the transportation for granted.

But you never know, and the transportation could very well be an Achilles heel, so we've considered it worthwhile to put in this up-front time and effort into developing and testing designs.

DR. PRICE: When you say a "full suite of

testing," are you including the kinds of tests that have been done on the old casks, such as 80-mile-an-hour crash tests and dropping them from an airplane, and so forth?

MR. KLEIN: We have provisions to allow us to do that. Buying up to two prototypes of each cask would permit us to use one in a destructive manner. There are a lot of issues associated with doing those sort of tests.

And we really have yet to make any final decisions, but we certainly have not precluded the option of doing it.

DR. CARTER: Let me ask a question about the commonality, I guess, of contractors. Now, this is a broader issue than transportation, but it comes up, I guess, or could, as far as the use of Sandia National Lab, because that's obviously been the contractor for the NRC in transportation for many, many years with I guess, an understanding with the Department of Transportation.

And now, I guess you folks are depending rather heavily on Sandia, and I presume this is the transportation center there, primarily.

MR. KOUTS: If we're using the technical arm of Sandia, I think NRC recognized the same potential for that conflict, and they've moved a lot of work away from Sandia to avoid any appearance. And that saved us the trouble of looking to go elsewhere.

But NRC was aware of that. NRC has moved and is trying to develop separate expertise than at Sandia. Again, Sandia is not involved in the development of the casks.

DR. CARTER: Yes, I understand.

MR. KOUTS: Sandia is a side contractor, if you will.

Very briefly, just to give you a status of where we are, the contracts have been signed; a variety of meetings have been held with them. They are now in the preliminary design area.

We've qualified all their QA plans, and we've had initial meetings with NRC, which we always attend also, so we understand, again, what interactions are going on between NRC and the contractors.

The other areas that we're looking at from a research standpoint, which are really a generic type of analyses that apply to all the contractors are in the area of burn-up credit, source term analysis, computer code benchmarking, materials and component development, and cask weeping.

All these considerations cross-cut the -- crosscut the contractors and we use whatever information that we develop to feed into the contractor we're going to --

DR. CANTLON: What does "burn-up credit" mean?

MR. KOUTS: The next slide will --

DR. CANTLON: Okay.

MR. KOUTS: -- get into that. Basically, what we're talking about with burn-up credit is the fact that spent fuel after it's been utilized in the reactor has reduced reactivity.

That has implications, especially in the area when you conduct criticality analyses. When you take these -- the fuel elements, put them into a cask, the NRC requires you to conduct a criticality analysis.

And, historically, what their conservative assumption was was that to assume it's fresh fuel and that the cask is going to be in an optimal position to go critical, given the right moderators and everything else.

What burn-up credit -- assuming we can get burn-up credit for our casks, what that will allow us to do is to make that criticality demonstrate that the criticality cannot occur in a much easier fashion, because there's less fisson material inside the cask.

Again, you're dealing with a regulatory body here. They want to make conservative assumptions. What we're doing is doing research to show what we would -- you know, how it affects criticality, assuming you assume a certain amount of burn-up credit in a cask.

This is an issue that we briefed NRC on recently. They have an interest in it. And, again, it's something that would have to be decided by NRC. And I think -- you know, we're hopeful that we'll be able to obtain some kind of burn-up credit to again help the capacities of our casks.

Let's go on to the next slide, please. Another area that we're interested in has to do with leak, leak-type requirements that NRC has on casks. It's an I.A, E.A. criterion and it's basically, again, a very conservative assumption that they've used in the past, and it's not really based on the actual source term that's within the cask, the fuel, the crud, and whatever residual contamination that's within the cask.

And what we're doing now is we're trying to go forth and understand, again, what the source term is so we can go to NRC and have them look at their requirements in a more realistic light and also develop a consistent approach as to how it is applied.

Basically, we're looking at a variety of tests for cask certification. We have our own approved engineering tests. We're developing our own procedures and criteria, and that's what this slide represents.

The two pieces of the -- yes, sir?

DR. PRICE: All right. Some would contend that

one of the major areas in the operational area of casks' major problems has been related to human factors, engineering of these casks. How are you addressing that issue?

MR. KOUTS: That's been something that we've looked at in the past, and we have a very low effort in that area now.

It's something that we are aware of, human factors associated with the actual drivers who will drive these vehicles, the wear and tear on them as they're going along the route, what the best operational procedures might be --

DR. PRICE: How about the design of the casks themselves?

MR. KOUTS: Can you amplify that? How?

DR. PRICE: Well, in the design of the casks, manufacturing errors occur because of human errors, valves put in backwards, and so forth.

MR. KOUTS: We're hopeful that the QA that we will lay on these -- the fabrication of these casks will more than compensate for that.

We haven't looked -- we've looked at it more from an operational end, not a fabrication end, because our assumption is that when we get to go the point when we're fabricating the fleet and we're procuring the fleet, that

whoever is building them will have a large qualified QA program so that those things don't occur.

But we're not doing any work right now that's looking at that issue. It's something that I'm sure we'll --

DR. PRICE: Are specific human engineering criteria being laid on the manufacturers?

MR. KOUTS: From the standpoint of cask handling, we're trying to standardize certain aspects of cask handling, so that human factors, issues will be diminished --

DR. PRICE: I was talking about the design itself.

MR. KOUTS: What I suggest is we talk afterward about this, so I fully understand your thoughts, and so forth. And, you know, I'm not sure I understand exactly what you mean.

In the design of the casks themselves, again, the major requirements that we're trying to deal with have to do with shielding, with making sure that criticality doesn't occur.

Human factors related to the design of the casks, mistakes in the design, or so forth, are dealt with, again, in the QA process that we'll set up in the review of the designs, and the fabrication that would be in the same

manner.

DR. PRICE: Okay.

MR. KOUTS: Flip it back up for a second, Phil, just so we can see what we're talking about. We have an economic insistence component of our program. We're getting away from the casks systems development program now.

We have a variety of models and technical databases that we deal with from a transportation standpoint. We also do a variety of technical analyses. One which we've done recently is to support the MRS systems studies which you'll be hearing about this afternoon.

This slide essentially is an amplification of what I said earlier. We do have a variety of databases and a variety of computer programs that do a lot of things for us, from routing to costing, to potentially optimization.

An area of special interest to the public is how we do our risk analyses and while we've recently gone through an adjustment of the Radtran Code that has been historically used by the Department for risk analyses related to radioactive waste transport.

We're working closely with Sandia, who is the keeper of the code, to make sure that the changes that we're proposing get into the code and that code is utilized by not only us, but by any other state that would want to

do their own analyses for our program or for any of the other programs within the Department that are moving radioactive waste.

We have an operations component to our program. It's looking at the functional requirements that we need to operate, technical requirements, and how those are going to be allocated across just the transportation system.

Next slide. Basically, we've got operations plans for -- draft plans to look at how we would operate truck and rail shipments.

We're also -- in the future, we'll be looking at a variety of other operational considerations, again, as we get closer to transport. It's not an area of the program that's of high interest at this point because we're pretty far away from shipping, or at least 10 years, I guess, at the earliest.

This part of the program probably gets the most notoriety. It's our institutional program. It's one where we've taken what I would consider to be a ground-breaking step to try to deal with the many issues that we're going to expect to surface as we have to transport these shipments.

We have -- we've instituted a variety of cooperative agreements which I'll discuss in a minute with a variety of regional groups around the country, and we

interact with them on a fairly regular basis to make sure they're aware of what we're doing and that they have input to what we're doing.

It's our attempt to try to make sure that we don't come up with a lot of surprises to the public when we're ready to ship and that we've worked a lot of the issues associated with routing and emergency preparedness through the states, right now through regional groups. So, again, these aren't impediments to allowing us to ship.

Beyond -- well, let's skip this slide for the time being, if you can. When I was talking about institutional groups, this is what I'm referring to. We have a variety of groups under cooperative agreement with the Department: the Southern States Energy Board, which deals with southern states; the Western Interstate Energy Board dealing with western states.

We have recently completed an agreement with the Midwest Office of the Council of State Governments that deals with, basically, the Midwest states. And right now we're looking at also identifying an eastern group. So we'll have national coverage.

We also have a cooperative agreement with the National Congress of American Indians, the National Conference of State Legislatures. We have technical groups also that we deal with: the Commercial Vehicle Safety

Alliance; Council of Radiation Program Directors; and the last one, AASHTO, which is the American Association of State Highway and Transportation Officials.

I want to highlight this one because this is a group that we've gone out to to give us some perspective to whether or not we can uniform permitting for overweight truck radioactive waste shipments.

They've been working on this contract for a couple of years. We expect some output at the end of this year, which would feed into a decision as to whether or not we would pursue an overweight truck cask.

This next slide will just give you the types of issues that these groups are interested in, and I won't go through it at length.

The other one was we also do a variety of other studies related to looking at previous campaigns to see if there are any lessons learned that we can apply to shipments that we would make in the future.

We also have a legislative database where we try to monitor changes in state laws related to radioactive waste transport, so we understand what's happening out at the states, at the state level.

The final two slides will give you some perspective of where the program will be and what we're going to be doing in the near term and the longer term and

the general time frames as to what we will be doing in the transportation area.

In 1989, if everything goes as planned, we could complete preliminary designs of the from-reactor casks. We're studying right now technical cask design issues. We're going to be issuing a comprehensive or -- a comprehensive transportation plan this year that pulls together previous plans that we've issued.

We issued an institutional plan and a business plan. What we're doing is taking those two documents and combining them and updating them, and we're going to be issuing that out for public comment, hopefully in a few months.

We're also -- as I mentioned earlier, we've reviewed our risk methodologies, and we're updating the codes so we've got the latest information in there.

In the 1990 time frame, we'll be again reviewing the progress on uniform permitting from the AASHTO study that will feed into a decision on overweight truck, as to whether or not we'd want to pursue it.

If everything goes as planned, we'll be in the final design stage of our from-reactor casks and we'll be also beginning to develop a strategy associated with providing training assistance at the time near -- three to five years before the time before we're we're going to

ship.

Next slide. '91 to '97 we'll be feeding into the transportation analyses that are done for the EIS. We'll be submitting safety analysis reports to NRC for our cask certification.

This is the SARs. That's the report that the contractors will be submitting to NRC and NRC will be either approving or disproving the cask design. We'll be making decisions on whether or not we want to initiate the development of other types of casks in the system.

Of course, MRS is contingent on where we're going in MRS, also defense waste casks and other casks, as appropriate. We'll be finalizing plans for training assistance and we'll be initiating equipment acquisition.

1990 to 2002, the closer we move to shipment, the closer we are to developing a fleet and procuring a fleet. And it's all pointing to, again, being able to initiate operations identified in the mission plan in the year 2003.

And I think I took a half an hour. So --

DR. CARTER: I have one question. What's the status at the moment between the various states and local communities and the federal government, as far as regulation of transportation?

In the past, you know, we've had nuclear free zones and a number of special things like that, and there

have been a lot of legalities involved. Is that pretty well settled in now? What do you anticipate in the future?

MR. KOUTS: If it has, it hasn't been communicated to me.

(Laughter.)

MR. KOUTS: I think that probably the most controversial area of transport will be routing and how we do our routing. That's Nevada's concern with the repository, the rest of the country's concern with whether or not this material is going to be going down their interstate highway or their rail line or over their bridges, or whatever. And it's a very, very heated issue still in the states.

As I mentioned, there are federal rules dealing with truck transport. And what the Department of Transportation has essentially regulated is the fact that the shipper -- I mean, actually, the carrier can utilize the interstate highway system unless the state designates alternatives.

And it's up to the state to apply to the DOE -- or DOT, I should say, and identify those designated alternatives. If they do designate an alternative, then we have to use them. So that's the mechanism for truck.

For rail, right now there are no federal rules. And that, in a sense, kind of opens the picture, if you

will, as to how we -- how the states will view it. If we have total discretion, then they like to see their state avoided.

DR. CARTER: Well, I guess the main one is what mode of operation DOE will take, whether it will be an interactive one with states to allow them to participate in the decision-making aspect of it or whether they'll basically be told, "We're going to do this," sort of thing.

MR. KOUTS: Well --

DR. CARTER: I think that's been the problem in the past. At least that's one of the contentions is a matter of input into the decision-making process on a timely basis.

MR. KOUTS: That's really the cornerstone of why we have an institutional program and why we're trying to develop relationships with now regional groups and, as we get closer to shipment, with the states to deal with them directly on this issue.

We've already received a proposal from the Western Interstate Energy Board that suggested to us that we ought to have a national route, if you will, that would go across the country and be the one main route used for all truck shipment.

That's kind of difficult to do when you have 100 different reactor sites and you're funneling them down to

one route. That was a good suggestion, but the good suggestion was an MRS, if you have them in the East, where we can consolidate shipments and put them on one rail line, but it's kind of difficult to do with truck.

But, again, the rationale for the Western Interstate Energy Board, you could look at hidden agendas, but the rational was, geez, you know, if you have it on one route, you could do all the trading along that one route, you don't have to worry about a variety of routes, and so forth.

Our position is that we would want to have as much flexibility as we can prior to shipment because there may be a lot of different conditions that will change. With roads, you could have construction associated with a specific route that you would want to go around it.

We want to maintain as much flexibility as we can so that we can move the shipments when we want to move them. That sometimes conflicts with the needs of the states, but, hopefully, with this long process that we will have embarked upon, we'll at least give everybody an opportunity to say what they want to say and, hopefully, come up with something that won't make everyone happy, but at least we'll get the job done.

DR. CANTLON: Your list of institutions that you had on one of your slides didn't look as though it were

uniform. For instance, you had the Western Energy Board. You didn't have a western governors' or legislative thing.

Is there some significance in that or have these other bodies delegated to the Energy Board handing of those issues? Because they have very different people --

MR. KOUTS: Oh, sure.

DR. CANTLON: -- on those bodies.

MR. KOUTS: No. We actually go through a review almost on a yearly basis if that's the right group for the region. The Western Governors Association, as you know, has been very active in a lot of issues associated --

DR. CANTLON: Why aren't they on your list?

MR. KOUTS: Well, it's just that right now we're working with the WIEB. We may later work with the WGA. We'd like to work with one entity for a region because if you start dealing with two different groups, then you're -- you know, the whole concept behind this was not to deal with individual states and to try to get a regional group that would be representative of the states.

DR. CARTER: Maybe I could help you a little bit. Actually, those first two -- the first one is a creature of the Southern Governors Conference, and the second one is a creature of the Western Governors Conference.

DR. CANTLON: Exactly. Yes. Right. That's why I questioned them, but yes.

DR. CARTER: So you're tied into those organizations.

MR. KOUTS: You are tied, and there are interactions between WIEB and the WGA. It's not -- we're not doing this in a vacuum, but --

MR. ISAACS: Well, I think it's also important to recognize we're not giving any sort of autonomy or authority to these groups by virtue of their participation. These are --

MR. KOUTS: Cooperative agreements.

MR. ISAACS: -- points of contact and places to go to get some distribution of information and participation back in from those areas.

MR. KOUTS: It's our way of getting information out of the program and getting information into the program. It's kind of like a pressure valve, if you will. And, you know, time will tell to see whether or not it's been successful.

CHAIRMAN DEERE: Tom, thank you very much. Chris, I think this has been very, very interesting and useful.

MR. KOUTS: You're welcome.

MR. ISAACS: I understand your lunches are somewhere in the vicinity, so we can take a break and you can go into a working lunch executive session. We'll meet

back with you at 1:30.

CHAIRMAN DEERE: Fine.

(Whereupon, at 12:15 .m., the meeting was recessed to closed session, to reconvene in open session at 1:30 p.m. this same day, Wednesday, March 8, 1989.)

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

(1:40 p.m.)

MR. COONS: The following panels were established. One, Containers and Transportation, and the members are Drs. Verink, Price, Carter, and North. Dr. Price is the Chairman of that particular group.

The second panel that was established is Risk and Performance Analysis. Members of that panel are Drs. Cantlon, North, Price, Verink, Deere, and Langmuir, with Dr. North being the Chairman.

The next, the third, is Structural Geology and Geoengineering. The Chairman is Dr. Allen, with Dr. Deere being on that particular panel.

Number four, Hydrogeology and Geochemistry, Dr. Langmuir is the Chairman, with Dr. Allen also on the panel.

And the fifth and last panel is Environmental and Public Health, Dr. Carter being the Chairman, with Drs. Cantlon and North members.

MR. ISAACS: I didn't quite get all that, so later on --

MR. COONS: Yes. I'm sure we can. I'll write it down. I've got some other notes there I would not be glad to share with you.

CHAIRMAN DEERE: And we do think there will have

to be some panel activity in the next several weeks. Since we can't get the full Board together, we do have groups that will want to meet with some of the other groups that you're dealing with, particularly the shaft -- this time the shaft and the tunnel.

Dr. Allen and I and perhaps a consultant will make contact to see if we can't have a one or two-day discussion meeting --

MR. ISAACS: Absolutely.

CHAIRMAN DEERE: -- with your --

MR. ISAACS: I would say the same thing to you that we have the same problems of scheduling meetings that you all do. Many of our meetings are --

CHAIRMAN DEERE: Yes.

MR. ISAACS: Particularly, this is the congressional season now. For example, we have certain things that we don't have much flexibility over as well. So it'll be real helpful if we can find a mechanism to work together to establish those dates --

CHAIRMAN DEERE: Yes.

MR. ISAACS: -- as well ahead of time as possible.

CHAIRMAN DEERE: Well, we'll give you the next dates, then, September 12 and 13 in Washington, December 12 and 13 in Washington. That's all we have at the moment.

MR. ISAACS: Okay. That's fine. If you feel -- those are far enough ahead of time, that I --

CHAIRMAN DEERE: Right. Right.

MR. ISAACS: -- see we ought to be able to accommodate them, barring seismic events. But it will be helpful if I can -- we have a master calendar. In fact, I can arrange to have you all put on the distribution for our master calendar, which shows you our major events and which one of us are taken up with those events. That might be useful --

CHAIRMAN DEERE: Yes.

MR. ISAACS: -- for planning purposes, even for your subpanel, since some of us will be involved with those as well as others.

CHAIRMAN DEERE: Right.

MR. ISAACS: Sure.

CHAIRMAN DEERE: Okay. Thank you.

MR. ISAACS: Okay. Should we proceed on with this afternoon's presentation?

CHAIRMAN DEERE: Yes.

MRS/SYSTEMS STUDIES

MR. ISAACS: Let me just mention that we'll plan on sticking to the schedule that's on your briefing schedule here if that's all right with you all. I thought I might start with just a one minute going back to

something that Clarence Allen brought up yesterday, just to make it clear, on the elevations. We were talking about where is the pad and where is the mountain, and all of those things. I thought it might be useful just to -- I think one minute worth.

The top elevation at Yucca Mountain is about 4,900 feet. And the pad for the collars for the two exploratory shafts is about 4,130. So it's down the side of the mountain.

The repository surface facilities which, as you recall, are located some mile or so to the east of the mountain are at about 3,700 feet elevation. The bottoms of the two shafts are at about 3,075 feet, or about 600 feet below the surface elevation, so the ramp over the course of the mile or mile and a half would go down something like 600 feet. That's just a snapshot of the elevations I mentioned to you.

Okay. If I could have the first slide, please? What I'm going to do is start off by giving a little bit of an overview on the MRS, which I introduced the subject of yesterday, and after that ask Bill Danker to pick up and go through with you some of the systems studies that we are doing to try and evaluate that system.

If I could have the first slide, please, Jim? Well, what is monitored retrievable storage? We talked

a bit about it yesterday. And what we're talking about is a facility essentially at the surface that would accept spent nuclear fuel for dry storage.

Now, there is no requirement that it would be dry storage. Other countries, Sweden, for example, has something equivalent in wet storage. But it seems to make the most sense to us for our purposes that it would be dry storage, probably in some kind of concrete vehicles, ultimately, concrete canisters.

And these would be stored in an easily retrievable fashion because, unlike the facilities that I talked about during the history yesterday of the RSFF and the AFR, which were looked at as facilities that might store fuel for decades or even up to 100 years, this facility would be seen as an integral part of the operations on the way to timely disposal.

And so the facilities would be done in a way where the fuel would be easily retrievable and the duration of storage is assumed to be something on the order of several years at most rather than decades.

If I could have the next slide, please? The way the system would work is that civilian spent nuclear fuel from reactor sites around the country would be transported first to this monitored retrievable storage facility.

It's then assumed that that fuel that would be

received at the MRS facility would be acted on in some ways that I will talk about a minute and at some point in time would then be shipped, presumably in some consolidated way, to the ultimate repository site assumed at this point in time, for obvious reasons, to be Yucca Mountain, should it prove to be acceptable.

It's also understood -- if you recall, we were talking about an MRS, that we saw some advantages of having it in the east, near the central of reactors and, all things being equal, there are still some driving forces that would say that was the smart thing to do.

And if, indeed, we have an MRS in the east, it would be likely that we would consider shipping some spent fuel, namely that in the west, directly to the repository, rather than shipping it all the way across the country to the MRS, only to be shipped all the way back, although there are reasons one would even consider doing that under certain circumstances.

And, lastly, since, as you're aware, the repository is scheduled to take not only spent nuclear fuel, but high level waste, a little bit of commercial, and the defense high level waste, that waste would be expected to be shipped from the few places where it now currently resides directly to a repository, principally by train. It would not be anticipated under normal circumstances to go

to an MRS.

If I could have the next slide? And I'm not going to spend much time on this one at all since we went into this in some detail yesterday. I think the point to make here is that on two other occasions, the Department did propose temporary storage facilities with an allayed concept of let's have a very deliberate, measured, let me use the words "go slow," developmental process for the repository.

And in both cases, those were ultimately abandoned, principally, I believe, because the political process -- and I mean that in a positive sense -- said that we should, indeed, look for this generation to solve the problems this generation created.

And, therefore, it was not acceptable to simply put this material into storage. And there were some who felt that, indeed, that this was an easy way out for the utilities, to off-load a problem and not being responsible in addressing it in a comprehensive way, namely a final solution, so that we can have confidence in the process.

Okay. Next, please, Jim. We also talked a little bit about this, but I want to go into it in just a little bit more detail. And I recommend your reading of Section 141 of the Nuclear Waste Policy Act to see the actual wording here. It's not very long and it's fairly

proscriptive in nature as to what it told the Department to do in 1982.

And, as you recall, I mentioned that it was a compromise, one of several compromises in the '82 Act, that there was a belief on the part of the Senate -- I'm being -- when you use generalizations like this, you can't -- I'm not talking unanimous view of the Senate, but the Senate had pushed very hard for a monitored retrievable storage and a go-slow on the repository.

The House had pushed, on the other hand, more for get a repository in place and don't have this temporary facility, because it will undermine our drive to solve the problem.

And, therefore, the compromise came out that the repository was authorized. It is, indeed, the focal point of the program, as you can tell from the presentations you're getting.

Nonetheless, they asked us to take a look at bringing to them for their consideration a proposal for an MRS. And what they said was, "Bring us a study on the need for and the feasibility of monitored retrievable storage." And they asked us to submit to them with that proposal a process by which one would go about constructing one or more such facilities.

And, as part of that, we were to include at least

three alternative sites and at least five alternative combinations of sites and designs. All of this was explicitly put in the law.

Now, let me remind you, as I did yesterday, that I believe that it would be fair to say that most people believed when they passed this, at the time, that the MRS they had in mind was a backup facility in case the repository program didn't work or was substantially delayed. I don't mean a year or two, but I mean substantially delayed that you would then bring forward this program and say, "Well, we've got to do something to back-stop this problem. That would be our backup."

The Department -- they also recognized in the law that this would be a licensed facility. So, just like the repository, this facility would be licensed by the NRC. And the MRS would be subject to very much the same provisions for state and Indian tribe involvement as the repository program was.

And we've tried to give you some flavor in short form of some of the requirements, and there are more, as I think of it, things that we have in the law and that we have done that we haven't even broached, things like the requirement for us to try and reach a consultation and cooperation agreement with the states and the Indian tribes, which was a long process that the Department went

through with those parties as well.

So if I could have the next slide, please, Jim? The Department performed the required analyses and in 1985 published this preliminary needs and feasibility analyses and decided, based on this analysis, to put forward the concept of the integrated MRS at that point in time.

The Department felt, and I will go into this in some more detail, that there were advantages to be gained from having this interim staging, processing transportation hub kind of facility that would benefit the overall objectives of the program.

And, as part of the response to the law, we also identified a process by which we could identify sites, as was required by the law, and how we would go about screening those sites to come up with the candidate number of sites.

We also developed a conceptual design for what an MRS would look like. And, indeed, we ultimately proposed three alternative sites. And as I mentioned yesterday and as most of you are probably aware, they were all in Tennessee, and we designated one site as preferred. It was, indeed, the Clinch River Breeder Reactor site at Oak Ridge, Tennessee.

Along with those three sites, we proposed six site and design combinations of how this facility would

work, in response to the law.

DR. CARTER: Tom, has there ever been any attempt to put a limit on how long you can leave fuel elements or high level waste at the MRS? I guess that's the real point that states are concerned about, that it turn into something rather than temporary.

MR. ISAACS: As a matter of fact, the -- well, I think it's the slide after this one. The Department voluntarily put limits that were intended to address that. So if I don't address your question by the next slide, hit me with it again, if you would.

DR. CARTER: All right.

MR. ISAACS: As we've discussed briefly, when we put forward that proposal -- if I could have the next slide, please, Jim? -- and I told you there was a lawsuit by the state, and so the proposal was held up for a year while it wound its way through the courts before we were ultimately able to give it to Congress for their consideration, the facility was considered to be a facility that would have operational actions upon the fuel.

It would not simply be a store only facility like the RSFF or the AFR, where you would put it out there and leave it until some day when you thought you might be able to do something with it, but it would be a facility that would conduct a number of operations on the fuel in

anticipation of it ultimately going into the repository.

And those operations might include consolidation, which was considered to be at the time something attractive. And we've talked about the pros and cons and the uncertainties associated with whether that makes sense, but if it were to be done, it would be done at a repository and that would -- I mean, at the MRS. And that would be our reference in the proposal that we put forward.

And we might put it into disposal-ready packaging, for example, so that it would make the operations at the repository at the other end of the country as simple as possible, in addition to which one of the reasons for locating the facility where we did was if you took the central of nuclear waste coming out of these reactors, if you actually did the mathematical calculations, you came out with an area that was very much in the area where Tennessee was.

I don't think that was an overwhelming determinant, but the fact that you can site an MRS much more easily than a repository because you don't have the same demands on the geologic environment to isolate waste for thousands of years, this is a facility to last a few decades and is not pushing the state-of-the-art -- I think we would all agree it's a kind of facility that's very much like the kinds of things we've already done and licensed in

this country for several decades; it's simply storing spent nuclear fuel elements -- that that gave you a lot more flexibility in siting it.

And, therefore, you had to find some criteria to make sense. And why not take advantage of optimizing transportation by putting this facility close to the fuel so you would have short transportation legs to the facility, where you would operate on it, you would consolidate it, you would package it.

And then you could have dedicated trains in a single line, much like we talked about this morning, the transportation issue. You could then have dedicated trains and, instead of having hundreds of thousands of shipments over hundreds and thousands of byways and communities, you could have once every couple of weeks a dedicated train going across the country from the MRS to the repository.

The other thing, and I want to talk about this a little bit more, that there was an advantage, of course, is the inherent flexibility of having a buffer in the system. Without an MRS in the system, what you have is 100-plus nuclear power plants operating, generating spent fuel, putting it in their fuel pools, building up, running out of room, adding space, and a hole in the ground somewhere, and not much in between because we are precluded by law from placing an MRS in the same state as the repository.

So this would give you a buffer capacity that in a first-of-a-kind operation like the repository, would certainly make it nice for operational efficiency to be able to regulate the flow from this MRS facility to the repository at a rate that is acceptable for accepting it, inspecting it, doing what's necessary in placing it in the ground in sort of a very routine manner. So we saw those kinds of advantages.

And the idea, as this slides says, a temporary storage was really more of a secondary objective. Okay?

If I could have the next slide? And this goes to the point that you were asking about, Mel. People once again raised the concern, legitimately so, that as soon as you agree to have an MRS, the push to have a repository will go away and you will wind up with a de facto repository at the surface for a long, long time and you will never be able to site a repository.

So the Department -- and keep in mind at that point in time we still had a lot of candidates for a repository and the political temperature was high in lots of places.

And so as a result of that, the Department came up with some voluntary restrictions that it would put on the MRS in order to try and convince people that we were serious about going forward on a very aggressive basis with

the repository program and, indeed, that the date that was in the law of 1998 we still met. And we tried.

As people used to describe, the fingernails were coming off the edge of the cliff, but we were trying to meet 1998 and because we recognized that it was important for people to know that the Department and the government was serious about solving the permanent disposal problem in a priority fashion.

And the two restrictions that we put in there were: one, that the MRS should be limited to 15,000 metric tons and, as we talked yesterday, that's about one-sixth or one-seventh of the amount of spent fuel we would expect today, so it clearly would not be designed to hold all of the spent fuel, so it would have to be a staging facility; and, second, that we would accept no fuel at the MRS until we received a construction authorization on the repository, linking the two in a way that says we're not going to take any fuel at this facility until there's a fairly high certainty that we're going to have a repository.

By making that linkage, incidentally, one very important thing happened. It was pretty clear to us by that point in time that we weren't going to be able to open a repository in 1998, as the law had asked and as people had very much wanted us to keep the pressure on, that we would have to delay it.

But by making that linkage, it would still be possible to meet all the provisions and have the MRS open for business in 1998 and, therefore, we could at least start to accept spent fuel from the nuclear utilities around the country on the date that was in the law. And we thought that was worth doing.

Yes?

DR. PRICE: Is there a reason why you elected to go to the amount rather than the amount of time that is spent in the MRS?

MR. ISAACS: I think it was -- there is some operational flexibility about which fuel you might take out of the MRS and ship west. That was a nice feature to have. You might want to age fuel somehow and ship out not necessarily in the same order you got it in.

So by putting the amount in there, you accomplish the fact that it was going to be a limited size facility without limiting the fact that first in had to be first out three years later kind of thing. I think that might be one of the reasons.

Were there any others, Keith, that come to your mind?

MR. KLEIN: That was the primary one. We couldn't -- some fuel we thought might be there 10 years. Other fuel would be there 10 days. And so it was difficult

to try to say any -- given a piece of fuel would only stay there. In a certain amount of time, that would detract from some of the flexibility you want to use it for.

And we just maintained the position that the facility would always stay open as long as the repository to which it was feeding fuel, the surface facilities, was operational.

So it was -- but we never, I guess, really had a recommendation or considered putting -- trying to put some set time limit on --

MR. ISAACS: It was a handy way of getting across our intent and allowing us some flexibility, I would say.

If I could have the next slide, please, Jim? Of course, adding a facility doesn't come for nothing, and the estimates at the time were that the cost impact on the nuclear waste fund; that is, on our program, was going to be estimated at about $1.5 billion for this facility.

Now, let me also add that this did not take into account a couple of other factors that were important, one, did not account for a potential cost savings by minimizing additional reactor storage of 100 utilities.

And one might say that the cost to the utilities or to the rate payers is really not how much are they paying to the waste fund, but how much are they paying in total.

And that's a combination of the amount of the money they give to us for our program plus the amount that they have to spend themselves. And estimates were that perhaps 500 million to as much as a billion dollars could be saved in reactor storage costs if we had this facility operating early so that they didn't have to plan for additional storage at their own sites.

It also didn't include any estimates of how much we might have to pay a host for benefit agreements because that was something that obviously would be negotiated between the parties. And so that would add somewhat to the cost of the program, and perhaps that would be some hundreds of millions of dollars as well. So those factors weren't in there.

And, as I mentioned, at the time, again, we're talking about the proposal that was put forward prior to the Amendments Act, we thought we could start this facility by 1998.

If I could have the next slide, please? Let me just quickly show you an MRS facility layout. It's not a very complicated facility, in many ways, as facilities go. The principal feature is the receiving and handling building, where fuel would be brought in by rock and trail -- now I sound like Jerry -- truck and rail. And it would be operated on.

We would consolidate the fuel there and conduct the kinds of operations on it that are necessary and put it into these concrete canisters. And they would be put on a parking lot out there to the upper left-hand side to be stored for whatever time was necessary, and the rest of the facilities were basically support facilities.

If I could have the next one, please? And here you can see -- and if you look at your own viewgraph copy, you might see it a little bit better. This was the conceptual way the facility would work, and it really goes -- the process goes kind of in a "U" shape from the lower left around and up.

And we would take -- you can see the little truck and the rail cask there in front of the viewgraph, and the fuel would be offloaded from there into a cask-handling area, where the cask transportation cask would be open and the fuel would be taken out, where it would be operated on.

Since consolidation was considered to be part of this, there was an operation area for consolidating the fuel, at which point it would be put into the canister, welded shut, and ultimately taken over to the discharge area, either to be discharged to the parking lot that I showed you earlier, the concrete pad where these things would be, or perhaps directly out to the repository site. Okay. Thank you.

And this just gives you a view of what the field storage cask was conceptualized to look like. It's a large concrete cask. It's heavily reinforced with thick walls that would protect people from gamma radiation.

It's a special kind of concrete to be able to withstand the kinds of temperatures that one would see, both from the heat being produced in the package and also from this exposure to the elements on the outside. It's about -- the dimensions are written on there, and you can see it's a rather substantial size cask.

Now, if I could have the next slide, please? And in the -- and I want to give one little commercial message here, that I think it's important myself that the TRB recognize that while the MRS Commission is in operation and is very important to us and we're working very closely with, they will go out of existence at the end of this year.

And, as I read it, the scope of this Board includes looking at transportation and storage modes as well and, therefore, this facility will be something that I would hope you all would look at as well in your deliberations, not just the repository and the transportation system if, indeed, we go forward with it.

And I think it's important for you all to recognize the overall objectives of the program and the

relative advantages and disadvantages, not so that you can weigh in, necessarily, on whether you think it's a good idea or not, but so that, in helping us to conduct this program in a successful way, we work together toward a set of common objectives.

And having said that, the advantages that we saw in the proposal itself at the time are noted here in short form. One, it meant that we could begin to accept fuel by 1998 and begin to accept it, I might add, at a fairly healthy rate.

The repository would have a relatively small start-up rate of spent fuel. We would be putting in, when the repository opened, something like 400 metric tons a year; whereas, an MRS, being a much more the kind of a facility that we have had before and don't need quite perhaps the pilot scale, could start up at a rate of perhaps 1,200 metric tons a year and ramp up to 3,000 very quickly. And we thought that was very important in terms of starting to offload the reactors' spent fuel inventories.

We also thought it would be valuable by being licensed and constructed somewhat ahead of the repository. It would provide technical and institutional experience and licensing experience to us, which would stand us in good stead when we went to license the repository. We would

certainly have some experiences of having gone through the system.

And, importantly, it would -- and I think this is still important. It would show early a confidence that the federal government is going to be able to solve this problem, that we're taking hold of the problem, and that we have a process by which we're going to be successful.

It provides that system reliability and flexibility factor that I talked about as part of our objectives yesterday in the main part of our objectives and the whole idea of having a buffer in the system and what that buys for you in an uncertain future world.

And it would allow for the use of dedicated trains for the cross-country shipment. All of those things were part of why we thought it made sense prior to the Amendments Act.

Next slide, please. Well, the Amendments Act we talked a little bit about yesterday, so I won't spend a lot of time on, but it did, indeed, change the provisions rather erratically on the repository program. Number one, it revoked our siting decision to site it in Oak Ridge, Tennessee and told us to go back and reinstitute a new siting activity.

At the same time, it did authorize the MRS. That was something that had been left open in the original 1982

Act. It was more, "Send us a proposal and we'll act on it." And they acted to authorize the facility.

But, at the same time, they authorized the MRS Commission to report back to them on the need for such a facility. And, indeed, they told us not to start siting such a facility until that Commission has issued its report and not to pick a site until we were able to select a site that could be recommended to the President for the repository.

And, as I told you, if you look at the schedule for the Yucca Mountain site, that would be 1995, which means that by this process we would not be able to pick a site for an MRS until 1995, if we stay on schedule with the repository.

CHAIRMAN DEERE: Tom, will the Commission, MRS Commission, be on schedule more or less?

MR. ISAACS: The MRS Commission doesn't have much choice. They will have to be on schedule.

CHAIRMAN DEERE: I see.

MR. ISAACS: But being a legislatively mandated commission, they don't have the flexibility to go on beyond what the law provides. So I'm sure they're -- I don't see anybody here from the Commission right now. I'm sure they will tell you they will meet November 1998.

CHAIRMAN DEERE: I see.

MR. ISAACS: And, in fact, the law, when it was originally passed, in the Amendments Act said June, but since they were late in being named, as you were, the law was actually amended to give them until November of this year. But I feel very certain they will meet in November.

Once more, the linkages -- this goes back to Mel's point about this fact of trying to keep it from being a de facto repository. If I could have the next slide, please?

There were a number of other linkages that placed very close ties between progress in the repository and progress in the MRS. And we were no longer able to leave development in the repository by a few years with the MRS. They're very closely in locked step right now.

DR. ALLEN: Incidentally, insofar as we can predict the MRS Commission's findings, will they, indeed, recommend an MRS facility?

MR. ISAACS: They have been very careful, I would say, not to give much in the way of hints. They've been very open and taken lots of testimony, and we've testified before them several times.

We will be testifying before them again next week and probably after that in giving them our recommendations. But they have not, as far as I know, indicated at all what their views will be on that.

What they have indicated -- and I think we've already talked about these things so, in the interest of time, let me simply go past it unless there are some questions.

What they have indicated is that they're going to take a look at the linkages that were put in between the repository and the MRS, that they themselves felt that was worth another look, so that in the event that they did come to the determination that such a facility was valuable to the system, it would not surprise me if they didn't address those linkages and make some recommendations there as well. But we don't know.

If I could have the next slide, please, Jim? The thing I talked about yesterday and, once again, in the interest of time, I'll keep it short is that the law provided this dual track now for siting.

In the first track is what I will call a more traditional survey and evaluation process, and that means that we would go through some kind of a site screening process selecting a site.

Perhaps the state or the local community would not want to win this contest. And we would go forward in some kind of a way in trying to establish a relationship with them, and the linkages that were in the law with regard to the connection between the progress in the two

facilities would remain in place. This would require no further congressional action.

The alternative is if we get an office of the negotiator and the negotiator is able to negotiator with a volunteer to host this facility in return for certain benefits and certain rights, shall we say, one might find that we could select a site a whole lot earlier than 1995 by that process.

And perhaps some of those linkages they would waive their right to, and we might be able to take advantage of the MRS to a greater extent than these current linkages allow.

Of course, as I mentioned to you yesterday, a negotiator by himself can do nothing other than recommend to Congress. It would be up to Congress to then enact some legislation in order to approve any kind of a benefit agreement. Presumably, if they didn't like what they saw, they still wouldn't have to accept it.

Next slide, please, Jim. We've talked about the Commission. They've been holding many hearings. And, as I mentioned to you, they are looking at the restrictions. The next to last bullet talks to that point there.

And the only point I would make is the Department is doing the systems studies that Bill is about to tell you about. And that and we're doing some, shall I say, public

analyses to determine what the Department's views are post-Amendments Act to see what we think makes the most sense.

Could I have the next slide, please? And we've been supporting the MRS Commission with those analyses.

I think it's important to recognize here that our preliminary schedule shows now that we would be able to start an MRS in 2003, just like the repository, if we were to use the survey and evaluation process, namely to go through site screening, and that the facility right now looks very much like the one that we described in the '87 proposal.

It may be possible, even without a volunteer, to accelerate the schedule for an MRS to open by phasing it, namely -- I visited Germany a few months ago, as a matter of fact, and the Germans have a very nice facility at Gorelaven, which is not much more than a concrete building and with a pad with about 420 dots on the floor.

And they bring in dual-purpose casks from around Germany, and they put them on the floor there. And they hook up some temperature probes and pressure gauges, and they have the equivalent of their MRS.

And it's a fairly straightforward, relatively elegant simple facility, one that might be built very quickly and perhaps licensed quickly. And then we could go

into that second phase where, once we had established the capability to accept fuel, if we needed to then process the fuel, we could do so. So we're investigating the advantages and disadvantages of a phased MRS facility. And that's something that we think is worth considering.

And I've already talked about the next slide so, in the interest of time, let me go to the last slide and just say that, as a summing up, if you look at the objectives I outlined to you yesterday -- and those objectives will be found in our new mission plan when it's published, namely that: we want to demonstrate early the ability to dispose of fuel; that we want to early begin to accept fuel from the utilities and accept it at a healthy rate; that we want to enhance the confidence in our schedules so that when people and the Congress and the utilities, for their planning, can have some confidence that when the government says it's going to do it, we're going to be able to do it; and, lastly, that we build in flexibility because of the unique nature of this program and the long-term nature of this program.

When you look at those objectives, we believe the MRS facility has certain potential advantages to it in the system, and we're investigating, and Bill will talk about, some of the extent of those benefits and some of the licensing extents of the costs that are along with it so

that we can make a reasonable set of decisions as to whether the costs outweigh the benefits or vice versa.

And with that, I would turn it over, other than some questions, to Bill.

DR. CARTER: Let me ask you --

MR. ISAACS: Sure.

DR. CARTER: -- one historical question. As I recall, originally in the legislation, the MRS was a moot point or was an optional kind of thing. As I remember it, DOE didn't elect to pick it up for some number of years, and then they took a look at it. Is my recollection correct on it?

MR. KLEIN: Yes. We took initially a conservative approach, considering it to be a backup that we would trigger in the event of a repository sort of experiencing some difficulties.

And, remember, this is at a time when there are a number of different repository sites. And we had not yet really had a director of the office appointed by the President and approved by the Senate.

And it really wasn't until Ben Rushi, who was our first director who met that criteria, that we began considering more aggressive options for the MRS that were more oriented towards policy considerations, and so forth.

And so we moved from that backup approach to

proposing this integrated approach that he had spoken of in his confirmation hearings, and so forth, in coming into the program.

Okay. Bill?

MR. DANKER: Good afternoon. I'm Bill Danker, as Ralph indicated this morning, Ralph Stein, Chief of the Integration Branch, and plan to first talk about the MRS systems studies. And then I'm also on the agenda to talk about some of the things we do in systems integration.

Starting with the MRS systems studies that are underway, these were initiated as a result of the enactment of the Amendments Act with the provisions described to you earlier by Tom.

These studies will report on the benefits, costs, and other factors that result from various federal waste management systems operating, both under the provisions or constraints of the Amendments Act and also in an unconstrained manner.

Systems studies are examining systems with no MRS and with MRS's that perform several different functions. Results will be used as input to an updated DOE position on the role of the MRS and the federal waste management system also, as alluded to by Tom.

I would like to mention that the studies are in the final stages of preparation and, therefore, I'm advised

that I'm not in the position to share the final results with you at this time.

However, I would like to describe these studies and provide you with a status of where, indeed, we are.

MR. ISAACS: To help out Bill a little bit here on that, one, these studies were worked out in conjunction with the MRS Commission. It would be appropriate, I think, to share those results with the MRS Commission first, frankly.

And, secondly, those studies have not yet gone through management review and, therefore, I think it would be premature to go too far into the results at this point, anyway.

MR. DANKER: Thank you, Tom. We do have a briefing coming up shortly with the MRS Review Commission. We'll be providing additional information regarding the preliminary results of these studies at that time.

Because these studies were intended as preliminary, scoping studies, it's always been our intent to do some additional follow-on analyses which may be necessary to develop a final DOE position.

As a matter of fact, we've initiated some additional analyses on a few scenarios. For example, we've begun to examine impacts to the reactors and to the transportation system for a system in which spent fuel is

stored at the reactors until they're decommissioned.

As I stated previously, these studies will be providing input to a DOE position. Other factors, as Tom indicated, will also be relevant as a very important part of the final decision.

When initiated in the Summer of '88, last summer, these studies were intended to be a series of short-term technical studies that would be used as a basis for the identification of initial analyses.

When the reports are made available, one will be able to see that they are -- they have, indeed, become fairly extensive, but it's still clear that additional analyses may be important to refine these analyses.

For example, because the reports are based on existing MRS repository designs, in all cases the most efficient facility may not have been examined from a costing standpoint.

It's clear that further examination of designs may reduce the cost of facility designs that weren't explicitly in the original MRS repository designs; in other words, extrapolations.

For example, the store only MRS does not have detailed designs. Consequently, conservative estimates were made that it would probably increase the cost estimates compared to what the cost might be if a more

thorough analyses were performed.

The basic approach taken in these studies was as shown, to define relevant parameters, such as assumptions on facility start dates, waste acceptance schedules, to select representative scenarios of how the waste management system might be operated, defining, for example, which packaging is done and whether or not fuel at western reactors is shipped directly to the repository.

And various defined alternatives were then to be compared against the system without the MRS to identify the changes in cost schedule and performance that might be obtained from the alternatives.

There were 10 tasks defined in the study, as noted on the viewgraph. These were decentralized studies conducted. By that, I mean under the guidance of several different offices and by several different contractors.

Task A identified and detailed aspects of the configurations and scenarios to be examined. Tasks B through I took these configurations and scenarios and examined them from several different aspects, your liability, licensability, licensing costs.

And Task J, the summary task, is compiling, integrating, presenting additional analyses in a summary fashion.

MR. ISAACS: Bill, excuse me. Do we have Task A,

the scenarios, in the package?

MR. DANKER: Not in the package. Task A was completed last summer. Tasks B through I are in various stages of completion at this stage.

MR. ISAACS: Right.

MR. DANKER: And Task J is in preparation. But I might note that A, it was always the intent, and I'll mention later as well, that as we were going through, there were slight modifications made, and also in J. J was not just a summary of the individual tasks but, indeed, included some additional analyses and re-looking at some of the assumptions.

MR. ISAACS: You might just tell them briefly what the range of scenarios was, if you looked at systems with and without an MRS and with and without consolidation. That's what I'm getting at.

MR. DANKER: Yes. As a matter of fact, we'll be coming to that.

MR. ISAACS: Okay.

MR. DANKER: As Tom indicated, Task A provided the basis for the other tasks. And the status is it was completed and its output was used by the other tasks. And, as I indicated, there's been a continual fine-tuning of these assumptions by the other tasks.

Specifically, getting to Tom's point, this is a

list of the parameters that were buried in this study. And, as far as packaging configurations, this refers to the assumptions made on what type of packaging, if any, was done at the MRS and at the repository.

For each of the facilities, you could have either no packaging or canistering, which puts the fuel into canisters that facilitate handling, but are not used for long-term containment, or containerization, putting the fuel into disposal-ready containers. I might mention both canistering and containerization can be performed on both intact or consolidated fuel.

MRS location looked at eastern or western MRS.

Western fuel strategy in the case of an eastern MRS, we considered cases where spent fuel from western reactors might go directly to the repository, as Tom alluded to earlier, or, indeed, cases where it might go through an MRS.

High level waste packaging location, we looked at packaging defense and commercial; that is, West Valley, high level waste at either the MRS or the repository.

MRS phasing, we looked at ways by which the development of the MRS might be enhanced by using a phased approach to operations. While the proposed MRS, again shown by Tom earlier, was essentially a facility that would be fully constructed prior to start of operations, it could

be worthwhile to consider developing development of initial acceptance capabilities in a shorter time frame.

Start date assumptions, we made a variety of assumptions on the date by which an MRS or repository might be able to begin operations.

Waste acceptance schedules, again, looked at different schedules there.

I'd like to take a look at Task B at this point. The purpose of Task B, facility design, was to examine design modifications to the reference facility designs for the various facility configurations and scenarios identified in Task A.

And, as I indicated earlier, the design modifications were based primarily on the designs presented in the site characterization plan, conceptual design report for the repository, and also the conceptual design report for the MRS.

And the first step was to modify the designs consistent with the number of different scenarios and configurations identified in Task A. Basically, these modifications involved moving consolidation equipment and changing numbers of fault cells and receiving based to a particular configuration.

Task C, MRS storage concepts, effectively updated an earlier analysis of storage techniques that would be

useful at the MRS, considering the different roles envisioned for the MRS in this study and some of the alternatives considered as shown here.

Task D, high level waste, the objective was to review issues associated with handling the high level waste, defense and commercial high level waste, at the MRS.

I might note that previous studies in 1985 had concluded that high level waste should not be packaged at the MRS. We reexamined this issue and looked at engineering and licensing implications supported by current cost estimates.

Task E provided effectively a current status report on waste package designs and costs and also provided input, then, to the other tasks, primarily Task B, facility design.

The scope discussed and referenced an alternative design concepts and costed out containers for container material under consideration. It also described and provided cost estimates for the MRS-produced canisters, also briefly discussed potential benefits and impacts of a heat tailored approach to waste packages.

By selecting the proper mix of assemblies to load into packages or by selecting a proper assortment of packages during emplacement, it may be possible to achieve a sort of narrow range of thermal output in the packages,

if you will, a uniform heat load.

This may result in some advantage in the prediction of long-term performance, among other potential advantages. But I should emphasize it's not a system requirement, however it's put.

Chris earlier today alluded to their activities on Task F, the transportation analyses, and to perform generic transportation analysis to determine transportation impacts, shipment miles, gas miles, costs, shipment risks associated with the various scenarios, and looked at routing and cost analyses for spent fuel and high level waste shipments and risk analyses, looked at population exposure along the routes. That included both public and occupational.

The Commission to-date in some of the briefings we've had with them have expressed all tasks are equal, but some are more equal than others, I guess. And this is one of the ones that was a little more equal.

It addresses several aspects -- examines several aspects of storage within the federal waste management system. Most important was in evaluation of additional reactor storage requirements. This is evaluation of storage that reactors require in excess of their capacity to store in existing pools. The costs associated with these storage requirements were also estimated.

The report identifies MRS storage requirements under the various scenarios and discusses the aspects of integration with an MRS in the system.

Task H. The purpose of Task H was to examine the impact of including an MRS in the system, examine the licensing impacts of producing the disposal container at the MRS, which was one of the scenarios or configurations that was considered, and examined the licensing impact on the repository when an MRS is included in the system.

The purpose of the Task I report is, as shown, to examine the reliability of the system with and without an MRS to accept and dispose of waste. And, indeed, it also looked at sort of the broader context of reliability; that is, sort of more of the flexibility angle or contingency capabilities of various systems and from a variety of angles, including ability to meet fuel acceptance obligations.

This takes us to the final reporting activity. Task J is pulling together the information developed by the other tasks and summarizing it currently for DOE management. As we talked about earlier, preliminary results are due to be provided to the Commission very shortly.

We're still assessing. We, as I indicated, have identified further evaluations that are needed, and we're

still looking at those evaluations.

The study provides additional technical information on the MRS and its potential uses. I might note that there is a peer review group that's been looking at the results of the individual tasks and expected to provide some insight into the area of whether there are other analyses that are needed as we focus on promising options coming out of this study.

Effectively to recap, Task A completed last summer, Tasks B through I are undergoing this peer review. That group has been meeting since -- I suppose January was when they first convened. There's been a series of four meetings and a broad spectrum of expertise from areas like repository and transportation, MRS involved in that activity.

Their report is scheduled for the end of this month and, indeed, the Task J report is under preparation. And we anticipate currently that these task reports would be released by late April.

DR. PRICE: That's an in-house peer review?

MR. DANKER: Yes.

CHAIRMAN DEERE: Now, these will be available then to us, in April, April or May?

MR. ISAACS: When they are put out, they certainly would be available to you.

CHAIRMAN DEERE: All right.

MR. ISAACS: And, in addition, if the group or some subgroup is interested, once we've made the -- once we've gone through the management chain here and made the presentations to the MRS Commission, that same information could certainly be made available to you on an interim basis, what we've given them.

I think, if I could just add before you go into systems integration, that this is a very timely subject for us now. I wanted to make sure the point got across that we're right in the middle now of the systems studies of evaluating, given the new law, what are the impacts on our ability to meet our objectives here if we have an MRS, what can we do if we don't have an MRS, what do we do if we consolidate at the MRS, what do we do if we have an MRS but we don't consolidate, and so forth.

And Bill has gone through in a very structured way for you the way we've looked at the "N" variable parameters here and how we're trying to evaluate the impact on costs and on waste acceptance and on reliability and on our ability to license the repository and what the impacts are.

And all of these things we think are very important to our objectives, which, again, go beyond simply building a repository, but are a national set of objectives

for the program.

DR. CANTLON: And you're legislatively constrained not to look at reprocessing --

MR. ISAACS: We have adopted --

DR. CANTLON: -- at the MRS site?

MR. ISAACS: We have adopted the attitude that our waste system needs to be able to dispose of high level waste, whether or not reprocessing takes place, but that the waste program should not be the driver or the determiner of whether or not there's reprocessing in this country, that, indeed, that set of decisions should be made on an entirely other set of bases, like economic and proliferation considerations and so forth, the kinds of things that have traditionally been the kinds of factors that have been used.

So no, we have not tried to determine whether or not reprocessing should go on in this country or should be done, certainly, on an MRS.

DR. CANTLON: And, apparently, nothing in the design of the MRS adopts a degree of preserving that option or flexibility assay?

MR. ISAACS: The MRS is designed currently on the basis that it will see spent fuel. If there were reprocessing in a substantial way in this country, obviously, that waste would then have to be vitrified

somewhere.

DR. CANTLON: Exactly. Right. Right.

MR. ISAACS: And that is not something that is contemplated as part of the acceptance system from us.

DR. CANTLON: But in terms of looking at MRS and not adopting a design that precludes that option in the future, --

MR. ISAACS: Right.

DR. CANTLON: -- if we were to have a substantially expanded use of nuclear based on greenhouse effects, acid rain, et cetera, what about the MRS designs, as now contemplated, would, in fact, not having considered this, give you such constraints that you're going to have to now up the cost of an MRS substantially?

MR. ISAACS: I think this probably deserves more thought than I'm willing to give it, but I can give you an answer anyway.

I really believe that, even if there is reprocessing, you're going to find some substantial amount of direct disposal of spent fuel in this country. I don't think that, based on what little I know, it's likely that you would need all of the spent fuel out there for the reprocessing.

The MRS would obviously need to be closely looked at for there to be a change, but the time frame over which

reprocessing would impact the schedule would be many years. You would need a new generation of reactors and new fuel fabrication facilities, an entire adjustment.

And we would certainly not want to do anything that would preclude the country from going to reprocessing of things that we're doing, but nor are we driving in any sense the processing.

DR. CANTLON: No. I understand that. I understand that. But the question is: Is it in the back of the minds that the designs adopted don't add additional cost if reprocessing is a choice?

MR. ISAACS: I think it's way in the back, yes. Presumably, if you had reprocessing, that would be done some places. Those would be -- in the current structure, they would be private facilities.

Therefore, utilities would be shipping their fuel to a select number of facilities somewhere, and then the relationship between those reprocessing facilities and taking those away and vitrifying them somewhere and bringing them then to an MRS or to a repository just hasn't really been on the front burner of consideration.

DR. CANTLON: But, as you articulate it, you have, in fact, as an agency, essentially, opted out of reprocessing as a federal action, --

MR. ISAACS: Yes.

facilitate the design and implementation of safe, reliable, efficient, cost-effective waste management systems.

Systems engineering, being the process that integrates disciplines and activities to provide the means by which coordinated technical planning, execution, and management of the program can be achieved and maintained, systems engineering techniques will be used to define the technical mission, establish requirements for the major elements of the system, evaluate alternatives for the configuration and design of the system, select from baseline a preferred overall system, and exercise a formal configuration control process to ensure that any deviations from the approved baseline are adequately evaluated before being incorporated.

This group of 12 activities or responsibilities is the designated responsibility of the Integration Branch within the Office of Systems Integration and Regulations, but, as alluded to earlier, integration is a responsibility of all aspects of the organization.

They relate directly to the overall mission and objectives for the civilian and waste management program, as articulated in the mission plan; and they also represent key components of the program management system, as noted in the PMS, the program management system manual.

Overall, the objective of systems integration is

DR. CANTLON: -- if I understand your --

MR. ISAACS: Well, I think that the waste program has said, "We will be prepared to solve the problem, whether or not there's reprocessing." Okay. The waste program will be able to solve the waste problem.

I don't want to imply that the Department of Energy might not take some very strong proactive steps towards reinvigorating the nuclear option in this country that might include consideration of reprocessing.

That's something well outside the scope of what our office concerns itself with. Okay.

SYSTEMS INTEGRATION

MR. DANKER: I'd like to take a few minutes at the outset of this presentation to discuss the importance of efforts to integrate the waste management system.

Systems integration is essential to the waste disposal because we have to safely and permanently dispose of nuclear waste from over 100 generators located all over the country with over 250,000 spent fuel assemblies of differing sizes, containing many thousands of tons of spent fuel and high level radioactive waste. This has to be done in conformance with stringent statutory and regulatory requirements and in concert with numerous federal, state, and private sector institutions.

For these reasons, we use systems engineering to

facilitate the design and implementation of safe, reliable, efficient, cost-effective waste management systems.

Systems engineering, being the process that integrates disciplines and activities to provide the means by which coordinated technical planning, execution, and management of the program can be achieved and maintained, systems engineering techniques will be used to define the technical mission, establish requirements for the major elements of the system, evaluate alternatives for the configuration and design of the system, select from baseline a preferred overall system, and exercise a formal configuration control process to ensure that any deviations from the approved baseline are adequately evaluated before being incorporated.

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Overall, the objective of systems integration is

to ensure the components or elements; for example, repository, MRS, or the transportation system, are integrated into the waste management system in a way that's efficient, safe, and on schedule.

The first activity is really a key activity, which is supported by many of the others which follow. This activity is essentially a coordinating role, touching virtually all of the program organizations, primarily through the system requirements and description documents, the system engineering management plans, change control boards, and other vehicles.

The second item on requirements, we'll discuss in a little more detail later.

The third item relates to the MRS systems study, and we discussed that earlier.

The fourth activity conducts waste logistics analysis and determines federal system storage requirements for waste acceptance schedules. In order to be able to conduct system-wide studies and related analyses three length models are under development in this branch, which soon should be providing a strong support to this analytical and decision-making capability, and we'll discuss that again a little later.

The fifth item is also going to be covered later and focuses on the important interface between DOE and the

utilities.

The next activity, the sixth, establishes and maintains a process for ensuring that the goals, schedules, and key technical activities are coordinated, the hierarchy, primarily through the hierarchy of a system engineering management plan, or SEMPs, which direct the implementation of the system engineering process throughout OCRWM.

There's a program SEMP at the highest level, followed by system engineering management plans at levels; for example, at the level of the repository. These SEMPs include the guidance; for example, generation of the technical baseline documents.

The seventh activity ensures that technical and operational interfaces are matched. Essentially here are tasks and activities dedicated to defining, evaluating, and controlling related functional and physical interfaces among systems and subsystems.

For example, the summary logic network activity, which we'll talk about, is currently focused on identifying technical integration milestones which would ultimately be baseline to support systems integration. Related activities here include systems description, systems modeling effort.

Under consistent philosophies, this activity

ensures that these philosophies are used in guiding cross-cutting studies, interpreting requirements, utilizing technologies; for example, robotics. That was discussed earlier today.

SEMPs, reference information bases, systems studies, and quality assurance are all activities which would assist in providing consistency over time.

Resolving key system technical issues, this activity identifies, prioritizes, and coordinates timely resolution of key system technical issues.

The primary vehicle for this resolution is a system studies plan, which we'll talk about. A result of system studies' timely provision of this information will facilitate decisions at all levels.

Special studies really refer to specialized analyses, which focus on uncertainties and new information, requirements generated from legislative action or problems or opportunities which developed over time.

Systems engineering approach, systems engineering has been used from the earliest stages of this program as a fundamental component. Systems engineering process we've described at the outset. I won't repeat it here.

Regarding the last activity shown here, these procedures that govern the development, revision, and replacement of controlled documents has been in place for

several years, and they are specified in the program management system manual I referred to earlier. I might note that's currently under revision.

Currently, there are two Boards at headquarters responsible for controlling issuance and revision of technical baselines and documents and databases. Those two are the Program Change Control Board and the Program Elements Change Control Board.

Chairman for the Program Change Control Board is the Director of OCRWM; Program Elements Change Control Board is the Associate Director for the Office of Systems Integration and Regulations.

This next viewgraph shows some of the near term tasks that are underway, and we'll discuss them in subsequent viewgraphs. Again, I'll skip Item 2 on the MRS system studies because I think we've covered that earlier.

This viewgraph focuses on system requirements and description documents. The key function here is to identify and baseline the requirements of the total system, maintain a current description of the waste management system that meets those requirements, including a system components function, some critical interfaces.

In order to unify the hierarchy of requirements levels and provide clear traceability of 10 CFR 60 requirements and other regulatory compliance requirements,

the top level performance requirements and system descriptions are currently being updated and revised.

These will become part of the essential core of the technical baseline and, with configuration control, will systematically guide the design and construction performance assessment of the waste management system.

As background to this task, repository, MRS, and transportation functions and requirements have largely been developed by separate organizations, interface logic networks, decision points, and milestones help to facilitate the integration process.

Information will be required that all interfaces and integration milestones will provide input to establishing, for example, a systems studies plan and the implementation of systems studies.

Again, as background, the systems studies planning has been undertaken at the system element level in repository, MRS, and transportation for some time. Our current efforts are aimed at linking these studies to logic networks and technical baselines.

I might note that, in addition to the MRS studies that we talked about earlier, a variety of pre-ACD studies are underway at the repository project, and it is an effort to clarify requirements and methodologies and technical approaches.

The Systems Integration Branch started approximately a year and a half ago working with R and L and Oak Ridge National Laboratory and the Pacific Northwest Laboratory to initiate development of three specific computer models to be used in various assessments of alternative federal waste management system designs and operating scenarios.

These three models, waste stream analysis, system operations and logistics model, and cost analysis capability, are underway. An integration demonstration of these models working together is just now being completed and will be very useful in allowing integration to do the kind of work that it needs to do.

Regarding waste acceptance criteria, this activity, the kind of tasks that are identified here that are being done in our organization supports the broader technical liaison effort with the utilities related to waste packaging and handling issues and managing the interface capability assessment activities.

DOE's interaction with utilities and other nuclear waste generators is important and has been structured for some years by the standard disposal contract.

This provides for the acquisition of title to spent fuel and/or high level waste by DOE from the owners

and generators and its transportation to DOE facilities and subsequent permanent disposal.

The Integration Branch is continuing to provide technical support to other OCRWM units; for example, the program administration resource management organization in this endeavor, and is currently undertaking a number of technical waste acceptance criteria studies which will be utilized in recently established issue resolution process, which is expected to resolve a number of mutually defined issues. Some of those are shown here.

Facility interface capability assessment is a major multi-year systems integration project being carried out by the Nuclear Assurance Corporation through Oak Ridge National Laboratory.

To-date 53 of 76 sites have been visited and systematically evaluated; for example, for fuel storage and cask-handling capabilities.

By December 1989 the project will have been completed, and the resultant data will represent the most comprehensive and up-to-date status of the sites and facilities and their capabilities. This will, in turn, permit detailed analyses and scenario testing and decision-making regarding logistics and a number of other issues.

As noted earlier, we have two change control

Boards at headquarters. They were established following last year's reorganization and are referenced in the program management system manual currently under revision.

I should note that at such time that the M and O contractor is on board, I would expect that they would make a contribution in this area. Accordingly, I anticipate at least some changes in this area.

Regarding future actions, this lists some of the activities that we have underway. I apologize again for acronyms. It seems to be an endemic disease.

But WMSR here is a waste management systems requirements document, and it's really three documents in a set. There's a rationale document that goes with those requirements that defines the basis for establishing those requirements, and then also the system design description document, the SDD.

In addition, we need to complete the MRS system studies. We need to complete the systems -- the broader systems studies plan; the logic networks; a system engineering management plan, the latest revision of that document; and also proceed with the change control process that we've established.

I suppose, in acknowledgement of the next speaker, I should have added a bullet to discuss implementation of quality assurance procedures and training

relative to system integration, obviously a very important activity, and full implementation of QA is really an aid to the integration process and application of systems engineering. But, regarding QA, I suppose Mr. Barrett will fill you in on more details there.

If there aren't any questions, I'll turn it back to Tom?

MR. ISAACS: Would you like to take a break? Because we have one more speaker, but that's an important subject, and so if you'd like to take a break.

CHAIRMAN DEERE: Five-minute break, please.

MR. ISAACS: Sure.

(Whereupon, a brief recess was taken.)

MR. ISAACS: The next speaker is, if I may just spend a moment to introduce you, is our Director of Quality Assurance. This is a subject that cuts across the entire organization.

It's one that is very, very timely because we are in the midst of a very high priority effort to bring a degree of rigor and what I'll call systematic engineering practices into the process and documentation into the process.

DR. ALLEN: Don't say that when you're talking about science.

MR. ISAACS: Nonetheless, we are saying it.

DR. ALLEN: Just a lot of good quality work, not just a matter of good engineering.

MR. ISAACS: Both. And the process by which we go about getting the license, of course, also requires that we have a rigorous quality assurance program in place. And so for all of those reasons, it's one of the highest priority activities that cuts across the entire organization.

And Lake Barrett, who is the Director, will go through with you where we are at it and what our challenges are in the quality assurance program.

Lake?

QUALITY ASSURANCE

MR. BARRETT: Thank you, Tom. Thank you all for hanging in here for two days. Especially in a room like this, you get an A-plus for hanging in.

I've probably got -- if I were just to run through the slides, it's probably about 20 minutes. Okay? So there is time for an interchange. And I would just as soon do it that way or whatever suits you best. I don't mind you interrupting at any point along with it.

This is sort of general. We'll talk about what is quality assurance in the RW program, where we are in the development of the program, and what I see are some of the major objectives that we're trying to make and the issues

that we have to address and overcome to get along.

And I think, as Dr. Allen implied, many times it's a case of mixing the science, almost a research kind of science hooked in with classic engineering discipline. And sometimes the two don't go together that easily, but that's part of the challenge and the opportunity we have in front of us, to find a way to make that happen.

What I have here to start off with are a classical definitions of what quality assurance is. This one here is the classical engineering of a structured system and component that comes out of a national standard NQA1, which is basically an engineering standard.

The second definition is basically what we modified that, to adjust us to our heavily orientated earth science program, where we're talking about QA to mean in this instance, are planned and systematic actions necessary to provide adequate confidence -- as much as one might like to have a geometric proof on something, many times in the scientific world, it's not that clear because there is judgment involved -- in the validity and integrity of basically our products, which are reports that talk about the suitability of the Yucca Mountain site to be a repository.

Now, given that, those general definitions, that's very nice, but, you know, how does that really apply

to us and why do we really need to have a QA program? And this is the kind of thing I have to kind of start out very simple in many cases for many of our staff to talk about what is QA.

You know, it's not just a book on a shelf. It's not just somebody coming in and checking on me and getting after me. It's more than that. But, basically, we're saying QA provides us the program to complement science.

It complements good science and engineering. Okay? It's really a key function of sound project management -- okay? -- because it's planned actions. In a waste program, we're not going to be in the situation -- with the oversight that we have on us, we have to go through a licensing process, basically an adjudicatory-type process.

They would love to have a geometric proof, but we know we could never come up with something as classic and as solid as a geometric proof. But you just can't basically say, "Well, just trust me. I've done good work in the past. I'll do good work in the future."

Our program is a long duration, a complex program with many parts. I think you've heard a little bit about Yucca Mountain, about all of the various contractors, and how we've had the various expertise of the scientists and the geologic and the hydrologic, what I basically refer to

as the "ologies," hooked in with engineers, hooked in basically with administrators and licensing administrative-type people.

It takes a team like that to get this job done, but it is complex and you've got to manage it and put it together, basically confidence, if we're going to protect the environment, the public health and safety.

The key item: It's mandatory for license. We can do the greatest technical job in the world, but it doesn't have, basically, the discipline and the documentation that will sustain an adjudicatory licensing process, we're not going to be successful.

You know, there are lots of examples in nuclear power. You can go to some of the nuclear power plants that were abandoned. They may have been technically very good, but they didn't have, basically, the records to support them through the licensing process.

And when all is said and done, when we're all done with this and the NRC has given us, let's say, the construction authorization to go ahead and build a repository, I personally believe there will be some people in the nation who will say that was a wrong decision and will take the NRC to court.

NRC has been through this on Three Mile Island and other places like that, things that I've been involved

in once upon a time. And I can almost tell you that one of the items will be -- in the briefing that the people who don't think we should go forward will be that the QA program was not adequate, you don't have documentation, it was helter-skelter, you were not organized, and that's one reason why you shouldn't go forward.

So, clearly, I believe this is something that we've got to have, basically the discipline and the program together, and the records for something that's going to be taking 20-some odd years in place to sustain those questions that are going to come up.

Yes, sir?

CHAIRMAN DEERE: Do you have a QA on that first word, or are you pulling our leg?

MR. BARRETT: Compliments. Well, I had to put something on there. I'm sorry. It's complementary. Sorry.

DR. ALLEN: An "E" instead of an "I."

MR. BARRETT: Yes, yes. Thank you. Okay.

CHAIRMAN DEERE: Your word processor didn't have a QA.

MR. BARRETT: What I'm going to do now is if you want to talk about why you want to have one, everyone would agree, you know, you need to have one. Now, we're talking about, well, what is it a little more specifically and how

do you get from maybe doing a program that had good science, the basic good management, but how do you basically develop a quality assurance program that will carry us through licensing? Okay?

The first thing you have to start off with is a commitment that basically you're going to really have a QA program that's going to be successful in licensing. If you don't start out with a commitment at the top, you're just not going to have it because it is painful, you know, to have to write things down and go through the discipline and build up, basically, a written pedigree that the lawyers can question and cross-examine.

But that's basically what the Nuclear Waste Policy Act asked for when they said we were to go through the licensing process. Money is given to the state to question.

You exist for that sort of thing, a check and a balance in the questioning of what we're doing. Is this technically the right thing? It's too important just to let it kind of go.

Now, we have made a very clear commitment that we will have an acceptable QA program in place before we start a new site characterization activity for Yucca Mountain. This QA program will be sufficient to support those new activities or new site characterization activities.

This is a commitment that has been strongly made by the Director, both Sam has supported that and the previous director, Ed Cay, made that, and we've said this to NRC several times.

So without this commitment, nothing really starts. But once you start with that, you have to carry it out.

And basically what I tried to do is have a little bit of a sketch of what -- when you start with a commitment and want to do something, what does it take out to reach the bottom end point, a successful quality assurance program?

And I've tried to do that graphically, sort of moving on down what are the various steps for developing a program. First, you start out with I'm going to have a commitment to do it, and this commitment chronologically runs all the way on down, because you're constantly tested.

It's one thing to write a letter and make a statement and a speech, but then if you forget about it next week or when the questions come up about "I want to go forward, but I'm not quite ready," the commitment lasts and lasts and lasts and is tested practically every day.

Do you really mean it? And you're constantly being tested. Do you really mean it? So that lasts, and that's why I show that line coming all the way on down.

Another thing that lasts all the time is called "documentation." Documentation runs all the time. The commitment needs to be in writing. It is in writing. It's been said, in every speech, basically, that Sam gives, he's got a comment in there about QA. I'm here to talk to you today about QA.

But not only do you say it, but you also need to write it in letters and places, and we have lots of documents to go on down.

After you have a commitment, the next step in development is a plan. You have a plan. And I'm going to go through these various boxes in more detail. I'm gong to briefly go through it now. But we're going to have QA plans for the various participants, and I'll go into that.

And then you have training. It's one thing to write a plan down, but if the people working on the program, umpteen thousand of us, if you don't understand it, it's useless.

So a QA is not a plan that sits on the shelf. If I go into an office, and I see a QA book, it will crack when you open it up. They don't have a program. If I see a QA book that's all dog-eared and yellowed and beat to heck, I'm pleased, -- okay? -- when I walk into an office.

So training has to come on through all the time. And training is something that continues throughout the

program at all the steps.

Okay. After training and your plan, really it gets -- the big burden of quality assurance goes away from the QA people and it goes into the line people. Line people are people who are not in the QA department.

And the real QA work is not done by the QA department. It's done by the line people in their everyday work. It's the scientists in the lab. It's the engineer in the optic engineering firm. It's the person in the field running the drills, and it's the miners and blasters, and that. Those are the people who really do the quality assurance because they're the ones doing the work.

No-one does quality assurance for quality assurance. People do quality assurance to sustain and support their activities and their assignments, be it ground water travel time calculations, or whatever.

So the burden here of understanding what it is you're doing, your plans to how you're going to approach some of the very knotty issues we have to deal with, the line people have that main job here.

Since QA is really a disciplined approach, a documented approach to solving the problem, you basically need to have some written procedures. Now, "procedure" is a nasty word. I hate procedures, but you've kind of got to have them.

But it's more than procedures. Procedures can be instructions. They can be lots of different ways to basically install some discipline and documentation.

We happen to have things called "quality assurance procedures," and then there are -- that's basically run by the quality assurance department folk.

And then you have line implementing procedures or implementing line procedures, and, of course, they are again, QA. But that's basically done by the line folk.

Now, these boxes as they get bigger mean there's a lot more work to them. This job is much bigger than, let's say, writing the QA plans. Okay? So that's basically procedures. Again, you've got to train to understand your procedures.

Now, the biggest box of all is basically implementation of program. Once you have a plan, you have your procedures, you've got to live by it. So many times I've seen so many people say, "Well, let me just write the procedure this way. It's quick. I can get this done, but I'll find another way and I'm going to live by loopholes, and I've got other ways to sneak around everything." You're in trouble if you start having that kind of thing. But you've got to have this.

This commitment, again, comes down. I should have made this green, kind of come really into this thing.

You have -- this is where the commitment comes down, but, yes, you are going to follow your procedures.

Procedures are something that are dynamic. I always have to tell people that. When you write a procedure, you wrote it to the best of your knowledge at that time. You're going to change it as time because the conditions will change. The job will change.

So the procedures have to be dynamic, and you don't want to burden yourself down any more than you absolutely have to with the bureaucracies to change procedures. You want to make them as flexibility as you can and you want to give the latitude to be able to get the job done.

This is especially important, I found, when you're dealing basically with scientific research. Now, you just don't know what you're going to see until you get underground.

Most of you gentlemen, I've noticed, are in the geologic profession, and I'm here to tell you I'm an engineer. Okay? But there's a lot more uncertainty in what you do than what I'm used to do.

And you need probably more -- scientists probably need more flexibility than, say, engineers do in much of what they're doing to do, because you're really more at the state of the art and the frontier of the science than, say,

the classical engineering story.

But you still need to do it, though, in a controlled manner and keep records so you can look back and say, "Yeah, I did what I did for the following reasons," and that's written down.

Now, these activities are done by, basically, the line folk. Now, when it come down to quality verifications, this basically means you look back at what you did -- now, the line people do this as well as the QA people do this. You look back and say, "Yeah, I did what I said I was going to do."

You need to go back and check yourself. Now, if you don't, you'll be surprised you'll find where you could have done better. Some people call those "errors," some. I call them "mistakes." But we all could do better when you look back with 20/20 hindsight.

As you do look back and learn from your lesser judgments, let one say, to do better next time, it's important to go back and look and learn and do better in the future. And that's an important part of that.

The primary work here is done by the line, but also by the QA people. But we try to enforce -- the main thing here is the line does this as well as QA. And, again, you document this so you have a record and you're learning from what you've done.

You still have to add these things up. Planning, achievements, -- achievement is basically doing the work here -- verification down here at the end, documentation in the classical QA sense clearly are what a quality assurance program is all about.

Now, we're putting basically together this triangle across the board for the various parts of the RW program. So now I'm going to go in a little more detail on where we are in the stages of evolution across the various family members.

You've probably seen a lot of this, but for the RW program, as I kind of look at it, is you start up with the headquarters, the program office. We're responsible for that.

We have basically three main parts. The Yucca Mountain project is what you're focusing on, but we have the MRS you've heard about; we have the transportation system you've heard about.

But if you look at the Yucca Mountain project office, we basically have the eight various players that we have in here, which are basically the main contractors and federal agencies that are partners, like USGS, with the Yucca Mountain project in achieving the job: the architect engineers, your scientific expertise that's in the USGS, Livermore, Los Alamos, RECO Reynolds Electric, which is

basically the implementing contractor out at the site.

DR. LANGMUIR: What's MACTEC?

MR. BARRETT: MACTEC is a -- it's a management consultant firm to the Yucca Mountain project. It's MAC, which is Management Analysis Corporation. MACTEC is their technical QA subsidiary company that supports Carl Gertz' project manager's office.

And then we have -- that's where we have the NRC, State of Nevada, utilities, EPA. I could have, you know, drawn a circle here for you, too, as well as the MRS Commission, a lot of the people who are vitally involved in the program, but don't have direct line responsibility to get things done.

Okay. Now, I mentioned on that triangle that the next step was plans. So now I'll tell you a little bit about the basis for our QA plans and where we are on that.

You notice back on that triangle we had sort of three levels of folk. We had the headquarters program people, project offices, and then we had the implementing contractors and implementing organizations.

And we've basically aligned this the same way: the headquarters, the programs, the projects office, and the participating organizations, with the bulk of the work, obviously, being done down here.

And we have plans, -- QA plans we're talking

about now -- QA requirements, QA program description with the requirements that are good for the whole system, and they spin all the way on down.

And then Yucca Mountain project has its QA plan, which basically -- here's how we're implementing the requirements. Okay? And they have their supporting procedures, just like headquarters has its supporting procedures.

And each participating organization has its individual QA program plan, which basically is their way that they're going to implement these requirements. And they, again, will have their own set of procedures.

This gives flexibility for different organizations to approach it a little bit differently. I think the way that USGS is set up might be something different than what you would find in a classical construction like Reynolds Electric would be set up, which might be somewhat different, again, than, say, an architect engineer like Fenix and Scisson would be set up.

It gives a flexibility to implement the quality assurance requirements.

DR. LANGMUIR: Where does Bectel come into this?

MR. BARRETT: Bectel? Okay. Bectel is -- Bectel, the future M and O contractor?

DR. LANGMUIR: Yes.

MR. BARRETT: Okay. Well, Bectel has lots of different parts. They are a subcontractor to Sandia today. Okay? But in the future M and O, they will be a project office. And this was done before.

I can talk to you about that, but the way I would draw that is they would be in -- right in line. When that comes to pass, when the contract is signed to select them, what you're going to see is they will be set right in here next to Yucca Mountain, the Yucca Mountain project.

There will be an M and O project office, and you'll have an M and O box down here for the actual Bectel systems management.

DR. PRICE: Is the actual operation of the facility going to be contracted? Is that the idea?

MR. ISAACS: Now, I tried to describe that a little bit yesterday. Sam may be the best guy to describe this since he was intimately involved in the process as --

MR. ROUSSO: Chairman of the evaluation board --

MR. ISAACS: Right.

MR. ROUSSO: -- for the contract, which we're attempting to sign very shortly. As you all know, we've announced that Bectel has won the competition. With respect to operation of any of the facilities, operation of the MRS potentially or operation of the repository or construction of the repository or construction of the MRS,

that's not part of this contract.

So they are there to help us in a major way to see that the total system goes forward, with key responsibilities in the characterization, oversight of the characterization work, providing performance assessment evaluations, the setting of the standards in every climate. It's the flow-down from the policy that's set by the government.

In addition, they will do the design of the repository, the design of an MRS, the siting work for an MRS, play a major role in the transportation. They won't have the cask contracts. Those are already let.

But in describing how those pieces come together, it's the total waste management system across the board, not just the repository, not just the geology work or characterization work.

But they were specifically excluded from being the constructor or the operator of the facilities. They will provide Title III-E services during the construction to help via transition.

DR. PRICE: Is it anticipated, though, in the plan that it will be a contractor that operators the facility?

MR. ROUSSO: I believe so. I don't think we've gotten to that point, but I would expect that that's the

way we'd do that.

MR. ISAACS: That's traditionally the way the Department has done business.

MR. ROUSSO: Yes.

MR. ISAACS: Certainly I'm sure that's our current expectation.

MR. BARRETT: Otherwise, you have GS grade people up here turning valves and, you know, operating construction prices.

DR. LANGMUIR: They're going to have QA responsibilities, too, within this whole --

MR. BARRETT: Oh, yes. Every participant, you know, when that comes on, you know, the M and O, those folks will have their QA plan, and the new one will show them. And they're going to have their plan as well.

MR. ISAACS: The one thing, I don't want to leave a misleading impression, and that chart's probably not the best place to show it. This M and O, as I reported on yesterday, reports to headquarters, does not report through the Yucca Mountain project office.

The Yucca Mountain will be responsible for moving dirt on the site. They're going to scratch the earth. All their contractors are going to characterize the site physically, collect the data, analyze the data in a preliminary sense.

The M and O working for headquarters will evaluate that information, pull it together, integrate it, design the facilities, and support us in bringing forward, if the site is good enough or not, number one; and, number two, if it is, all that information that's necessary to go forward to licensing.

DR. LANGMUIR: I sense a concern among the labs or the groups below here that they have another box being put on top of it, which is going to mean more responsibilities and more people to have to answer to.

MR. ROUSSO: Well, in some sense, that's true. But we've worked out an arrangement with the Yucca Mountain project office to try and keep those lines of responsibility clear.

The contractors at Yucca Mountain are contracted with Yucca Mountain. They're not contracted with the M and O. And so if within the basic framework, the baseline program that is passed down, there is a change that the M and O wishes to accomplish, they must first get our approval for that change.

But if it's within the framework, within the requirements for schedule and milestones that we've set down, he can pass his recommendations through the Yucca Mountain federal people, who will then pass that down to their contractors, so that, in the sense of overall

control, the M and O has a very large responsibility role.

But he cannot directly direct the contractors at Yucca Mountain doing the characterization who report to and through the Yucca Mountain federal people.

DR. PRICE: In this contract, on the design aspect of it, did you provide criteria to the contractor that was to be met in the area of a systems safety engineering program, systems safety analysis in Duct EV, Duct E type approaches, development of systems safety plans, and so forth?

MR. ROUSSO: I can't really answer that one. I don't know the status of those aspects right now, if that's being done and who's got it or whether that transfers over.

The advanced conceptual design, for example, of the repository is not due to begin until about November of this year, and the same thing for the waste package. So some of those things may be in early stages.

It'll depend on how quickly the M and O comes on board and can get up to speed and get the right people and what work that's already been accomplished is transferred over to him and whether he accepts that as a basic soluble.

DR. PRICE: I've been listening, since I've been here for this kind of information, and also reading. And I'm aware of your development of issues out of the

regulation criteria for my reading and for some of the subsequent events analysis that was imposed and then the deductive fault tree analysis that was placed upon some things, indicating some system safety engineering or awareness was involved in the program.

But I've been wondering about: Is there some place where there is a dedicated system safety concern? And, you know, quality assurance, I'm sure, has safety concerns.

But is there some place where there's a dedicated system safety concern that if I went to NIS, then to what extent are you using DOE's MORT program? They would be able to give me an answer.

MR. ROUSSO: I think we've got another item there.

MR. ISAACS: Certainly the regulations that we live under -- I'm not sure this answers your question -- have an inherent obligation on the department, both DOE's orders that we live under, 4700, for example, orders another -- covers the fact that we've got to have addressed safety in an entirely appropriate manner.

And that's inherent in the regulations and in the way we're organized in order to meet those regulations. Whether there's something beyond that that you're getting at --

DR. PRICE: I kind of have a feeling that if safety is everybody's business, certainly safety is a primary concern here.

MR. ISAACS: Right.

DR. PRICE: And I think it's everybody's concern. But it's also possible that the stronger, more disciplined aspects of safety engineering could become nobody's buisness in that process.

MR. ROUSSO: Well, I don't want to leave you with the impression that we don't take that just as seriously as you've expressed it. Whether we have a safety program dealing with safety of personnel or safety engineering program in the design of the facility, I think, is what you're raising.

DR. PRICE: Yes.

MR. ROUSSO: That's an aspect that I would expect any competent A and E to be working into the process. As I said, the design stage right now is fairly early, and I don't know specifically who or what group is doing that. But I think we can certainly find that out.

DR. PRICE: But I would raise the question whether -- unless you have called it out specifically in the specifications, that, indeed, it would be addressed maybe in a way that would really be satisfactory, any competent A and E may come under that blanket you just

provided, but whether or not it is the disciplined approach that you really want to see take place is another question.

But if you provide specs, specifications, and really nail it down when you go through the contract process, then it's there and you've got something to talk with them about.

MR. ROUSSO: All right. In this M and O contract, It did not carry that level of detail in the scope of work. But I don't recall the

MR. GERTZ: Yes. I was going to add something, that we have taken a limited shot at that in our conceptual design of the repository design, using vector, using fault trees, what at best would you analyze for an accident, what releases.

But that's merely in the conceptual design that was done a year and a half ago. And we've kind of put that on the shelf.

DR. PRICE: I sort of feel this is conceptual design-initiated. So that's where it should start. And some decisions have already been made. Functional allocation, you've decided the humans are going to do some things and machines are going to do some things, and so forth.

And those decisions need to be approached carefully, and I'm sure you have. But there are aspects of

it that are covered in these kinds of disciplines very carefully.

MR. GERTZ: Totally understand the MORD approach, and I totally agree with what you said. And I don't make a representation that we've done that, except to say we've made an approach to that, a start of that.

MR. BARRETT: Okay. Let me touch a little bit on elements. The basic elements that the QA plans are drawn upon are -- start off with the industry practice and standard.

There's an NQA1, which is primarily geared towards engineering, but we've modified that in these plans to adjust to our more heavy involvement of basically what I call the "earth" sciences. So it's not just any QA1 alone, but, again, QA and 1 modified pick up the earth sciences.

Basically, we have our NRC requirements that are specific in the NRC regulations, 10 CFR Appendix B, which is for the power plants, but we have modified and made agreements with NRC and negotiations to adjust this to fit our needs, which is not just purely a nuclear power plant.

But many of the principles here still apply, and I'll go into those in a moment.

And we still have more work to do with NRC as we negotiate with NRC to basically improve these plants. These are not static things, but they're not changing all

the time where we have some members of the family say, "Well, I don't need to do this yet because it's still changing."

They are fixed. They are now. They are dynamic. We're implementing them now, and we're going to make them better in the future, and then our retention will become better.

But basically these are the plans. And also this picks up, as in the DOE orders. 5700.6b is the QA one, which would pick up the OSHA requirements and other things as well, and will start to come in here.

And here's where you start to see some of your classical, you know, occupational safety and personnel safety as well as any radiological risk studies, which we've done quite a bit of hooked into as out of the performance assessment activities in the repository.

The classic 18 criteria you hear people talk about, which is out at NQA1, it's referenced by 10 CFR Appendix B, are these. And they're basically classic, when you get down to it, basically good management and good planning.

You talk about your organization, what are responsibilities, who has what authorities, and you basically go down the line. And that's basically how all the plans are basically set up, in that same general

direction.

We can go into any of these if you'd like to, but basically that's what they are.

Now, once you have you plan, I mentioned after that from our triangle came training. Basically what training is, again, is it on-goes throughout all phases of the program and all levels of the program.

Everybody needs some training to some degree from the person pushing the mail cart all the way up to the Director. All right? And these different types of training depend on what your job is.

The way we're set up, there is basic QA indoctrination, which all employees get. I'll speak here for headquarters, since that's plainly my responsibility. We basically have a one shot which is basic indoctrination. And then if you're an engineer using certain procedures, you've got to get trained in those particular activities.

Beyond that, if you're a secretary, you'd be trained, basically, in documentation, and you'd know, for example, the document control systems. If somebody asks you for a plan, you have the current plan, and it's the right one. It's not the one that was outdated last year and how that system goes.

Again, training is a very key thing for understanding and communications. If it's the one biggest

problem I have in this program, it is explaining to people what QA is and what it is not.

There are an awful lot of self-proclaimed experts who say, "Well, I heard something from somebody who works in QA. Therefore, I now know." Okay? That's difficult.

And you find that there are more old wive's tales and myths floating around on QA than probably any other subject around that I've ever met. So a good training program helps you with communication and in understanding what it is and what it is not. It is not just a pain in the backside and a set of paperwork what that's to do.

Next, procedures and instructions, what basically comes next. And this is basically a disciplined approach to the planning, control, and performance, and documentation that the work that you're doing -- okay? -- will assure that it's performed satisfactorily. That's also planning.

What we used to say back in the shipyard, where I worked once upon a time, was "Engage brain before wrench." If you go out there with a wrench before you engage your brain, you're in trouble. I think that probably works in the laboratory as well as any other place.

And I think a well-written procedure, again, you know, will basically help, assist -- okay? -- your good science and your good engineering.

Now, within the biggest part, and I can't under-emphasize it, is the actual implementation program. You've got to live it and breathe it in your work as you go along. You've got to always be constantly -- and it becomes second nature.

In a mature, operating QA program, people don't know they're doing QA. They're just doing their job. They're doing a good job. And it's automatically incorporated into it.

The most successful QA program may be those that don't even think they have a QA program. But they're really doing it, and it has the elements to it. That's almost utopia.

You never quite get to utopia, I don't think, in a practical program. That's ideally what you want to have happen.

CHAIRMAN DEERE: That's what separates, maybe, a good driller from a bad driller. The good driller knows from his experience the things he has to do to get the core recovery, and he's applying his own QA, whether he knows it or not.

MR. BARRETT: That's right. But also, in the classical case, when you're going to be -- when somebody's working over your shoulders and saying, "Show me" -- I hate to use the word "proof," but "Show me the assurance that

that's done properly and that core is what you said it was," it takes a little bit more documentation, and that kind of thing.

So it's in addition to. You could have good drillers who may not have the documentation part, that last piece of it. And when somebody who may not be another -- just a real good driller comes in and says, "Show me," I say an NRC person or maybe a QA person, that's when things can start to break down.

He can still be a good driller, but sometimes he --

CHAIRMAN DEERE: Yes.

MR. BARRETT: -- has to do a little bit more to document that.

And, again, you know, strict adherence, verbatim compliance is a classic when you have a nuclear program kind of thing, nuclear utilities. And you've got to live by these things, and you can't just say, "Well, it's okay to make a shortcut on this. I know because I wrote these, but they're still okay to shortcut them."

You've got to constantly be on guard to make sure you're proceeding and not overly binding to your program. You can still do what you need to do and you have a chain system that is adaptable and flexible to the changes you're going to see happen.

Then next to the last was verification. Again, as I mentioned earlier, it was performed by the line person. Who can judge his own work better than the person doing the work?

You're never going to find a QA organization who also does verification, but especially when you're talking to someone, what I call "high sciences," experts in geology or hydrology or seismology, whatever, no QA person is ever going to have -- even when we put ology-type people on a QA team -- are never going to have the knowledge of the person who is primarily the principal investigator.

So who best can judge that? It's the principal investigator himself. And that's why in the QA plan we have in the NRC headquarters, the primary burden for verification, the classical engineering at nuclear plants, the QA do all the verification.

We asked to change that and convinced the NRC that QA does spot checks, doesn't do 100 percent verification of things. The classic thing is radiographs. A QA person signs off on all the radiographs.

We say we're not going to have QA people sign off on 100 percent of all the scientific work that's done here and have to create QA staffs who have not been that productive.

But I want the responsibility on the line

organization doing it and they are willing to check their own. I mean, there are some concepts that we have worked in that are uniquely put into this program for the NRC.

A lot of this has not worked its way all the way down to the people in the field doing the work yet, but there are things that we're trying to put together to do this, to adjust our program to the environment that we have to live in.

And, last, and certainly not least, is documentation. Now, this is a long-term program, roughly 10 years. People move. And, you know, what you may have committed to memory or a piece of scrap of paper somewhere that you normally keep or your personal files when you're going, and we're going to be gone here before this program is done, I'm afraid, -- okay? -- is you're going to lose it.

I mean, I can look back. I've been in this program three years now. And sometimes I'll look back and somebody will say, "Well, you guys, you were involved in that decision three years."

"Yeah."

"Well, we're trying to resurrect that. Did you write that down? Did you write minutes of that?"

And there you are, "How do I really know? I have to think back." And in some cases I think back, I say,

"Well, I wish we'd written those minutes up then." But I remember we had a lot of flaps and a lot of crises and we didn't get time. And everybody has that problem, but you've got to enforce a little bit of self-discipline and do something.

So it's important and it's necessary. And if we don't do this, we're not going to be successful. You may have the greatest scientific product here, but if it's not good enough to get through the licensing, we're going to fail the nation in establishing high level waste depositories. So it's basically got to be done.

Now, that basically finished up the triangle. Now I want to talk a little bit about our qualification process. We want to have a qualified program in place. Qualified is one that we the program are satisfied with, start with site characterization activities.

That's basically the QA people as well as the NRC puts in their two cents on how good or bad they see it is. So we have to basically go through that. We have to -- DOE has to be satisfied with it. The line basically has to be able to live with it -- okay? -- and do it.

The NRC is going to, you know, basically look at it and see if they have any real heartburn with it or not. and then after that, we're going to start site characterization activities.

We're basically going to want to go through this basically before September, which is our current schedule, to start the multi-purpose bore hole as a precursor to the exploratory shaft. I think you've all heard about that.

And that's coming up this fall, and that's a lot of work in not a lot of time. But we've been working on this, you know, for some time now.

I can go into schedules and audits, and things like that, but let me just stop at the bottom line on it. For the Yucca Mountain participants, as well as the Yucca Mountain project and headquarters, to basically have this schedule for when we're going to do our qualification audits, that basically the NRC and the state, you know, will be there as observers and will draw their own conclusions.

You can see the first one is going to start basically one month from now at F and S, the architect engineer, and then H and N. The reason we sort of put these together, these folks are involved pretty much with the Title II design start for the start of the exploratory shaft facility and then work on our way down.

And then there's -- you know, I have all kinds of others we can go into as far as we have 169 QA surveillance activities in place prior to these things taking place and one per month for the organizations to ensure

implementation after the fact over the next 6 to 9 months.

So it's a very extensive verification activity and, as very large as that is, it's small compared to the real work of establishing the QA program by the line. So the major QA work is done by the line.

And what we've been doing since, let's say, our new augmented quality assurance program at headquarters since it was put in place last summer, when we had a reorganization, the Office of QA reported to the Director, I was told the next day I was going to be the director of the QA office, and then we drafted some staff in and things got moving a little faster. When we got the horsepower to do it last summertime, that was our goal.

And we've done a lot, but we've got an awful long way still to go to meet this schedule to support the ultimate response.

CHAIRMAN DEERE: Did you say that Fenix and Scisson and Holmes and Narver are doing the Stage II shaft design?

MR. BARRETT: Basically, the final design for the exploratory shaft is a team. It's F and S and H and N, our two architect engineers.

CHAIRMAN DEERE: Right.

MR. BARRETT: And they're augmented with Sandia, as well as the requirements for that come from all the

participants, USGS and Livermore. So --

CHAIRMAN DEERE: They're all available at the site?

MR. BARRETT: Yes. Carl; right?

MR. GERTZ: Yes, that's correct. The F and S concentrates on the below-ground part of the exploratory shaft; Holmes and Narver on the above-ground facilities.

CHAIRMAN DEERE: So if we have a session in a month, it would probably be there rather than Washington?

MR. GERTZ: I would think it would be, yes.

MR. BARRETT: Right. It goes back. This is the Yucca Mountain -- I call it the "Yucca Mountain" team -- okay? -- under Carl's direction of the project, the Yucca Mountain project office, which is doing this, as Tom was saying, moving the earth and making the design for the exploratory shaft. Your architect engineers are here.

Now, the exploratory shaft is not M and O. That is done basically by the Yucca Mountain project, and the M and O contractor comes in after that. That's an ongoing right now item and the M and O is not here.

And all of these folk are out there with Carl in the bottom.

MR. GERTZ: I don't have to mention we have 1,400 people on the project, about 800 in Nevada and about 600 right in a complex we call "1010 Convention Center Drive."

So within 100 feet in a high-rise bank building in my office, we have both architect engineers, representatives of the constructor, and representatives for the national labs.

CHAIRMAN DEERE: Is Don Walton still there for F and S or is he gone?

MR. GERTZ: He may be. I don't recognize the name, though.

CHAIRMAN DEERE: I guess he's gone, then. You would know. He was number one there.

MR. BARRETT: I can go into all kinds of other detail if you would like, but what -- I know it's the end here, but are there any particular areas I haven't talked about you're interested in?

DR. CARTER: I've got a couple of questions, one on the appraisal program for QA. How often are those to be done? What's the frequency? Are they every three years or two years, or what? What's your --

MR. BARRETT: Okay. Now, when you -- I always have a problem with jargon. Okay. When you say the "appraisal," is that --

DR. CARTER: Well, you referred to appraisal for your gold star program, and you've got the first one of those scheduled for --

MR. BARRETT: Okay.

DR. CARTER: -- a number of companies or a number of functions. How frequently will they be repeated?

MR. BARRETT: Okay. Basically, this is an audit. Now, there is a hierarchy of look-sees, -- okay? -- how well you're doing. An audit is the higher -- there are lots of things which are called "surveillances," which are less involved.

An audit for us is probably about -- from the time we get the state and the NRC in, we've got 30 people out there looking at somebody. It's rather traumatic if you're not looking at this sort of thing, if you're being looked at by this many folk.

But, basically, audits are annual. Okay? So there would be one per year for an audit. And then there are multiple -- I'd say there are tens of surveillance for year, which is surveilance if you're going to look at a partiuclar area, as mine control, for example, where the audit is more comprehensive. So annual is the requirement for audits.

DR. CARTER: Okay. Then the other question I had about your pyramid, essentially: What is the status now of your QA plans as far as the written procedures?

MR. BARRETT: Okay.

DR. CARTER: You've got a lot of them to do, and I presume you have done some and some haven't been done.

MR. BARRETT: Okay. The two headquarters documents have been signed. They're operable. They are issued for use. We have had -- in the fall we submitted them to NRC.

We have had several meetings with NRC on those plans, and they basically accepted them verbally. And they are now in their final write-ups. The NRC writes a safety evaluation for those, too. That's the headquarters QA requirements.

And the program description, they're a book about that thick. (Indicating.) It's a book putting them together. So those are operable. They're approved internally, and NRC is about to give a blessing on that. But those are in place and basically done.

The Yucca Mountain QA plan, the remaining one, is the -- you know, for the whole project -- okay? -- and their participants. "889," we call it. That has been at NRC. We've negotiated on it with NRC. And NRC has formally written a letter accepting that. So we have an actual letter in-house from the NRC.

It's actually the first safety evaluation the NRC has ever issued in the RW program, which basically formally accepts that.

So that is signed, sealed, and delivered. There will be additional provisions as we improve the program as

it goes along. Okay? But that is out, and it's operable right now.

But the Yucca Mountain QA plan is basically how the project internally does its work. This applies to the project as well as all its participants.

This is due to be submitted to the NRC, should have been to the NRC, should have been in last week. It's two weeks late, but it's basically at final sign-off now at the project.

It's always been there. This is a newer revision to it. It's in concert with the negotiations we had with NRC here and a superior plan. So this is basically going to be in place next week.

DR. CARTER: Okay. Is this for the technical information that will be collected, technical information data collected as part of site characterization?

MR. BARRETT: No. This is -- this doesn't -- the Yucca Mountain project doesn't -- underneath this plan, the participants prepare their own plans, and they're the ones who are actually collecting the data.

What you have is the participating organizations have their own QA plans that implement these requirements here.

DR. CARTER: Because I presume that's following on.

MR. BARRETT: Right.

DR. CARTER: It's not in place yet.

MR. BARRETT: Well, no. I'm going to tell you about those.

DR. CARTER: All right.

MR. BARRETT: I'm working my way down this. Headquarters is done. Project is basically done. Now let's talk about these folks down here.

SAIC and MACTEC are basically management folk working with the project, so they work under the project plan, which is basically done.

Let me tell you what has been done, signed, and sent to NRC for NRC look-see. We're working through it right now. F and S has been sent to NRC in the last month. Holmes and Narver has been sent to the NRC. RECO, Reynolds Electric, has been sent to the NRC, and I just signed off Friday the Los Alamos, has been sent to NRC.

We've got one more, I think. No. These three, Sandia -- has Livermore been sent to me, Carl? I think I sent Livermore also. I think Livermore may be at NRC, too.

MR. GERTZ: I don't know, Lake, myself.

MR. BARRETT: I'm not sure.

DR. CARTER: Let me ask you --

MR. BARRETT: They are due in those two weeks.

DR. CARTER: Let me ask you a jargon question.

You asked me one. When you say you sent it to the NRC, --

MR. BARRETT: Okay.

DR. CARTER: -- what in the heck -- what does that mean?

MR. BARRETT: Okay.

DR. CARTER: Does that mean you might get it back in two weeks approved or does it might mean that that's a two-year process or just what?

MR. BARRETT: Well, it depends on how long. Based on -- it took -- the NRC, I think, from start to finish on the 889, the Nevada plan, I think it took them close to six months.

We submitted our headquarters plans to the NRC in the fall, in the early fall, September. We had negotiations that finished up into December. And I sent the last final one in then, which Sam signed, I signed, and we're using it.

I have yet to get their -- it's been three months. I haven't got their approval yet. It doesn't matter.

DR. CARTER: So this is a period of time, yes.

MR. BARRETT: It's approved and we're using it, we're implementing it, and I'm thinking the NRC's going to say, "Yes."

If they don't say, "Yes," I'm going to say,

"What's your problem?" And we're going to work it out. But I'm going to still be using what I have.

So when I say that, you don't send it to NRC, you know, until it's been through our internal -- that we're satisfied with it. For example, on all of these, I don't send these to NRC until I know that Carl's satisfied and Carl has signed off on his participant's plan.

DR. CARTER: Yes. But I presume you wouldn't do very much in the QA business unless you either have an approved plan by the NRC or at least it's, you know, predictable that it is going to come.

Otherwise, you might have a problem, I presume, on the acceptability or validity of the data that's maintained.

MR. BARRETT: That's correct. That's why we're going through the process.

DR. CARTER: You've got to have something in hand to prove these things.

MR. BARRETT: We're going through this process now, and we had considerable negotiations with the NRC on the Yucca Mountain project plan initially -- that was the forerunner chronologically -- and the two headquarters plans.

And we told our participants, when Carl's instructing and writing his participants, "Your plans are

to be in concert and implemented with the upper tier requirements in the Nevada plan."

MR. ISAACS: Let's give a shortcut answer, though, too, Lake. We're not going to start new site characterization activities unless and until we know we've got NRC approval on the activities that are going to be covered.

MR. GERTZ: On the plans and implementation plans, too.

MR. ISAACS: Okay? And that's all part of -- the schedule that Lake's got there presumes that that's the order in which we do these things.

MR. BARRETT: The word is not quite NRC "approval." It's acceptance. There's a legal reason for "approval" versus "acceptance." It's basically no objection. They don't have a -- they're not going to approve anything.

All my letters to them say, "This is for your information." If they've got a personal problem, I want to hear about it.

DR. CARTER: Yes. I --

MR. BARRETT: I don't expect any problems. I know they've looked at the F and S plan already, and I know, from talking to them, that they've got their approvals basically to their -- yes, I said it -- their

acceptance letters basically drafted already. Okay?

So, I mean, I don't expect any problems. But if we sat and waited, we'd be sitting and waiting for a long time.

DR. CARTER: Okay. I just wanted to get a feel for the timing involved in it. And then I presume once you get those in hand or fairly close to it, then the implementation training can occur.

MR. BARRETT: Yes, sir.

DR. CARTER: Okay. So these are the sequences of events?

MR. BARRETT: Yes, sir. As, for example, on the starter Title II, we're not -- we're going to start the Title II designs, exploratory shaft final designs, under a good QA program.

And so, for example, F and S, the architect engineers, will have their plans issues, their procedures written, and their people trained when they start. And Carl's people are looking at that very closely, and that's the biggest effort we have probably right now today.

DR. ALLEN: Could I ask a question about the -- this project's a little bit unique in the sense that the State of Nevada already has a rather strongly announced position on the issue.

If I were a lawyer and trying to do everything I

could do stop or slow down this project, I would certainly try to make the QA one area where I'd tie everything up in red tape.

MR. BARRETT: Yes, sir.

DR. ALLEN: Is this a problem for you or a potential problem?

MR. BARRETT: I would say it's a potential problem. I would say that when we do audits and whenever I have a QA meeting with the NRC, there's always a State of Nevada representative sitting right there, every time we have any discussions.

That has not been a problem to me. So far the State of Nevada QA people, I think, have acted very responsibly, and I have not found that to be a real problem yet.

Now, is there a potential? Yes, there's always a potential. I believe when it comes down to the court cases someday, QA is going to be one that's going to be ripe, one of the lean items. It's one of the reasons why this program fails.

So yes, I believe it will be a potential problem, but right now I don't think that's been a real problem, to me, anyway.

MR. ISAACS: But they're not between us and moving forward.

DR. ALLEN: They don't have any --

MR. ISAACS: Veto rights or --

DR. ALLEN: They don't have any veto rights in the same sense that we're having --

MR. ISAACS: -- or they're not on political paths in the sense of some of these other activities.

MR. BARRETT: We get observation reports from the state, where they say, "I think you could do this better. I think you didn't do that very well." I think some of those are constructive.

MR. ISAACS: But it's not like the permits. I think that was what you were getting at.

DR. ALLEN: Yes.

MR. BARRETT: I don't need -- there's no whole point where the state must be satisfied with this, so, I mean, they can always comment on something.

DR. ALLEN: Well, I think you're right, probably, --

MR. ISAACS: It'll be a licensing issue.

DR. ALLEN: -- that the lawyers are sitting there thinking of ways that five years from now, we can charge when something didn't go correctly.

MR. BARRETT: I'm sure that they will.

DR. NORTH: You have in your last slide, which I'm not sure you put up --

MR. BARRETT: Last slide. Okay. What am I -- oh, yes. It was. Never mind. Where am I here? Hard work, communication, and understanding. That's my --

DR. NORTH: I think I understand one and three, but I'd like to hear two.

MR. BARRETT: Okay. Understanding the objectives. What are the objectives of the program? One of the problems that I've had is: What is the objective of a QA program?

Some people will think of all the negative things. It's just a pain in the neck. It's just a money sucker-upper. It's just somebody wanting things in triplicate and procedures that really QA is really a part of. Okay?

The overall objective is to establish a repository that will meet the environmental and safety requirements. And the QA plays a part in that. And that's what I meant to put in.

What I think QA is is not really what it is or is not a common understanding of what the objectives are in the program. Some people like to do just, "Well, this is a good science program."

It's not a good science program. We're collecting money from electricity users to build a repository. It's not that. Okay? Now, good science is

necessary to end up with a successful repository, but this is not a good science program just on itself.

It's those kinds of things, is what I meant by that bullet.

DR. NORTH: One of the things that concerns me a bit is the trade-off between having detailed plans and having the flexibility to learn as you go along and evolve better procedures.

You've addressed that in general early in your presentation, but I think it would be very useful to us to see some examples and more detail on how you propose to do it.

Dr. Price brought up some of the safety issues where, as you get into things like fault tree analysis, you may find out that some data is really critical and you need to get it very precisely, and you didn't know that when you wrote the plan.

How can you bring that in so that you make sure that gets done and the lawyers can't come after you after the fact, having seen the analysis, and say, "Well, obviously, that data needed to be very precise and you didn't do it"?

On the other hand, there may be other things where you've started off in the plan saying, "You have to be very precise," and that turns out to be very burdensome

on the people that are generating the data and not doing much good.

I had a meeting a couple of weeks ago with one of the people in atmospheric science who was complaining frequently and bitterly on the requirements that DOE was laying on them for commenting a general circulation atmospheric model to try to predict what the precipitation levels might be in Nevada many decades or centuries hence, which I would argue is an extremely uncertain quantity and where I'm not sure line-by-line commenting of the computer code really is adding very much.

MR. BARRETT: I think this is where it boils down to your -- you know, the possibility of QA lies with the line people doing their job, and QA people can only tell them, "Plan your work and what you're going to do."

"If you need something to be five significant figures, state it up front, to the best of your ability and your rationale and go for it. If you want something that's within two orders of magnitude, you know, state that up front and you gear according to it.

One of the things I've found is totally missed -- is difficult to communicate is a concept we've known as "grading." Okay? The QA requirements that you're going to meet -- okay? -- and how you're going to do those is the responsibility of the line person.

If you just say, "Look, I want something with three orders of magnitude," don't subject yourself to a QA procedure that says "I want my calculators out to five significant figures all the time."

You will find people will not do that. They will end up because either -- they think some QA person told them, they will say, "Look, this is within the three orders of magnitude. This is all I wanted on these things. You know, I don't need calculators that are calibrated to 10 significant figures."

But he needs to specify that up front of what he really needs to do. And the only people who can do that are the line people.

DR. NORTH: I agree. And my concern is: as the line people learn what is really important, that that get into the system and the plans get iterated. And I'm asking: How are you going to do it?

MR. BARRETT: The QA plans, see, don't go and tell you how you've got to do these things. We're just -- we're trying to get it across to line people today, and it's difficult, "You have the responsibility, and you establish your own requirements. Don't take the most restrictive thing there is if someone wants to" --

MR. ISAACS: Your point is very well taken. I think it would be more looking towards the adjustments to

the site characterization plan and the study plans underneath it that have to be living documents to take into account that understanding that will come and the adjustments that are necessary, more there.

And Lake's responsibility is to make sure that that's not in a disciplined fashioned.

DR. NORTH: Yes, I understand.

MR. BARRETT: Yes. And that's part of the dynamics of a site characterization program. I mean, you're going to learn things as you start going. This is more important than I thought; that is less important than I thought.

Carl?

MR. GERTZ: Yes. We believe we have the mechanism to change plans as we go. We just have to make sure we know what we changed, and Lake can verify that when we do it as a line person.

We've tried to get with the scientists and say, "If you need to change it, develop a procedure for changing it so people know how to do it."

MR. BARRETT: Change in a disciplined, controlled manner. That's what we're basically talking about, because we know change is going to happen. Some people erroneously say, "QA means I can't change anything."

MR. GERTZ: And that's wrong.

MR. BARRETT: That is wrong, flat wrong. Okay?

DR. NORTH: So you have a procedure for change orders in which this can be done quickly and efficiently?

MR. BARRETT: Each participant does.

MR. ISAACS: And, in fact, the participants can write the QA procedures in a way that gives them the flexibility up front to change things, as long as when they change things, they recognize they do it according to the procedures that they wrote into their plan for how to do changes.

MR. GERTZ: But, to be candid, it's more disciplined, more time-consuming, and more costly than a traditional science approach is. We recognize that because it's part of the licensing package.

DR. ALLEN: You have the uneasy feeling you're doing it to please the lawyers that way.

(Laughter.)

MR. BARRETT: And yet we are somewhat -- to be successful we have to satisfy those lawyers. Okay? And once in a while, you might find some good science. You know, it does help the science a little bit, too, once in a while.

DR. CARTER: A lot of it doesn't hurt.

MR. BARRETT: I mean, a lot of it --

MR. ISAACS: I think there are ample cases that

one can pick out of lots of places where a QA program, even for the guy who thinks he's a good driller, makes a whole lot of sense.

I can't help but think about the Challenger report. I can't help but think about the report after the Challenger incident and that poor airline where the captain forgot to set the flaps and the checklist.

I mean, these people were presumably trained. These people had done it 100 or 1,000 times, and they forgot to set the flaps on an airplane. And I just think those are examples of why QA is far more than paperwork in triplicate, in my mind. And I think we're going to have to learn to live with it.

DR. PRICE: You mentioned ALAR just then. Do you have ALAR requirements on things other than the cask? I think you have them on the cask, do you not?

MR. BARRETT: Well, it's -- you know, ALAR -- we do. In the RFP for casks, we specifically asked the contractor to address ALAR. In our whole program, you know, we have addressed ALAR; as far as that bring a QA item, no.

And that's not an item we've called out, but that's part of the designing specifications and requirements to start the program. That's a regulatory requirement that it be designed in accordance with ALAR.

What I meant to say about ALAR as an example, I think many utilities have found that when they first started ALAR programs 15 years ago, this is nothing but a pain in the neck. We've got to do it because of the regulators and the exposure.

What they found on steam generator change, something nice to do, was that you would -- not only did you save exposure, but when you found out you saved exposure, you generally saved time, and when you save time, you save big dollars.

I think you'll find many utilities today who talk about ALAR programs, as well as being reasonably achievable --

DR. NORTH: Thank you.

MR. BARRETT: -- for radiation exposure -- I'm sorry; I guess I'm talking jargon myself -- will be helpful to their business of trying to get their plants on line.

And they have seen correlations where reduced exposure can lead to reduced costs, which is something they were --

DR. PRICE: But this requirement is not actually officially passed on to your contractors, and so forth, other than your cask?

MR. BARRETT: It is. No. It is in the cask, and it will be in our program, too. What we have is our

systems engineering approach -- okay? -- to design. As any big program would, you specify your requirements, and we specify in our various systems requirements documents the requirements for the program.

And one of those is Tenos versus ALAR, which is keep your exposures and your design of your exploratory shaft, for example. There is an ALAR complement in there.

So that requirement does exist, and you trace that down through the program.

MR. GERTZ: Not too much exploratory shaft, because we're not dealing with radioactive material.

MR. BARRETT: Okay.

MR. GERTZ: ALAR comes in the concept when you start designing your repository.

MR. BARRETT: Pardon me.

MR. GERTZ: Exploratory shaft is more a scientific facility that will be an exhaust shaft to the eventual repository.

DR. PRICE: I understand.

MR. BARRETT: Thank you very much for the correction. For the design, we -- you know, in the design, we go into advanced conceptual design. The requirements for that -- okay? -- which is handled through -- does have an ALAR requirement in it, but that would have done it.

DR. PRICE: Yes. I was looking for your general

comment, not --

MR. BARRETT: Yes. So that will be in for the repository system. That's -- the only thing we're designing now is handling radioactivity to the cask, and that's why that was specifically written in the RFP.

MR. ISAACS: Thank you, Lake.

MR. BARRETT: Thank you all.

CHAIRMAN DEERE: Thank you.

MR. ISAACS: Can I sum up?

CHAIRMAN DEERE: You may.

MR. ISAACS: Let me say, on behalf of the Department, first of all, that I'm personally delighted and the Department is delighted that you all were finally named. And, as I suspected all along, they did a good job.

It's quite clear we have eight highly energetic, tremendously competent people that I believe can help us in this program very much. And I believe that, from the Secretary on down, we felt that if things went the way we wanted to, this would be a big benefit to the program.

I have to say I am absolutely delighted with the orientation which this group has taken, at least in this first meeting, which is a very positive one and one that seems to be oriented toward helping us do the best possible job.

And to the extent that we can work together

toward that common objective of being successful in this program, I really think it's in all of our best interests.

I want to endorse the concept that's been mentioned a couple of times here that we are more than open to the work that the Board will conduct. We want to help you be as successful as possible as a Board and, in that regard, we want to make sure that when you have concerns or you want information or you have some criticism, that we hear it first.

We want to be able to work with you and react to the Board in a real meaningful way and make the adjustments to the program in a way that makes sense.

The one thing I would ask you to consider, as I looked at it from my side, is, of course, right now we have an eight-member Board. It's probably going to be an 11-member Board pretty soon.

You've got already a competent Executive Director and I'm sure before too long you'll be having clerical staff and professional staff and consultants. And you're going to be, from our point of view, a major player in the program for the foreseeable future.

And it's very important that we implement some quality assurance practices in working together to make sure that we serve you as well as possible in that the work that you do is as meaningful as possible to us.

So I want to encourage you to recognize that, as I told you at the very beginning, my office and Jim Carlson in my office and I, in particular, have in our job descriptions the fact that we are to be the liaison with this Board.

And we're here to serve you and to make sure that the linkage between the Board and this large complicated program takes place.

Please make sure to take advantage and to channel things in as best a fashion as possible through our office so that we can make available whatever resources are necessary, whether it's scientists in the field, computers, travel money, coffee. Whatever the scope of activities, documents, we're the ones who it ought to come channeled through.

There are a lot of factors that came to my mind where I would hope that we can get Jim and perhaps Bill working together to come up with a system where, as you all identify issues, that we have an issue identification system and a practice for making sure that those issues are addressed and resolved to your satisfaction, that when you want to have meetings, -- and there are gang to be lots of meetings, I can tell, from the way you want to operate -- that we get the right people in the room at the right time calibrated to deal with the problem that you're there for.

So that we don't have -- because your time is valuable and limited, and we've got to make sure we hit the problems right the first time.

I want to put in place a commitment tracking system so that when we tell you in a meeting like this we're going to provide you such and such on March 15th or you ask me, Don, you know, "Would you please make sure copies of this get sent to all the" -- whatever it is, that we have a commitment tracking system put in place and that when it comes to information which will come out of this program in bucketfuls, you've already seen, that we provide that information to you in a very comprehensive and disciplined way so that we know what we've given you, you know what you've gotten, and if you need something, we can make sure that it gets to you.

All those things need to be worked through very carefully because you're important to us.

The last thing I would just mention to you, because I think it's important as the Board deliberates, we've tried to give you an impression in two days of a very large, complex program, and I think you can see how many players there are driving this program.

It's not just the Department trying to do a job, but we've got very important players on the Hill, in the industry, in the states, in the NRC, in the EPA, and many

others. And you are clearly one of the most important.

One of the reasons we went through the history in such detail and tried to give you that broader perspective was to recognize the complexities with which we have to deal in making progress here.

One of the things I am, again, delighted with is the obvious sensitivity you all have to what the objectives of this program are and how we have to balance off schedules, dollars, political impacts with the bottom line, which is unquestionably adequate, first quality, demonstrable, not perfect, but very high quality science and engineering and technology in order to conduct this program.

If we don't have it, we'll fall on our nose. So, to the extent that you all can help us keep our eye on that ball, recognizing the other ones that we have to juggle here and being sensitive to those, it'll, I think, be very valuable, not only to the program, but I think to the country. And I think if the Secretary were here, he'd reiterate that.

Again, it's a pleasure to see you, and we will stand ready to do whatever we can to help make your job successful.

CHAIRMAN DEERE: Well, thank you very much. We certainly have had a lot of material presented to us in a

very fine way. You've been very receptive and in answering -- taking our questions and answering them.

To make our work a little bit more efficient, I've felt we had to do something. One of those things has been I have appointed an Executive Committee that can work and make decisions and do some special studies without contacting the entire membership.

And these are Dr. John Cantlon and Dr. Clarence Allen and Dr. Mel Carter. I wouldn't say they're the three oldest members of our group, but certainly they have a lot of experience in various phases of this program, with the National Academy of Science, and with other organizations.

They will be advising the Board. They will be advising me. And I should say ex officio member will be Bill Coons, who will serve on this.

We have given them the authority to make a decision which otherwise might be made by me in case I am absent or out of the country or not available. So anything that comes up would go to Bill, and Bill would know whether that is something that he wants to bring to me, or if I am available, or whether it will go to the other three members.

And for something important, why, he, in turn, will check with the others. But that is one way you can

operate.

The other thing we have done is established the groups, the technical groups, the five of them, and we may well have a little change down the road or may have an addition to that.

But it is clear it's difficult to get 8, and it will be more difficult to get 11 of us, together. In the future, it will be a little easier since we'll be able to plan ahead.

We already have a meeting date for December. We have a meeting date in September. And we have a meeting date in June. But we feel that there are things that have to be addressed.

Anything to do with the shaft and that program involved with the exploratory shaft has to -- we have to get an input and discussion in the next month. And, therefore, our one committee has looked at having a meeting -- it appears now it should be at the site rather than Washington, but wherever it would be the best, and you can tell us that -- the days of April 11 and 12. And there will be three of us there.

Would you be able to meet at the site if we go there?

DR. NORTH: Oh, yes. That's easier. That would be easier.

CHAIRMAN DEERE: So these are dates and if that's the appropriate place. If you find it not -- and the two items we want to address are our very strong feeling that this first exploratory shaft ought to have a perimeter exploratory drift.

The second issue is that it probably could be best driven with the tunnel boring machine, but that's really the secondary thing. The first thing is the drift. But, as far as time and stability and not disturbing the structure, a TBM is to be preferred.

And the second item was the one of the consideration of the shaft complex itself and what we discussed this morning. Could the two borings be at the shaft location? Could the first shaft be driven faster with less testing to get it down to drive over and to do the second shaft as a raised boring upward? And that becomes the exploratory shaft, the detailed mapping shaft, the test shaft.

And I know these are questions that are going to involve people who are doing the readings and the experiments, and things such as this. We're willing to talk with them.

We'll want to talk with them about their geoengineering requirements, their rock mechanics requirements, their structural geology information, et

cetera.

So we feel that we are developing a mechanism where we can give to you the things that we would like to get to fairly fast. Many of the things that you have given to us are down the road. Some of them are a year off and some of them are two years off and an ongoing thing.

But this is one thing. The shaft is about to start, and we think it's great. We really feel that that's great, and we just have a couple possibilities of maybe we can get more information at not too much more money.

MR. ISAACS: Well, we're delighted to respond to that, Don, and we'll prepare for it. As I mentioned to you, I want to make double sure on the schedule that we can have the right --

CHAIRMAN DEERE: Right.

MR. ISAACS: -- people in the room. We'll make sure that we have the right people in the room, but I just want to make sure that we get -- the other thing that I think will be useful is prior to that meeting, probably a phone call or two, as I discussed with you in the margins of the meetings, perhaps with you directly or perhaps a conference call with you and the two who will go there, to make darned sure ahead of time that we're calibrated on the issues.

I mean, I think I understand them here, --

CHAIRMAN DEERE: Yes.

MR. ISAACS: -- but it would be awfully nice to make sure we've got the people who are going to be dealing with you well-calibrated on what the issues are so when we sit down to the table, we don't have to spend half the time wondering what the issue is.

MR. GERTZ: We want to answer the right questions.

CHAIRMAN DEERE: Yes.

MR. ISAACS: Okay? So that's important preplanning for this meeting, and I think it can set the stage for how I believe, because I've been involved enough in bureaucracy here to know that, by the time you tell us something here and we tell Carl and Carl tells the contractor and the contractor tells the principal scientist, there's no guarantee that the guy who's actually done the work that you would like to talk to really understood what the concern was in the first place.

CHAIRMAN DEERE: Yes.

MR. ISAACS: And there's nothing like making sure that that takes place up front. So we need to make sure that that happens. And we'll take the initiative in that regard.

DR. NORTH: Again, I will urge, since we have a transcript that will be available in five days, that's a

wonderful way to communicate that doesn't depend on some of us --

MR. ISAACS: Interpreted.

DR. NORTH: -- getting minutes written, documenting this meeting, as we would like to do, but it may take some time. The transcript is immediate documentation. It just requires the work of going through and picking the right sections.

And I imagine we'll have 600 pages from these two days?

MR. ISAACS: That in itself is a daunting task.

CHAIRMAN DEERE: And I think I also agree --

DR. NORTH: That's something you can do.

MR. ISAACS: Sure.

CHAIRMAN DEERE: -- that probably our contact should be from Bill to your office, to Jim or to you.

MR. ISAACS: Certainly in the day-to-day, as Sam said and as I say, I mean, anytime anybody needs to talk to me or to Sam, --

CHAIRMAN DEERE: Yes.

MR. ISAACS: -- we are, by definition, available, but in the day-to-day contact over the period of time, that would be the most useful way for us to do business.

CHAIRMAN DEERE: Yes. And we appreciate very much the comments that you had, and the history was very

good. The historical background was really necessary for us to understand the complexities, the players, to some extent.

MR. ISAACS: Sure.

CHAIRMAN DEERE: We appreciate very much that Sam Rousso was able to come and make comments and certainly that the Secretary of Energy was able to speak to us.

MR. ISAACS: If you don't mind, I will make sure that that comment gets back to him that you were pleased that he --

CHAIRMAN DEERE: If you would do that, yes.

MR. ISAACS: -- took the time.

CHAIRMAN DEERE: We think it was very good, very positive, and we certainly want to help to the maximum that we can. We're interested in the program. We think it's a vital program for the country. So we're ready to move forward.

MR. ISAACS: Great.

CHAIRMAN DEERE: Thank you.

(Whereupon, at 4:25 p.m., the meeting was adjourned.)

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before DEPARTMENT OF THE INTERIOR

in the matter of: NUCLEAR WASTE TECHNICAL REVIEW BOARD

were held as herein appears and that this is the original transcript thereof for the file of the Department or Commission.

Official Reporter

DATE: MARCH 8,1989