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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

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155th MEETING

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TUESDAY

NOVEMBER 16, 2004

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ROCKVILLE, MARYLAND

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

MEMBERS PRESENT:

MICHAEL T. RYAN Chairman

ALLEN G. CROFF Vice Chairman

RUTH WEINER Member

ACNW STAFF PRESENT:

JOHN T. FLACK	Acting Branch Chief, ACNW
JOHN T. LARKINS	Executive Director, ACRS/ACNW
HOWARD J. LARSON	Special Assistant, ACRS/ACNW
RICHARD K. MAJOR	ACNW Staff
NEIL M. COLEMAN	ACNW Staff
LATIF HAMDAN	ACNW Staff
MICHAEL LEE	ACNW Staff

ALSO PRESENT:

JAMES H. CLARKE	Consultant, ACNW

P R O C E E D I N G S

(8:38 a.m.)

CHAIRMAN RYAN: The meeting will come to order. This is the first day of the 155th Meeting of the Advisory Committee on Nuclear Waste. My name is Michael Ryan, Chairman of the ACNW.

The other members of the Committee present are Allen Croff, Vice Chair, and Ruth Weiner. Also present is consultant Jim Clarke.

Today the Committee will hear a briefing by a DOE Representative on the general DOE format and content of the forthcoming DOE license application , hear the semi-annual briefing from the Director, Division of High-Level Waste Repository Safety and the Director of Waste Management and Environmental Protection.

We'll also hear a report on International spent fuel transportation-related meetings by the Director of the Spent Fuel Project Office.

Howard Larson is the Designated Federal Official for today's initial session.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act.

We have received no requests for time to make oral statements from members of the public regarding today's sessions. Should anyone wish to address the Committee, please make your wishes known to one of the Committee's staff.

It is requested that speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so they can be readily heard.

Before starting the first session, I would like to cover some brief items of current interest.

On October 28th, Jenny Gallo as well as Sharon Stone who was here on a rotational assignment received certificates as graduates of the one-year long Leadership Potential Program in a ceremony conducted in the TWFN Auditorium. Commissioner Merrifield provided the keynote address.

Patricia Norry, NRC Deputy Executive Director for Management Services announced her intention to retire at the end of January 2005. She commenced her career as staff assistant to then AEC Chairman Glenn Seaborg in 1961.

We wish these folks congratulations and good wishes in their future endeavors.

With that being said, I'd like to welcome Joseph Ziegler, Director of the Office of Licensing

Application and Strategy who is going to provide us with an update on the Yucca Mountain Project license application. Joe, good morning and welcome.

MR. ZIEGLER: Thank you, Michael, appreciate the opportunity to be hear and I appreciate you arranging the schedule so that I could speak in the morning.

I'm basically going to go over our application and describe the format of that application and what it contains. And then I'm going to do a comparison between our application and the Yucca Mountain Review Plan so you can see how it aligns. And it aligns rather well but it's not absolutely exact.

The primary emphasis of our application is on meeting the requirements of 10 CFR 63 and addressing all the review criteria of the acceptance criteria in the Yucca Mountain Review Plan.

The Safety Analysis Report maps the Yucca Mountain Review Plan. It also considers recent precedent in other licensing actions. We looked at the private fuel storage application. We looked at the MOX Fuel Facility in South Carolina.

We looked at the LES Enrichment Facility that's now being proposed in New Mexico. And we looked at several reactor SARs, you know, and basically the lessons learned there not only just to prepare the license application and Safety Analysis Report but to keep the Safety Analysis Report up to date over time because periodic updates are necessary and required.

We put crosswalks in our application to 10 CFR 63 and the Yucca Mountain Review Plan so at the beginning of each section, each major section starts with a crosswalk to the acceptance criteria in the Yucca Mountain Review Plan and the regulations that that acceptance criteria is related to.

Now I'll highlight, as I go through this, any deviations or apparent deviations from the Review Plan just to let you know because there are some apparent deviations that in my mind aren't really deviations.

On to page 2, this is just an outline of what I'm going to go through, an overview that I've just started. The general information outline, there's two basic sections of the application: general information and the Safety Analysis Report, as required by the regulations.

So I'll go through the general information outline. Then the Safety Analysis Report outline.

I'll key that relationship to the Review Plan. I'll give you a sample of what that crosswalk looks like at the very end of the presentation. And then I'll summarize what I've been through.

Page 3, the overview does consist of the GI section, general information and Safety Analysis Report. It does conform with NUREG-1804. That is the Yucca Mountain Review Plan, Rev. 2.

And it is responsive to the acceptance criteria. And we did the crosswalk to absolutely make sure and positive that it is. And make sure it's very clear. And it facilitates the review by the NRC staff.

The key parts of the Safety Analysis Report are in two parts, the Pre-closure Safety Analysis, which covers a 100-year period, 50 years of active surface facility operations but an additional 50 years before closure of the repository, and it covers post-closure, the Total System Performance Assessment, that's a 10,000-year analysis.

And our application today deals with 10,000, not beyond 10,000 years. And there's some issues there with the remand of the EPA standard that we have not actively done that analysis to deal with that remand yet. And we don't know exactly what the standard beyond 10,000 years is going to be either.

The next slide just gives an outline of the general information section at a very high level of the application, a general description. This aligns to Section 1 of the Yucca Mountain Review Plan so 1.1 would be general description. We call it GI-1.

Basically just some lead-in information, give a general description of the repository, the repository facilities, the repository location, a little bit about Yucca Mountain.

GI-2, again, these align exactly with the Review Plan 1.1 through 1.5. Its proposed scheduled, it gives the schedule for construction, receipt, and then emplacement of waste.

GI-3 is the Physical Protection Plan. At this point in time, the Physical Protection Plan and GI-4 as well, the Material Control and Accounting Plan, are more conceptual plans. We give commitments to what those plans will contain in detail.

Those commitments will be to have those plans available, I believe, six months before we make the update to the license application, which is required by the regulation.

We sent a letter to the NRC staff and got a response where they agreed that these sections would contain more detail further along in the licensing process. We really need a facility to describe this in detail. So we don't have the facilities yet, but -- so those plans will be developed in more detail and refinement later on.

And then we talk about site characterization activities. This is, by length, the longest part of the Review Plan. It goes through the 20-plus years of site characterization that's been done on the Yucca Mountain site. It gives some of the results of that scientific analysis as it leads into the safety analyses that come later.

This slide on 5 just basically shows you the Yucca Mountain site and how we've defined the boundaries, you know, in the regulation, and how our terminology aligns with that.

The green line along the outside is what we have been calling the land withdrawal boundary or proposed land withdrawal boundary. At this point in time, the land withdrawal boundary will equal the site, which will equal the pre-closure controlled area. So all of that information and all those terminologies will be the same in our definition.

We also show the surface GROA and the subsurface GROA. The surface GROA, and it's a little bit odd shaped maybe even than what you've seen before, basically shows the maximum extent of the surface GROA.

There will also be where the openings to the underground, that will also be designated as GROA. And I'll show you on, I think, the next slide how the GROA will move over time.

On the left side, you see the subsurface GROA, the left in blue. And that shows the subsurface as it develops and the geological repository operations area, it also will move over time.

So as the repository is developed and as nuclear material is handled or placed in the repository, the GROA will expand to cover the areas of nuclear operations. So this shows the maximum extent of the subsurface GROA as well.

And I will point out, and you can see, the blue area. That's the controlled area which would be the post-closure controlled area. And again, defined by regulation, it can't be more than 300 square kilometers. And this is about a 300-square kilometer depiction here.

Basically it extends south in the predominant direct of ground water flow per the regulation again.

I think you can see 40-mile wash over to the right side of that blue area that kind of meanders back to the middle.

It's where 40-mile wash crosses the southern boundary of the controlled area, which aligns with the southern boundary of the Nevada Test Site. That would be where the ReMi would draw water and where the water concentrations are calculated or the dose.

The next slide shows the GROA as it may expand over time. On the lefthand side, it shows an initial operating capacity of what we call the fuel handling facility.

I think you've had -- I know you've had presentations on the design of the repository. Right now there are several different surface facilities that would be developed in a phased manner. So the first facility to be built would be the fuel handling facility.

Perhaps the canister handling facility, which is the second from the left, would be completed at the same time and available for nuclear operations. But as the facilities, and kind of diagonally from left to right, are developed -- in this depiction -- this is a north being up depiction -- as the areas expand, as the aging facilities are developed in modules, 5,000 metric ton modules for aging facility, then the GROA boundaries would expand to cover the extent of the nuclear operations.

So where there's nuclear operations, that is geological repository operations areas.

There would be separation, and this is outlined in the application. We calculate, I believe, the Part 20 dose limit requirements. And our regulation is a little unique in that Part 20 and important to safety are tied together in the regulation.

Those Part 20 on-site requirements, on-site public requirements, are calculated, I believe, at 100 meters from any nuclear potential point of radiation release. And we would make sure we maintain that as the GROA boundaries are managed. And as construction on the other side of the boundaries are managed.

So in the full operating capacity, you'll see the outline and the shape of that matches the shape on the previous slide. That would include fuel handling facility, canister handling facility, dry transfer facility 1, dry transfer facility 2, and a fully developed aging facility.

And that facility now is 21,000 metric tons, 20,000 metric tons, and 5,000 metric ton modules, and 1,000 within the immediate handling facility operations.

Slide 7 gives you the general upper tier outline of the Safety Analysis Report. The Safety Analysis Report in the Yucca Mountain Review Plan is Section 2 of the Review Plan. And in our terminology, it's SAR Chapter 1 through 5. So instead of 2.1 through 2.5, it's SAR 1 through 5.

We start with repository safety before permanent closures. The Pre-closure Safety Analysis, that's 2.1 of the Yucca Mountain Review Plan. We go repository safety after permanent closure. Our total system performance assessment is 2.2 of the Review Plan.

Research and development programs to resolve safety questions, Chapter 3 of the Safety Analysis, 2.3 of the Yucca Mountain Review Plan. And I'll go ahead and say -- we're probably not going to talk about this later -- this, for us, right now is a placeholder.

We believe we have adequate information and have performed an adequate safety analysis to show that a repository can be operated safety both in the pre-closure period and it will be safe over 10,000 years.

If issues come up during the licensing reviews or other issues for any other reason and we need a research program to resolve those questions, then we would have to modify and put that information in here. But right now, that's a placeholder section.

Then the Performance Confirmation Program and I know back then, I think the last time was July of `03, you had quite an extensive presentation on the Performance Confirmation Program.

We were on Rev. 3 of our Performance Confirmation Plan at that time. We are getting ready to issue Rev. 5 of the Performance Confirmation Plan, which should be done about the end of this month or the first of next month.

This section is a summary of the Performance Confirmation Plan. And like other parts of the application, there's extension referencing to the underlying basis documents that we prepared on the project.

But the Performance Confirmation Plan itself is not part of the LA. But it's just a summary description that appears in the license application. But it is referenced extensively. And it will be available for the NRC staff review.

And then --

CHAIRMAN RYAN: Joe, just a quick question.

MR. ZIEGLER: Yes?

CHAIRMAN RYAN: It's not part of the LA but it is one of the requirements you have to meet?

MR. ZIEGLER: It is a requirement that we have a Performance Confirmation Plan. But it's not required that that plan be part of the LA.

The problem comes making a lot of these plans actually part of the LA is changing the application means a license change. And so changing the Performance Confirmation Plan in relatively minor ways would not necessarily require a license application change or a license change. So --

CHAIRMAN RYAN: So it's really to address the procedural aspect? But as I read the regulation, it's obviously one of the major requirements.

MR. ZIEGLER: It is required, right. It's like Radiation Protection Program.

CHAIRMAN RYAN: Got you.

MR. ZIEGLER: We have the program but the program has minor modifications to it, you know, as time goes on but the program itself is not part of the

LA. It's described in the LA.

And then we go through management systems. And I'll go into detail what that entails later. But that's the organizational structure, key positions, things like that.

To just show you a little bit of an out line here of the surface facilities because all the front end of the application is that. And this shows kind of the layouts that I was talking about before. It was in the GROA depiction.

But development of the surface facilities kind of starts in the lower left portion. And then it kind of moves up diagonally to the right. So the communication center, central communication center, fuel handling facility, canister handling facility, dry transfer facility 1, dry transfer facility 2.

The aging area is up in this area, cask waste prep and receipt building is right here, so canister and waste package receipt building -- so you'll see on these lines is what we call site specific casks can either go in this prep building or they can go up here directly into these facilities.

A site specific cask would be an aging cask. So we've developed site specific casks. We outline that in Section 1.2.6 when we discuss our aging facilities. And so those aging casks would come in that direction.

The blue line shows the direction that waste packages could come in. They could either go into this prep building and then into the aging facilities before loaded or we have the capability to take them directly into each of the handling facilities.

Once they are loaded, then they come back out and go into the ground here. Here's the tunnel that exists today that goes underground.

And transportation casks. Again, transportation casks can come in and go through the prep building and into these major facilities or they would have to go directly into the fuel handling facility. So -- and then they would be unloaded. And the waste material that's inside then would be put either in a site specific cask to go to the aging facility or they would be put in a waste package to go underground and be in place.

Going into a little bit more detail now about what the Safety Analysis Report contains. Chapter 1 of the Safety Analysis Report is on the order of about a thousand pages plus many other hundreds of pages of tables.

We use a tabular format in many cases, and I'll get into some of that later, especially when we were doing in pre-closure in the determination of what is important to safety and what's not important to safety and what's the probably subject of technical specifications.

1.1 gives the site description as it pertains to pre-closure safety. That's things like climatology, meteorology, geography, seismology, land use tomography. This basically says what we need to know in order to do an adequate pre-closure safety analysis and to construct and operate the surface facilities.

1.2 goes through the surface structure systems and components and the pre-operational process activities. It's an overview. It talks about option in construction activities. It talks about what the major facilities of the repository that I just basically went over with you in a little bit more detail than that though. And it just sets the stage for the subsequent sections.

Then we go through -- okay, on the surface. Then on the subsurface structure systems and components and operational activities are in Chapters 1.3. Again, overview, design considerations, emplacement and non-emplacement areas of the subsurface are described.

Then we talk about infrastructure, system structures and components, the equipment, the operational process activities, things like electric power, controls and monitoring, fire protection, waste management as far as onsite-generated waste, those facilities and services, heating, air, water, fuel, all those types of things. That's discussed in Section 1.4.

And then the waste form and the waste package itself, that's spent fuel and high-level waste, and our waste package, which is the Alloy 22 outer shell with an inner shell of stainless steel is described in Section 1.5.

Moving on through the pre-closure safety analysis on Slide 10, we identify the hazards and the initiating events that need to be analyzed, need to be considered for safety analysis for the pre-closure period.

Once the hazards are identified, we identify event sequences per the regulation. And the event sequences are sequences of events that could lead to radiological releases or radiological exposures.

We determine the probability of those event sequences. The probability plays into whether the event sequence is categorized as a Category 1 event, which is something that is expected to occur at least once over the period of operations or a Category 2 event, which is something that's not expected to occur over the period of operations but it has a one in one hundred chance of occurring over the period of operations.

Or whether it's beyond Category 2. And that's important because the regulatory limits that apply to these event sequences are dependent upon their probability. And it's risk-based regulation.

Then we go through the consequence analysis. For the event sequences that are Category 1 or Category 2 event sequences, we calculate consequences.

Our safety philosophy, I'll just tell you right now, is prevention first. So if we can prevent an event sequence from occurring in a reasonable manner and at a reasonable cost, then we prevent the event sequence from occurring. Or we reduce the probability to force it into a Category 2 event sequence or beyond Category 2 event sequence.

Secondary is mitigation. In all of this, we don't eliminate one or the other, you know, if we get to a probability that's nearly Category 2 but it's still Category 1, we still provide mitigation.

If it's a little bit beyond Category 2 as far as on the lower probability side, we still provide mitigation. So there is the defense in depth there. So we're not trying to cut the margin so fine that we don't protect our workers, and the public, and the environment. So we do.

1.9, and this is one that is table intensive, there's probably 10 to 20 pages of text in this section but it's mostly tabular information. And these are the SSCs, or the structure systems and components important to safety, the safety controls that will be applied to those SSCs, and measures to ensure the availability of safety system.

The table actually shows important to safety and important to waste isolation. We decided to put our classification information in one section. That's really a post-closure item.

But because we might have to put operational controls on important to waste isolation components, for instance the waste package, we want to make sure that the waste package stays in good shape during the pre-closure period so, like I said, our post-closure safety analysis continues to be valid.

So there are operational controls. Within this tabular format, we not only depict the classification, important to safety or not important to safety, and why, we also, on the important to safety and important to waste isolation, SSCs define whether or not they are the probable subject of technical specifications.

I think they call it licensing specifications in the Review Plan. I think the traditional name in nuclear facilities has been tech specs. So we call it technical specifications but we do define the probable subject of tech specs and the nature of those specifications and what they'll be.

So they will either be limiting conditions of operation or other operational controls on those structure systems and components.

Chapter 1.10 deals with meeting the ALARA requirements for normal operations in Category 1 event sequences. ALARA will be implemented. Our project, under the auspices of a comprehensive Radiation Protection Program, we've included that as a later section with a description of the Radiation Protection Program. And this section refers heavily to that section that will come later on.

And we included that in a later chapter of the Safety Analysis Report. But this gives a fairly comprehensive description of ALARA and managements commitment to maintaining doses as low as reasonably achievable.

1.11, you'll see the plans for retrieval and alternate storage of waste. Again, this is a conceptual plan at this point in time. It goes to the element of what a plan for retrieval would contain. It makes commitments that if we ever decide to retrieve, then we would go through detailed planning and a more detailed, refined retrieval plan based on the circumstances that exist at the time.

But we do not believe that it was necessary nor prudent to go through a detailed planning for something one, that may never occur, and if it did occur, it would be at least decades into the future. And we've written a letter to NRC staff on that. And I believe we have their agreement on this concept as well.

1.12, plan for permanent closure, decontamination, dismantlement, it's just what it says. And, again, a fairly high-level plan at this point in time. This would be at about 50 years, anywhere between 40 and 50 years for the surface facilities or planned dismantlement of most of those facilities but not all of them. And 100 years is when we have analyzed closure, when we anticipate closure of the repository.

And we've added two sections that are not in the review plan. We added a section on equipment qualification program. It's been kind of a longstanding issue in the commercial power business. We wanted to address it.

It turns out there's not very -- this is basically on our important to safety and components, are they going to operate under the environment and are they qualified to operate under the environment that they will have to see.

And as it turns out, as you would expect, there's not a lot of very harsh environments at a repository. It doesn't have the very harsh environments of high temperature, high humidity. It does have high radiation fields that are typical in a nuclear power plant.

And it doesn't have the accident conditions where you get much higher levels of those three components, radiation, temperature, and humidity. And what it sees under normal operations. What this facility sees under normal ops is pretty much what it would see under any accident conditions so the equipment should operate. But we wanted to cover that more explicitly.

We also wanted to cover nuclear criticality safety. We believed it will be an important aspect of licensing the repository. So we've included a separate section on nuclear criticality safety.

Now I'm going to Chapter 2. Chapter 2 is our post-closure safety analysis. And that's done in what we call total system performance assessment. This aligns, I believe, with Section 3 of the Review Plan. I have a detailed comparison here later.

2.1 talks about the system description and a demonstration of multiple barriers. And on the next slide I'll give you a graphic depiction of the way we have defined barriers. And it's a little different than what we have -- we've grouped it differently than what has been presented in the past at ACNW.

Let me just go ahead and flip to the next slide. And then we'll have to come back for this.

Basically our modeling and our barrier description follows the path of water, okay? The only way any substantive radionuclide releases could occur in a repository is ultimately through water infiltrating -- you know, through precipitation infiltrating through the mountain eventually seeping into the repository drifts where the waste would be located creating a mechanism for corrosion of the engineered barriers and degradation of those barriers.

So basically the way we've defined the barrier systems, we've define it upper natural barrier. And this would include the topography, the surficial soil, the rock, and the unsaturated zone above the repository. So the modeling then, to climb it down through there down to the repository proper, that's just a depiction of a drift within the repository.

Our second barrier is the engineered barrier system. And we basically are looking at several things here. We're looking at the emplacement drifts themselves. The shape and the size of the drifts will limit the size of rock pile, they will limit the way water could ingress into the repository through seepage, and the way it would disperse around -- in most cases disperse around the walls of the repository.

Dripping is, however, possible. Therefore there's a drip shield that's a primary component of the engineered barrier system. The drip shield and then the waste package under the drip shield.

Ultimately, once moisture and water get in, it is possible that this barrier would degrade over long periods of time. So once these barriers are degraded and moisture gets in, there's some additional engineered barriers. There's the cladding, in particular, on spent nuclear fuel and the waste form of the other waste.

There's the invert under the drift. This is a pallet with waste packages sitting on it. The inverts under the drift would be filled with crushed stone. But there is some absorption and diffusion through that invert.

This is the drift T-way. And we've also called that important to waste isolation. The t-way basically is backfill plugs at the end of each drift in the primary access mine. The reason this is important to waste isolation is in an igneous event scenario.

There were questions raised as to whether or not magma, once it came up through the repository, even though a very low probability event, whether it might snake its way back and forth along the drift. This backfill plugs at the end of the drifts helps address that question so that's part of the design.

Once the engineered barriers are taken into considered, this engineered barrier system, second barrier, our third barrier is the lower natural barrier system. And the lower natural barrier system, again, following the water.

Once it got through, water got through the invert, it might have some radiological contaminants in it. It still has about a thousand feet of the unsaturated zone that it has to penetrate before ultimately reaching the saturated zone.

So -- and each of these provides its own hold up, its own dispersion, and own performance aspects. And they're all part of the engineered barrier -- all part of the barriers in repositories. So we've defined three primary barriers, upper natural barrier, which contains several features, the engineered barrier system, which contains several features, and the lower natural barrier system, which contains several features.

Going back to Slide 11, Section 2.2 is the scenario analysis and event probabilities, what we call the FEP section. This is another section that is largely tabular in nature. It goes through the screening analysis of all the features, events, and processes that we consider in evaluating safety of the repository over long period of time.

We're required to consider events that have at least one in 10,000 probability over a 10,000 year, nominally a 10 to the minus 8 per year probability event. So we go through a long list of features, events, and process, screen them.

Either they're in or they're out. If the probability is above 10 to the minus 8 or at 10 to the minus 8 per year or higher, it is screened in unless there is reason to show that it is of no consequence to the performance of the repository.

So events that meet the probability threshold and are of consequence to performance of the repository are considered in the safety analysis.

Section 2.3 goes through the model extractions. It will show the components of the repository, the basis for the presentation, and the order of that. And I'll show a little more detail about 2.3 because 2.3 is probably, volume-wise, the most voluminous part of the application because it goes through the different model components that are considered in the post-closure safety analysis so more detail later.

And then 2.4 is the demonstration of compliance with the pre-closure public health and safety and environmental standards. That's where we go through the model description of the integrated TSPA model. So there is some lead in information there.

Once we go through the individual model components in Section 2.3, we go through the model description of the integrated TSPA models and how they fit together in 2.4.

There's a little bit of that in a lead-in section. It's 2.0. I didn't put it down here but that gets into more detail in Section 2.4.

Then we go through the results and present the results based on the individual protection standard, the human intrusion standard, and the groundwater protection standard. And we give the results in each of those area.

CHAIRMAN RYAN: Joe, I think I heard you say pre-closure but I think you meant post-closure.

MR. ZIEGLER: I mean post-closure, excuse me.

Okay. And I've been through Slide 12. We'll go to Slide 13. Thirteen goes through Chapter 5 of the Safety Analysis Report. And I skipped from 2 to 5. If you'll remember Chapter 3 was the R&D programs. It's basically a placeholder section.

Chapter 4 is the Performance Conformation Program. So it's about a 50-page summary description of our Performance Confirmation Program that relies heavily on the Performance Confirmation Plan.

Chapter 5 goes through the management systems. And it's the whole long list of management systems. Quality assurance program, we reference our quality assurance and requirements description. It's in Reg 17 proposed right now.

And we plan to just continue to revise the program that's in existence. It largely meets the review plan criteria. As a matter of fact, I think the review plan was largely written around our existing program.

Not only do we reference it, we will include it as part of the application because it's required by the regulation. So we will do that.

Record reports, tests and experiments, general records program, retention, storage, disposition requirements are all talked about in that section. That also talks about the provision of space to the NRC at our location for resident inspectors. And we've had a recent request from NRC about providing more space. And we've agreed to provide more space as they plan to provide inspection activity for the project.

Qualification of personnel, 5.3, that gets into the organizational structure for both construction and operations of a repository. It gets into what the key positions are and the qualifications of those key positions are.

We have not named people to fill most of those key positions at this point in time because we're years away from those positions needing to be filled. We don't need an operations manager or a construction manager today.

We're years away from that but we do give -- we do define the organizational structure and the minimum set of requirements for those positions.

We go through expert elicitation. And we talk about the elicitations that we've already done. And we talk about how we do elicitations according to NUREG-1563, which is the NRC Branch Technical Position on Expert Elicitation.

Some of those that we've already done are probabilistic vulcanic hazards analysis, probabilistic seismic hazards analysis. There's an elicitation done on FC flow and transport. And then if we ever do any in the future, then they would need to come back and be described in this section.

5.5 talks about the plans for initial start up activities and testing. That is a brief section at this point in time. And would be more fully developed in detail once the facilities were actually -- construction was nearing completion. And then a submittal and an update to the application would be made at that time to the Nuclear Regulatory Commission.

5.6, plans and procedures for the conduct of normal activities, maintenance surveillance, periodic testing, again, that's a brief section. There's commitments to have various and appropriate operating maintenance, surveillance, and test programs and procedures in place before those activities need to occur. And again, we're years away from any of those activities.

Emergency planning, again a conceptual plan with a commitment for more detailed planning once the facilities were more fully developed. There won't be any nuclear material on site until after 2010. And so we're years away from that. The emergency plans need to be done and then kept up to date.

So we make many commitments for the detail and the content that will be in the ultimate emergency plan. It's more conceptual at this point in time.

Controls to restrict access and regulate land uses. We talked about land ownership, controls, the need for withdrawal of the Bureau of Land Management properties for permanent use for the repository. We talked about pre-closure controls. We'd also talk about the permanent marker systems that are required post-closure. And so there is a fairly extensive discussion of what those markers will be.

5.9, we talk about uses for other uses of the repository. Basically we recognize that there are Native American activities that have gone on in this area and will continue into the future. We talk about protection of resources, performance monitoring, pre-closure and post-closure.

We talk about other activities will be allowed only if there is a specific analysis that shows that those activities can be done safely. So we'd make sure that there is no harm to the public or the environment.

Tech specs and license conditions, 5.10. It talks about the structure of our tech specs. It's what the review plan, I believe, calls licensing specifications. We call them tech specs. And the probable subjects of technical specifications. This section points back and relies heavily on the tables in Section 1.9 that go through the classification of what's important to safety and what's important to waste isolation. And identifies specifically the probably subjects of the tech specs.

And then 5.11 is the Operational Radiation Protection Program. We go through that in more detail here. There's about a 25-page summary section of what the Operational Radiation Protection Program have in it. And a commitment of more fully develop that program as we get closer to the time where the program will actually be needed. And it reiterates the commitment keeping doses as low as reasonably achievable.

I'd mentioned earlier that I wanted to go into a little bit more detail about Section 2.3 2.3.X, as we call it, basically are the component models of the total system performance assessment. And these sections are developed in a standard format. And it covers quite a few of the acceptance criteria in the review plan.

There's acceptance criteria that requires system description and model integration, data and model justification, data uncertainty, model uncertainty, and general references.

We have structured this to talk about the role of the model component in the TSPA. And how each particular model component fits within the entire analysis or the integrated analysis.

We talk about a summary of the features, events, and processes, the FEPs, that are evaluated in that particular model component. Now we will point back to Section 2.2, which goes through the entire FEPs screening, which screens some things in, it screens some things out.

The things that are screened in that need to be considered within each model component are discussed in more detail in each model component section.

Then we talk about the overview and a summary of that model component. Again, trying to say what's in it, how it integrates in more detail.

And then we go into several subsections, typically it's 2.3.X.4 through 2.3.X.7. Sometimes it goes through .8. And it talks about the things particularly in these middle acceptance criteria. Data and model justification, data uncertainty, model uncertainty. Make sure we go into that in detail.

Sometimes there's submodels within the models so the models so it's broken out into subsections.

And then a section on general reference that, again, points back to the bases analysis. That's the basis of what actually goes into the license application.

And again, I want to reiterate that we tried to reference within the text of the application where the basis documents that make up the bases for the application, where that information is contained in more detail. Again, that's to facilitate the NRC review of the license application.

Safety Analysis Report outline. These next two slides I'm going to kind of reiterate what I said when we define the barrier system is our organization is to follow the flow of the water. We start with the climate and infiltration. We have precipitation and some infiltration into Yucca Mountain.

We talk about the water and how it may flow through the unsaturated zone. Ultimately some of that water would reach the drifts and seep into the drifts. Some of the water might drip, okay? Most of the water will not be dripping water when it gets into the drifts. But there is the possibility in some parts of the repository there will be dripping water.

So we talk about the drip shields. And we talk about the waste package. And we talk about the mechanisms that could degrade the drip shield and the waste package.

We talk about the chemical environment in the drift, okay? And how that chemical environment either promotes or protects the engineered barrier system. And then leading up to corrosion of the system.

Then we talk about the end package environment because once the waste package would be degraded, which is possible over very, very long periods of time, then the chemical environment and the way the waste form degrades and the solubility of the materials that make up the waste form and water become important into the performance.

Then ultimately for the nuclides that are dissolved, radionuclide transport through the remaindered of the engineered barrier system and then into the unsaturated zone below that. Now we're into the third barrier I mentioned.

Saturated zone flow, eventually the water reaches the saturated zone. It eventually gets to the point where the ReMi would be using water or withdrawing water. That would be -- and it would go into biosphere transport and exposure. So it's how the water is taken up, how it's used.

The ReMi drinks two liters a day, uses it to grow crops based on the average in the town of Amargosa Valley. And that's based on food consumption surveys that have been done.

Section 2.3.11 is igneous activity. And igneous activity is a little bit different because there's two part of that disruptive event scenario. There's an intrusive igneous event and the intrusive igneous event could damage some of the waste packages but would not actually result in a volcano.

Once the waste packages are damaged, then basically the engineered barriers are not as effective or not effective at all in some cases. And then the rest of the modeling is still applicable.

For the extrusive igneous event, for the volcano scenario, it's a different set of analyses. And that's why we divided igneous up into a separate section of the Safety Analysis Report. And so that's modeled separately.

It goes through, at least as far as the way the event propagates, and then it leads to a deposition in the form of vulcanic ash at the ReMi location. And then it gets back into part of the biosphere calculations.

This just shows what I've already said in words is that, you know, the way the process works, we've identified the features, events, and processes. We've screened the features, events, and processes. If it's of a less than 10 to the minus 8 per year probability, it's screened out. If it's of no consequence to repository performance, it's screened out.

The FEPs that are screened in are a nominal scenario class that's basically, you know, through the groundwater class.

Seismic scenario class is included within the model components that I described earlier. There are seismic scenarios that cause some of the engineered barriers to degrade faster at different times or to make those engineered barriers not available during certain seismic events. So that's included within the modeling components that I described earlier.

The igneous scenario class I just went over. And it's divided into those two components, extrusive and intrusive.

And then we basically, again, just follow the water. Unsaturated zone flow to the repository system, engineered barrier system, waste package.

Then we get to biosphere. And from the biosphere is where -- the output of that is where we actually feed and calculate radiological dose.

And we can get a dose from igneous scenario, the nominal scenario, and the seismic scenario. Those doses are weighted and summed. And that gives us the results that we use in Section 2.4 to show how we address the radiological protection standards.

Slide 17, it -- and I'm not going to spend as much time on these slides because it's a repeat of what I've already gone over but I did want to show a comparison to the review plan. We have been asked questions about why we didn't align with the review plan in certain instances. And my answer is is that we do align with the review plan.

So this just shows the general information section. It's Section 1 of the Yucca Mountain Review Plan. It's the GI section of the license application. And as you can see, Sections 1 though 5 align just almost perfectly and they're modeled almost identically so that those sections align fairly obviously. I won't dwell on that.

Page 18, that goes through Section 2 of the review plan. Section 2 of the review plan is safety analysis report, Section 1, in our license application terminology. And that's the repository pre-closure safety analysis. It aligns very well also.

We start with just a general lead-in section. We talk about the site description as it pertains to that pre-closure safety. Then the review plan goes into Section 2.1.12, a description of the structure, systems, components, and equipment, and operational process activities.

The review plan, and if you'll just glance at the next page, divides a description of the structure system and components. If you look at Section 2.1.17, it talks about the design of the structure systems and components important to safety and safety controls.

We've combined those two sections. But we've combined it then we sliced it a little bit differently.

We talk about the description and the design of the structure systems and components in the same sections. We start -- but we have broken it out into various major pre-closure facilities. The surface structure, systems, and components, the subsurface structure, systems, and components, the infrastructure SSCs, and then the waste form and the waste package.

And in each of those we go through both the description and the design of those components. So we just sliced it a little different. The same information is there.

And this was more for -- one, there was a lot of redundancy we were finding, and two, is the Safety Analysis Report has to be kept up to date. So if we keep all of that information in one place, there's less likely to have a disconnect and not get part of the information updated. So it's also a configuration management concern on our part.

Going back to Slide 18, the rest of Chapter 1 of the LA, again aligns, I believe, perfectly with the review plan.

Go through page 19, let's see -- get to 1.9 up at the top of page 19, structure, systems, and components. This is, again, that large set of tabular information where we do the classification analysis. I will mention here that this has caused us some problems.

And it's because of the little bit of a difference -- and problem is probably not the right word -- it's caused some consternation on our part.

It's 63-111A talks about the requirements for repository, 63-111B talks about classification and what's important to safety.

63-111A says we have to meet 10 CFR 20, which we knew that. You know all nuclear facilities licensed by the NRC meet Part 20. 63-111B, though, talks about classifications. So as it turns out, our regulations requires that SSCs that are required to meet Part 20 onsite dosage requirements are important to safety. That's a little bit different treatment than what you would see in a commercial power plant.

And because of that, we're having to define certain components of the repository, certain SSCs of the repository as important to safety, make them safety grade, apply QA controls and such that aren't necessarily typical within the nuclear business for the same level of risk.

It has caused us to classify some of our systems as important to safety that may be in a power plant would not be classified as important to safety. We'll get through it. And we have. And we've described it that way. But it's a little bit different concept than what's in a typical --

CHAIRMAN RYAN: Just a quick question, Joe. Do you have an example of that? Or can you just give us an example that would help us understand a little bit?

MR. ZIEGLER: I'll give you an example of something that's ITS because it's meeting a Part 20 onsite limit. Our handling and transfer cells operate, you know, normally high radiation doses within those transfer cells where we're taking commercial fuel assemblies and taking them out of a transportation cask and putting them into a waste package.

We can show that normal operational doses are very, very low there. But we have -- typically we would not need important to safety electrical systems in our repository. Things fail safe. We try to prevent events and event sequences that would release radiation from occurring.

In this particular facility though is that in order to meet the Part 20 dose limit which, I believe, is 100 millirem, the onsite, non-rad worker, the onsite public will need those ventilation systems to be operating.

If we can show through just normal operations, one, the facility wouldn't be operating. If they're not operating, we can show redundancy. We can show high reliability of those systems. But once they become important to safety, then we are applying different criteria to those systems even though we can show they're highly reliable.

Part of the problem is is that our designers have worked in nuclear power plant design in the past. There's a lot of comfort in designing to certain IEEE codes in this case for the electrical systems.

We really don't need those codes and designs but it's difficult to get away from standard nuclear safety design, okay?

We don't have a reactor core to melt. We don't have any severe accident scenarios. And so meet this 100 millirem limit, which basically is going to be met with the reliability of the systems anyway, we go to ITS and we start applying, you know, design codes and standards that are standard for the nuclear industry.

And so it's caused us to do some things that maybe otherwise we wouldn't normally have done. And I'm not sure that it actually adds to safety but it may detract because it's money and resource spent in this area versus spending it in another area.

But anyway, it's something we will get through. We will design it and we will meet the requirements. And so that's the way the design is right now.

Okay, 2.1.18 is, again, the ALARA Program. I will point out that we included the Radiation Protection Program in this ALARA description here but it always shows up later on as well. So there's a match here in this section. But it also shows up in Section 5 of the Safety Analysis Report.

Okay, still in the pre-closure section, plans for retrieval. We put together a retrieval plan. I mentioned that that would relatively conceptual at this point in time. More detail if a decision is ever made to retrieve.

And plan for permanent closure, I've been through that.

Equipment -- we added equipment qualification. We added nuclear criticality safety. So, again, there's no specific review plan referenced to those. I've been over that already.

Okay, now we go into YMRP Section 2.2, that's the post-closure safety analysis. That's our Safety Analysis Report Section 2.

I didn't put it on here but there's actually a lead-in heading on the review plan called repository safety after permanent closure. And then it talks about performance assessment.

We've combined that repository safety after permanent closure. That's out lead-in section.

We also have some of the information required in this review plan section in Section 2.4. So we've kind of been a little bit redundant here where we have a lead-in section but when we get to the results section, we also talk about the integration of all the different model components and how they fit together.

So some of that information is also contained as the lead in to Section 2.4, particularly in Section 2.4.1 that talks about the TSPA model, the nominal, the seismic, and the igneous scenario classes.

Then we start moving down through the outline. The system description, same. Same order of the scenario analysis and event probability. That's the features, events, and processes screening. That's the same. The model extraction, that's the same.

Waste package and drip shield barriers. You'll start seeing -- we starting getting in different order here. As the ordering in the review plan is done, and I presume that ordering was done to align with the NRC modeling of total performance, their PPA code, we structured this, again, to follow the way that we modeled repository performance.

And we modeled it following the water. So our structure is ordered a little bit different but, again, it contains the same information.

And we believe that to really facilitate the regulator's review it would be -- instead of trying to force ourselves into that format in the review plan, it would be better to define our application in the way that the modeling was done so that there won't be this translation back and forth all the time so that actually the reviewers can look and see the way we did the modeling.

It will require some translation. That's one of the reasons that in the application, in each of these 2.3.X sections and other major subsections is that we include a table right up front that says okay, here's what's in this section, here's what review plan sections that it addresses. And here's what regulatory -- Part 63 and Part 20 or other parts of the regulation that is addressed within that section. So we've done that cross referencing.

And we follow the water. So that's the differences. And you can see just looking on the next two pages -- I guess three pages -- that there is some difference here. But the differences are more in ordering than they are in anything else. And that's in our 2.3.X sections versus the 2.2.1 sections of the review plan all the way through Slide 23.

And I'm not going to go through all these in detail but you can see the differences. But the differences are entirely in the ordering I believe.

There's a couple of other differences. For instance on page 23, if you'll look at review plan Section 2.2.1.311 and 2.2.1.313, 2.2.1.311 talks about airborne transported radionuclides. There's not a lot of airborne transport except in the igneous scenario. So airborne is dealt with in our biosphere description. But it's also dealt with in that igneous extrusive circumstance.

Same thing in 2.2.1.313, redistribution of radionuclides in the soil. That's dealt with in the biosphere section for the nominal scenarios, you know, where nuclides may reach the accessible environment through a water pathway.

But through a vulcanic pathway, the distribution in the soils is a little bit different circumstance where through the pathway once a volcano occurs, the primary uptake of radionuclides is through resuspension in the air whereas through the groundwater pathways, it's primary is drinking two liters of water a day.

So it's a little bit different there and we've included it where the results of the model took us.

Okay. Then we get into Section 2.4 of the review plan. 2.4 aligns with 2.2.1.4 of the review plan. That's our results section, demonstration of compliance. And, again, we go down just as the review plan does, individual protection standards, human intrusion standard, and groundwater protection standard.

Again, this shows Section 3, 4, and 5 of the review plan. I think I've been through all of these in some detail. They align with the review of the LA. The LA sections align with SAR Section 3. And research and development of programs, performance confirmation, QA, records, down the list. And we align perfectly there until the bottom of page 26.

I mentioned that we included a section specifically about the Operational Radiation Protection Program. That was not called out in the review plan but we thought that program was important enough that it needed to be called out specifically.

And there's more detail. There's a 20- or

30-page section just summarizing the Radiological Protection Program that aligns more closely with 2.1.18 of the review plan which I already went over up in the pre-closure section.

The next slide, on 27, gives you a little bit of an idea of what the outline is going to look like. So there will be tabular information in a little bit different form. But essentially in this form at the beginning of each major section.

For instance, GI Section -- General Information Section 3 is the physical protection plan. We point to Section 1.3 of the review plan. And we point to 10 CFR 7351, 72106, 6321B3.

The we go down into the subsections of the physical protection plan outline. And those subsections point to the review plan sections and the regulatory sections.

And, again, that's to facilitate the NRC reviewers' review. And, frankly, to help us make sure that we've covered everything when we're preparing the license application. So this structure is in the entire license application.

I will say although it's not part of the application, we also did a different cut on this. And then we did a reverse matrix. It's not part of the application. We do plan to provide that at the same time as we provide the application to the NRC.

That may actually help facilitate the individual reviewers that have certain responsibilities defined by review plan sections. We think that may help NRC then look and make sure that they look at each section where we've met part of the review criteria.

So we're doing it both ways and, again, we think it will facilitate review but it also facilitates completeness on our part.

So in summary, our license application format and content does align with the Yucca Mountain Review Plan with minor deviations but -- or apparent deviations but we believe they're very minor and there's reasons for those deviations that, I think, actually will facilitate its review.

The organization presents our licensing basis for the repository, both in pre-closure safety and post-closure safety. The content is consistent with the existing and supporting project documents. Things such as the site description, what we call analysis and model reports, or AMRs, for the post-closure analysis, system description documents which lead into facility description documents and are the basis for the design of the facilities.

And so those documents are heavily referenced and will be available to the NRC reviewers for inspection during the review of the application.

We also included the crosswalk in each section, the tabular information at the lead in of each major section, and we'll include that reverse crosswalk to help facilitate the review at the time we make the license application.

So with that, I hope this didn't get too long winded for you but I'll entertain any questions you have.

CHAIRMAN RYAN: Joe, thanks. That's a very detailed picture of the license application. I think that's pretty helpful for you to go through that. It's a lot of information to digest but we have a really clear roadmap of where you're going.

I guess four questions came up in my mind as you gave your presentation. One, back in June we talked with you about quality assurance. And that there had been a process of review. And at that point, you were six months away from where you are now and you had talked about that flowing into the application.

Could you talk a little bit about how that worked and, you know, how your quality assurance process helped the application be where it is today?

MR. ZIEGLER: Yes. Most of the quality assurance, as far as the safety analysis, went in to what we've done with the AMRs and with the pre-closure analysis. We've done a lot of extensive QA evaluation and assessment.

Over long periods of time, you know, we've had some problems in following procedures in the post-closure analyses parts. The AMRs are getting through that. We're doing an assessment that's being done right now. It's about halfway through looking at the quality of the underlying post-closure safety analyses and the supporting AMRs. And it's looking good.

So we believe if it continues to go the way it's going so far -- we're about halfway -- the QA organization is about halfway through that, assisted by technical experts in each field -- that's coming out pretty darn clean.

So we believe that we've added a lot of better -- what's the right word -- assurance, I guess, quality assurance that the products do meet their intended purposes, are done according to the right procedures, that the documentation and analysis will withstand whatever tests.

Pre-closure, we -- within the program a couple things happened. We were starting to look through our QA organization. But we also were encouraging, because of past problems in other areas, encouraging all of our project staff, if there were problems, to identify them.

So we had a couple self-identified condition reports on the pre-closure safety aspects of this. We went and looked, both technical staff on the DOE side and QA staff.

We were able -- actually the concerns that were raised were not exactly substantiated. But we looked further than that. And there were issues that needed to be dealt with.

So we've created the Design Integration Team. And it's to look at the design and then the pre-closure safety analysis flowing from that design work. And we're basically going back and making sure that that information is what it needs to be, it meets all the quality standards as well. And that the documentation is there to prove it when we need to do that. So we've done that.

As far as the document itself goes, we added another review to the document. A senior project manager -- John Arthur and myself and others read through the entire license application in the month of September and commented extensively on it.

A lot of it was transparency, traceability. I guess that was the biggest concern. But those were the types of things that were identified in our technical products as well.

QA participated in that review as well. And other technical specialists in various areas.

We went through it, John and I, you know, basically we'd read during the daytime and we would meet in the evenings to go through the comments and hand them back over for resolution. That review resulted in a complete revised draft of the application that was delivered on November 5th.

So I have a ten-volume license application. We have not completed our review of that to make sure that all the issues that were identified have been adequately resolved. But we're in the process of doing that. So we've done a lot actually.

CHAIRMAN RYAN: Well, it sounds interesting. I guess the documentation of all those processes and activities would be available to the review staff at some point?

MR. ZIEGLER: The management review, yes, all the QA reviews --

CHAIRMAN RYAN: Yes.

MR. ZIEGLER: The RIT effort, the Regulatory Integration Team, the Design Integration Team, yes, the documentation to all that is available.

The management reviews, documentation, I don't know if it's publically available or not because our lawyers tend to mark all this pre-decisional, you know, attorney/client work product. But it's there. I would think that the NRC would have access to it.

CHAIRMAN RYAN: The second question is we've heard a lot, of course, over the years about KTIs and resolution of KTIs. Could you maybe speak to how that stands from your view at this point?

MR. ZIEGLER: Better than the last time I talked to you. We completed all of our KTI responses in August of this year so we responded to all 293 agreements. I think since last I talked to you, I've gotten about 20, 24 more agreements closed by the NRC staff. So we're up to, I think, 124, 125 agreements closed.

We've asked and been told that we will get responses to all the high risk agreements by the end of the year. But subsequent to that, some of the final touches on some of our analysis and model reports, our schedules lagged a little bit there.

And so I have asked Margaret Federline to, you know, don't feel obligated to respond, you know, on a particular day just because you had it in your schedule if all you're waiting for is our final AMRs. And the NRC staff has told us that they have the right to come in and inspect, you know, documents that aren't complete. So we allow that.

But they won't close agreements until that information is in a public forum. We don't put it into a public forum until the AMRs are actually issued. Once they're issued, we've been putting them up on our Website.

So there's -- some of their responses are probably waiting for us to complete and issue those AMRs. I think all the AMRs are scheduled to be issued, with the exception of the TSPA analysis itself, by the end of this month. So I think we'll make that. It may be a week or so into December.

And so I would expect quite a few additional KTI agreements to be closed by NRC.

I also sent NRC letter. I can't remember -- it was about the same time frame I met with you last, basically describing our process, that we would respond to the agreements but we would probably not be able to respond to any more requests for additional --

we call them requests -- information -- additional information needs I think is what we call them in KTI space, that came prior to our application just because of the timing and being able to do that.

But whatever they told us, we would consider and try to work into the application itself. So I think since that time, we've only gotten a few agreements that they've not closed, where they responded. So I think most of the responses we've gotten to date are closures.

So I feel pretty good about where we are in the KTI process. It's not to say that some things won't be issues in the licensing proceeding once we get into more detail and the staff gets into more detail. But I think the process was useful.

And I've heard a lot of criticism from external groups about the process and how it's difficult for us and we ought to be playing in the licensing process but I believe it provided a structure to a first-of-a-kind analysis.

And as part of the structure, not that I necessarily agree with the NRC staff in every case, but that structure helped us through the process of looking at post-closure safety analysis in a very rigorous way. And I think it helped us get to where we need to be.

CHAIRMAN RYAN: Okay, well thanks. That's good to hear. I guess it sounds like the interaction with staff has been productive and moved things along in a productive way, too.

MR. ZIEGLER: I think it has, yes.

CHAIRMAN RYAN: You know I'll ask you the last two questions simultaneously. And somebody will ask you if I don't. Are we on schedule is one. Then the other is once the schedule is clear and there is an application, how will it be made publically available, and, you know, be available for anybody that might want to look at the 11 volumes or so?

MR. ZIEGLER: Okay. I'm going to dodge.

CHAIRMAN RYAN: Okay.

MR. ZIEGLER: And there's a lot of things that have happened over the last several months. You know the EPA standard was remanded. And there were lawsuits. And then the lawsuits were turned down. So the EPA standard is up in the air, you know, the post-10,000-year question in particular.

There are also -- we have had problems in our certification of LSN. There was lawsuits there and we were going to have to go back and re-certify LSN. And that work is still ongoing as well.

At the time, we have, as I mentioned to you, I have a ten-volume license application that's pretty good. And it's not that if we get more time that I wouldn't do some things to it, you know, to make it -- to facilitate its review.

But -- so my answer is there's people at higher pay grades within DOE that are considering that, including our large legal staff as to what's appropriate at the appropriate time. And I don't have an answer.

CHAIRMAN RYAN: Fair answer. I just -- I mean every body is thinking about it. So I figured I'd ask it first.

MR. ZIEGLER: I practiced that one.

CHAIRMAN RYAN: Thank you. Other questions from members? Allen?

VICE CHAIRMAN CROFF: Let me follow up on sort of what Mike just asked. You mentioned when you were talking at one point an update to the safety analysis. And then at another point, keeping it up to date.

Is this going to be some kind of a document that changes fairly frequently through time in the next few years, let's say, and how do people, you know, how does one know that there's been a change to it and where the change is in this rather massive thing?

MR. ZIEGLER: We'll have to, you know, have a configuration management process just like any Safety Analysis Report. In reactor space, Safety Analysis Reports are required to be updated once a year. Our regulation requires the Safety Analysis Report to be updated every two years.

I would expect after the initial application, and much like other licensing proceedings, especially large complex ones, this being a first of a kind, that we will probably update the Safety Analysis Report probably twice a year.

And I don't expect any particular massive changes to it. But as we get questions from NRC, as our analysis is refined -- analysis -- as our design is refined, okay, if we see things that are changing that would cause us to need to change the analysis or to update the analysis, then we're obligated to make that information known and do an application amendment or supplement.

The regulation also talks about, you know, basically two primary stages of the licensing process, Part 63. It talks about submitting the application. And then many times it talks about the Safety Analysis

Report as updated.

If you look at 6344 and some of the other change process descriptions within the regulation, it clearly anticipates the Safety Analysis Report as updated. We view that as being the version that exists, the revision that exists, okay, before the NRC is actually able to grant us a license to receive and possess waste.

But we would expect other amendments to the application, many amendments over time in the next three or four years. So I would say at least once every six months. If there's something major that actually comes up and it's not just a relatively routine update of the application, then I would expect, you know, intermediate updates in between.

VICE CHAIRMAN CROFF: Okay. And somehow the application is going to be made accessible to the public and everybody else on a Website or whatever?

MR. ZIEGLER: I can tell you a couple ways I know that it will be available. Of course once we submit it, NRC dockets it. I think it goes up within their record system. It also will be available in LSN. I'm pretty sure we're going to put it on our Website but I'm not going to commit to that right now.

But I see no reason not to. It's public

information. We've been pretty good in this program about providing documents, a lot of our technical analysis documents. So I believe it will be available on our Website as well.

Sometimes that's the easiest place to get it. If you have a broadband access, there's a lot of graphics and things, a long document.

VICE CHAIRMAN CROFF: Yes. You mentioned in a couple places basis documents I guess they were called.

MR. ZIEGLER: Yes.

VICE CHAIRMAN CROFF: Will those be available at the time the LA is submitted? The initial LA?

MR. ZIEGLER: Yes.

VICE CHAIRMAN CROFF: Okay. In the application, how is low level waste disposal handled or addressed?

MR. ZIEGLER: Right now we plan to package low level waste and send it to a licensed receiver disposal facility for low level waste. We got comments in the EIS and in other places that maybe we ought to dispose of it at the test site.

But right now that's not an option. In the future it could be. It would seem to make sense, right, because they have a large low level waste disposal facility.

You know we wouldn't even have to get on public roads. But right now what we said is we're going to dispose everything at a license disposal facility. So we'll package it for shipment offsite.

VICE CHAIRMAN CROFF: Okay. And coming to your -- I'll call it sort of the flow through kind of a mind set, if you will.

MR. ZIEGLER: Yes.

VICE CHAIRMAN CROFF: A couple of issues in that at one point I remembered there is some degree of coupling in feedback in terms of the thermal effects in water circulation, you know, I guess initially around the repository. But maybe as it cools, some of that is starting to intersect it.

How is that handled in terms of what's sort of an in and an out kind of a mind set? The feedback and the coupling?

MR. ZIEGLER: I'm not sure I understand the question. I may not be the right person to answer it.

VICE CHAIRMAN CROFF: Well, the repository is hot and then, of course, keeps water out.

MR. ZIEGLER: Right. Oh, oh, the reflux?

VICE CHAIRMAN CROFF: And then the reflux, right, right.

MR. ZIEGLER: I'm a nuclear engineer. I'll tell you what I know. And it may not be an answer and we may have to go get Bob Andrews or somebody to answer it.

But the way the modeling works is we do drive water away during the thermal heat up period. We still have thermal management criteria for loading the repository such that at least half of the space between the drifts -- and actually we get much more than that most of the time. It never going above the boiling point of water.

So things that are driven out to the side should flow down between the drift and the rock pillars between the drifts and in the fractures that exist in some of those.

All I can tell you is is that's part of the, you know, one of those 2.3.X sections. As to the way that water moves, we've done tests, including our large-scale heater tests where we actually heated up large portions -- you know, an experimental drive.

We have measured the way that the water has come back and moved back towards the drift. It actually moves rather slowly back towards the drift.

So all I can really tell you is that based on the data we've collected and the analysis we've done, that's factored into the models.

VICE CHAIRMAN CROFF: Okay. And where does the intruder business fit into this?

VICE CHAIRMAN CROFF: The human intrusion scenario is a stylized area defined in the regulation. And what it basically says it assumes that a driller on top of the mountain who would, and I think nominally would be drilling for water, which don't ask me why that makes sense. But we need to define the time at which that driller could drill without being aware that he wad hitting a repository.

Okay. So we've done an analysis to show that the engineered barriers, the drip shield, and the waste packages are intact. And I can't remember the number but it's something on the order of at least 30,000 or 40,000 years, okay?

And at that point in time, we basically said okay, just do the calculation. At that point in time, it would show up in the EIS. That's the way the regulation reads today.

Now how this remand of the EPA standard might effect the human intrusion scenario, I don't know. But we did a calculation of a driller drilling through a waste package, okay, and making the contents of that waste package available for transport down through the water system to the accessible environment.

I think also by regulation, we're not required to look at the impacts to the driller themselves.

VICE CHAIRMAN CROFF: Okay. And just out of curiosity, how long it -- how many pages is this thing roughly?

MR. ZIEGLER: The total application is about 5,000 to 6,000 pages including tables and figures.

VICE CHAIRMAN CROFF: Okay. Thanks.

CHAIRMAN RYAN: Ruth?

MEMBER WEINER: Let me get my microphone here.

Joe, first I want to thank you for a very thorough presentation. This is really good.

What do you expect are the most critical things in the license application? Where do you see that the red flags are?

MR. ZIEGLER: First I think it's a pretty good application. I'm not allowed to talk about what the dose results are but they will be comparable to what you've seen in the past in the time of the site recommendation and the FEIS.

We're pretty -- we're able to show that we meet the pre-closure standards rather easily. I'm having to make some systems and equipment important safety maybe that I wouldn't like to make but that's more from an operational cost perspective.

We've had some interchange with the NRC staff on these programs and plans is that if we look at our application versus other recent applications, the extent of the development of our application, we're comparable, probably a little more material being presented in that area than what you see in most recent applications.

It's a whole lot more than you would have seen in a reactor application say for radiological protect plan or emergency plan or physical protection plan. So Part 63 has a lot of requirements in there and a lot of expectations. If you look at review plan, there's a lot of acceptance criteria.

I guess the unknown is my biggest concern is that because -- I review the plan as the review plan not just for the time to determine whether or not construction authorization is granted but also for the time when the determination is made for a license to receive and possess.

And some parts of the review plan are very clear about what is expected when. Other parts of the review plan are not as clear about what is expected at what stage of the application.

We've used, to the extent we can, you know, intercourse with the NRC. We've had several letters back and forth, had several public meetings where that's been discussed. We've also looked at precedence as to what recent precedence and more historical precedence back in reactor licensing space that I have an uneasy feeling about exactly what the expectations are across the board in that area.

MEMBER WEINER: So is it fair to say, to say back to you what you just said, that your primary concern is something where the expectations of the licensing agency are not clear? Is that the fair thing to say? Where there is something unexpected that you can't foresee now will --

MR. ZIEGLER: I'm concerned about it because I would like to have more clarity in that area. But that clarity will come, you know, in the licensing -- I don't want to point fingers at the NRC staff.

I think they've, you know, this is a

first-of-a-kind licensing process. They've created an extensive review plan and a regulation. And, you know, we'll work with the staff as we go through the licensing process.

But yes, I have some concerns in that area.

MEMBER WEINER: And you can't -- there's -- it's nothing you could identify now?

MR. ZIEGLER: Well, the plans and the programs, we've sent to letters to NRC. Retrievability, for instance, okay? The review plan calls for, you know, plans on retrievability. And it sounds pretty explicit on some of what it is calling for.

Now I don't know if we're ever going to retrieve. If we make a decision to retrieve, it would be at least decades into the future. So it doesn't make sense to us to do a very detailed plan on retrievability.

We have built into the -- we have designed the repository such that we have not precluded the ability to retrieve. That's required by the regulation.

But do I know exactly the piece of equipment that I will use when I retrieve, if I retrieve? No, but I know equipment exists that is capable of retrieving the waste as we are emplacing, as we've designed the facility.

So we think we've done enough. Again, we've had some interchange but, you know, you never know until you get there. And I'm sure there will be some surprises. And we'll work through them. We'll work through them with the staff.

MEMBER WEINER: Related question on your diagram of the PA.

MR. ZIEGLER: Yes?

MEMBER WEINER: Is there -- are there critical points in that performance assessment? Something that is analogous to rate determining steps in a complex chemical reaction? You want to go back to the slide?

MR. ZIEGLER: Yes, I'm going to try and see if I can find that slide.

MEMBER WEINER: It's Slide 16.

MR. ZIEGLER: Well, there's some things in here that are built in. I mean first if you look at the seismic scenario class, is we had done some modeling on seismic that I think was really, really, really conservative in the past because we were getting practically infinite ground motions.

I think the things that deal with these 10 to the minus 8 per year probabilities are problematic. I don't know -- they effect the result, okay, they effect the results greatly based on these probabilities that are almost infinitely low.

And so when I look at seismic -- I'll tell you the way we did the seismic analysis in the past. Now we've done some additional work, okay, to show that there's probably maximums on actual ground motion that could ever exist regardless of the probability. And so that's built into here. But we're still probably conservative in that area.

And how that effects the engineered barriers is -- I think most of us on the project think that we've overestimated the degradation of barriers through mechanisms like that.

Volcanism is similar, okay? The whole volcanism analysis hinges on the probability of the vulcanic event. It's somewhere near 10 to the minus 8 per year. And then you take it -- it's a little bit above 10 to the minus 8 per year, therefore we go through a series of relatively precise calculations with a lot of uncertainty bands.

But still ultimately you compare it to 15 millirem. So it needs to be a -- you know the mean value needs to be a precise calculation. So we spend a lot of time doing calculations for these infinitely low events that, you know, humans don't protect at those probabilities for anything else in our normal life for people today, okay?

But this person 10,000 years from now is going to be protected to a 10 to the minus 8 event. And so I think some of that becomes very difficult. I think it's going to end up being the focus of a lot of the licensing proceedings.

And I'm not sure that the focus ought to be on the events that are very, very unlikely to occur versus things that are going to occur.

So --

MEMBER WEINER: So you think --

MR. ZIEGLER: -- I don't know if I answered your question but --

MEMBER WEINER: No, you have answered it very well. So to restate that, you think that the lower probability events are likely to have a larger influence on the licensing proceeding than --

MR. ZIEGLER: I think they will because I think they'll be challenged not because your analysis is bad or the information you used wasn't bad, but because those low probability events are going to be easier to challenge.

MEMBER WEINER: Yes. You started your presentation by talking about the repository being safe.

MR. ZIEGLER: Yes.

MEMBER WEINER: Does safe mean -- is safe equal to meeting the current EPA standard? Whatever -- I mean recognizing that that is somewhat -- the time of that is somewhat up in the air.

MR. ZIEGLER: Yes, yes.

MEMBER WEINER: But is that what you mean by safe?

MR. ZIEGLER: Well, we certainly do that. We do that with a relatively large margin.

MEMBER WEINER: Yes.

MR. ZIEGLER: So I think safe means more than that. It means that we operate responsibly once we're operating. It means that we protect our workers, that we achieve, you know, our ALARA commitment.

MEMBER WEINER: Yes.

MR. ZIEGLER: That we protect the environment. I think it means more than that. If we were on the, you know, the cusp of the standard, if I was at 14.9 millirem, I would not be comfortable, okay? Not that 15 is a magic number, you know, 15, 25, 10, it's all the same number when you're predicting the future for 10,000 years or longer.

But we're at a fraction of a millirem. And so yes, I think we're safe in the post-closure. On the pre-closure for the normal operating limits, we're way -- I mean we're orders of magnitude below just like commercial plants are.

And so I'd have a lot of margin in that safety. So it's not nearly meeting the standard even though I do believe if we meet the standard we are safe. So I'm not throwing rocks at the standard. I think it's a reasonable standard.

But we're not going to commit, you know, tens of billions of dollars to barely meeting the standard, hoping everything goes well in the licensing proceedings. We've got margin.

MEMBER WEINER: Yes, I just wondered -- when you used the term, it can cover a lot of ground.

MR. ZIEGLER: Yes.

MEMBER WEINER: What's the status of the surface facility design?

MR. ZIEGLER: Surface facility designs, we added a couple facilities over the last year. We added the fuel handling facility and the canister handling facility.

MEMBER WEINER: Yes.

MR. ZIEGLER: Those designs have actually caught up rather rapidly with the dry transfer facility. So it's -- I would like to have more detail. We have enough detail to do adequate safety analyses. I don't know if I've got enough detail to construct yet or not --

MEMBER WEINER: Yes.

MR. ZIEGLER: -- because I need to do specs on procurements and things like that. By the same token, our budget request, you know, we're in a continuing resolution right now. We had asked for like 300 million more dollars than what the continuing resolution has in it. So I'm not sure we're ready to procure most of those things anyway because of budget restraints.

But I would like to have more detail in the design just so we could proceed with the project not so much from a safety analysis standpoint but from a construction preparation standpoint.

There are things in the safety analysis where we've placed what I call engineering requirements, engineering specifications. And so I don't have the equipment set. I haven't procured it yet. You know, I don't know the vendor of this particular pump or this particular diesel generator yet because we've not done that procurement activity.

But we've put design specifications -- and they're meetable design specifications -- so we've been careful to make sure that -- Steve Hanauer works with me. He says make sure that whatever specs that we put on it, it's not a three-minute mile, okay?

MEMBER WEINER: Okay.

MR. ZIEGLER: So we make sure that the specifications are reasonable and obtainable.

MEMBER WEINER: And, finally, you said -- this is my last one -- you said at the beginning when you were describing the GROA, you said that it follows the path of the water, because this is your primary concern, that --

MR. ZIEGLER: Yes. I may have misspoke. The GROA follows the path of the development of the repository.

MEMBER WEINER: Oh, yes, but --

MR. ZIEGLER: The TSPA modeling follows the path of the water.

MEMBER WEINER: How much does the prevailing winds, since that would be important to a seismic event, how much does the prevailing wind differ from that?

MR. ZIEGLER: Not much. And the thing is if you start doing it and you look at worst case winds, it's the calm winds. So you go out there and you stand on top of the mountain and the wind blows a lot, that's not the problem. The problem is when it's calm. So when the winds are relatively calm, it's almost a circular distribution around the side. So it's maybe a little bit more to the south, and that's where the remi is. But our pre-closure calculation is actually not done at the remi location. The pre-closure calculation is done on the western boundary, so it's about eight kilometers away, I think, from the openings of the subsurface and about 11 kilometers to the west of the surface facility handling operation.

MEMBER WEINER: Thank you.

CHAIRPERSON RYAN: Jim Clarke.

MR. CLARKE: Joe, just a couple of questions by way of clarification. Michelle, can you put up Slide 10? On the pre-closure safety analysis, when you spoke to this, I missed it, but the event sequences had two categories and they were defined on the basis of probability of the event?

MR. ZIEGLER: Oh, Category 1, Category 2.

MR. CLARKE: Category 1, Category 2.

MR. ZIEGLER: Yes. Regulation, regulatory defined. The Category 1 event sequences are event sequences that are expected to occur at least once over the period of operation, okay? So it's off normal, it's not normal ops, but it's event sequences that are expected to happen at least once. So for a 50-year operating period for most of the surface facilities, that would be five times ten to the minus fifth annual probability over a 50-year period.

Category 2 event sequences have at least a ten to the minus four chance of occurring over the period of operations. They're not expected to occur but have at least a ten to the minus four chance of occurring over the period of operations. I'm looking at Tim McCartin back there. Tell me if I mess up, Tim.

And so they could be anything barely beyond Category 1 or others. The regulatory limits are different for those events. And I'll give you a for instance. Part 20 on-site dose requirements apply. Part 20 on-site dose requirements don't apply for accidents or emergencies. So the Category 2 Part 20 on-site limits would not be applicable, but the Part 63 limits are. And Part 63 defines on-site and off-site different than Part 20.

So Part 20, basically, we're saying if we're outside the GROA, then you're treated as public. For Part 63, it talks about the off-site public, so it's actually off the site that I showed on the map

MR. CLARKE: You then analyze consequences for each of those categories, and I think I heard you say that you provided mitigation even for some of the Category 2 events.

MR. ZIEGLER: Yes, for ALARA purposes. Now, that mitigation may not be important to safety, and I give you a key example. I've got a relative reliable off-site power supply, I've got six diesel generators, okay, and those diesel generators can be inter-tied, some of them manual so that we don't have common mode failure. I don't take credit for nearly all of that in the safety analysis, and yet I have highly reliable backup power supplies. So that's mitigation in case I lost my power for some other reason when I might need it.

Another example, we're designing our cranes where we do lifts inside our transfer cells. In a power plant, they call them drop-proof or single failure proof cranes. Well, when you've got as many lifts and handles as we have, it's hard to do the probability calculations and say that it's totally single failure proof, but they are designed to very, very highly reliable, okay? They're designed to withstand seismic events, design basis seismic events. So the cranes will not drop a fuel assembly or can a task during a seismic event. But we still have HEPA filter ventilation systems, even where the requirement for those ventilation systems does not exist per my safety calculation.

MR. CLARKE: Thank you. Just one more quick one. Slide 20 or 21 -- 21, please. And this is just to check my understanding. This is the fifth of a series of slides. It says safety analysis report for pre-closure, but is this not in fact the post-closure analysis?

MR. ZIEGLER: You're right, that's post-closure. Mistake.

MR. CLARKE: Okay. Thanks.

CHAIRPERSON RYAN: Okay. Thanks, Jim. Any other questions from staff?

MR. LARKINS: Just one quick question.

CHAIRPERSON RYAN: Go ahead.

MR. LARKINS: You talked briefly about an equipment qualification program and you talked about how the environment obviously wouldn't be as harsh as it is for a reactor when we do safety-related equipment. How do you define -- did you define the envelope for the environment, for the testing?

MR. ZIEGLER: Yes. What we've done, and most of the -- there's not a lot of ITS active mechanical active equipment, especially electrical. There's not very much electrical at all. It's basically the fans that run the -- that provide the flow through the HEPA filtration system where we're handling bare fuel assemblies. But what we will do is we will define the environments that they have to operate under, much as a commercial plant would. The environments will be really not nearly as harsh as the environments in an equal power plant. There will be some radiation environment, the temperatures won't be nearly as high, the high humidity conditions just won't exist, there's no mechanism to create that high humidity. So we will define those conditions.

We've not done procurement yet, but we will put those specifications on before we procure the equipment, and I would expect that we'll be able to procure that equipment nuclear grade, most of it, those active components. If we're not able to procure it nuclear grade, then we will have to dedicate it to show that it's acceptable for its use for that function. But even though they're not extremely harsh, we still have to make sure they work in that environment. I can't go down to ACE Hardware and buy it.

MR. LARKINS: I was just curious as to what's in the Part 63 requirement. Did you come up with your own standard?

MR. ZIEGLER: Well, I guess it was 50.49 in the commercial plant side. And I guess -- I used to work in the commercial business. I personally think it was -- the equipment, the safety equipment in a commercial plant, I believe, even before 50.49 existed, I believe it was a requirement to show that it would operate when it was called upon. I think 50.49 just clarified that, and it showed that just because it operated in a test mode didn't necessarily mean it would operate in the environment it had operated in.

I do think we do have an advantage and that's it in that we can operate -- most of our equipment we can operate in a test mode once the facility is operating. That test mode is probably in most cases, I think there might be a couple of exceptions, but that test mode is the environment it would have to operate in during an emergency as well. So it gives us an advantage on our ability to be able to qualify the equipment. There's not very much -- I guess on the seismic loads we'll have to put design specs on those, but a lot of the ITS equipment doesn't necessarily have to meet seismic requirements in our facility.

And I would go back to the ventilation of the HEPA system is that the combined probability of a bare fuel assembly drop with a seismic event is beyond Category 2, okay, because our facilities are designed and our cranes are designed to not drop the fuel during a seismic event. So the seismic event would not induce the drop. So the ventilation system itself doesn't have to meet for regulatory purposes seismic design criteria. On the other hand, we are designing it with certain seismic criteria as a defense-in-depth mode. Does that answer it at all?

CHAIRPERSON RYAN: John?

MR. FLACK: Yes, a couple things. When you talked about single failure proof cranes, we did studies on that and found that it doesn't buy as much as you think you buy. A lot of the accidents occur below the hook, so it's really hooking the stuff up correctly, and that of course is affected by safety culture and these other things. So just a word of caution.

Now's the time to ask that advanced reactor question. I know you talked about other reactor types, initially a consideration. Now, what about waste forms from things like HTGR and ACR 700? Are these going to be accommodated by the facility?

MR. ZIEGLER: We made some input -- we've defined the inputs to the waste forms that we've analyzed today. I keep getting asked to do a bounding analysis, and the problem with doing a bounding analysis is is that for long-term performance there are things such as the chemical characteristics of the dissolved waste form. As far as the radionuclide content, it will never be an issue, okay? I can just scale it up or down. But could there be a possible exotic chemical dissolution form of an unknown waste form? I guess it's possible. I personally think it's unlikely, but I think before we dispose those waste forms, we would have to go back and make sure that we had the bases analysis to show either that our existing analysis envelopes it or to show that -- or to modify the analysis to incorporate it. I really can't think of a waste form that would fall into that category, but I can't rule it out without doing the analysis.

MR. FLACK: Okay. So the analysis would

still need to be done.

MR. ZIEGLER: The analysis would -- I believe the analysis either to show that we were enveloped --

MR. FLACK: Right.

MR. ZIEGLER: -- or to modify our bases would need to be done.

MR. FLACK: Okay. Fine. And just one other question I had was on the 10,000 years versus a more extended period of time, do you think there are conservatisms that were built into your model that could meet the 10,000 year criteria, which will now have to be revisited if you go beyond that?

MR. ZIEGLER: That's a great question, and, yes, I do. I think there probably are, and I think that's part of the decision of when we submit, I think, and what we submit and whether we address beyond 10,000 years. We built our analysis, we actually built it for 20,000 years this time around, and we validated our modeling for 20,000 years. But part of that validation has been to include conservatisms in many factors. I think there's conservatisms in the seismic analysis, I think there's conservatisms in the waste form dissolution analysis, I think there's conservatisms in the chemical environment analysis and how that affects waste package corrosion.

Those conservatisms really don't affect the 10,000 year analysis much. I mean I'm still at a low level of comparable to what you saw at the time of the FEIS and the site recommendation. Those same conservatisms may not be appropriate for an analysis of much longer periods of time, and I think before we -- that's something we're taking a look at right now, and I believe there probably are and we may want to modify our analysis because of that. But there are known conservatisms in the analysis.

CHAIRPERSON RYAN: Mike?

MR. LEE: Yes, Joe. Has DOE done any analysis to certify that the waste forms going into Yucca Mountain aren't RCRA characteristic? Have you looked to that issue at all?

MR. ZIEGLER: The EIS is the latest, I guess, position on that, and we look at spent nuclear fuel. Spent nuclear fuel is not categorized as RCRA anywhere that I'm aware of. High level waste, I think Hanford and Idaho have made some declarations regarding the nature of their waste and whether it's RCRA or not. They could certainly get it delisted in their states. I think Savannah River site is a little more innovative in the way they've characterized their high level waste, and I don't believe it's treated as RCRA waste.

Our position is it's not going to a RCRA-permitted facility.

MR. LEE: Sure. Yes.

MR. ZIEGLER: So if we're not able to either show that the waste forms are not RCRA or get those waste forms delisted, then right now we would have a problem being able to accept that waste for disposal. The state of Nevada is obviously a recognized very vocal opponent of the repository. My understanding, and I'm not a RCRA expert per se, is that to delist a RCRA waste, the delisting has to be agreed to by both the state of generation and the state of disposal. There may be some appeal processes through the EPA itself that could overrule that if the decisions were made for not technical reasons. But right now we are not going to be a RCRA disposal facility. I think that may cause some additional work and some rulings that might be necessary for the Hanford and for the Idaho waste forms.

MR. LEE: Just one other question real quick. Should DOE receive a construction authorization, will you undertake or the Department undertake a new procurement for construction?

MR. ZIEGLER: We are looking at contracting strategies right now, and I would say that our contract with Bechtel SAIC Corporation is a five-year contract, and I think we're coming up on the end of year four right now. So I would expect to see some different contracting strategies in the future. That's one of the possibilities, yes.

MR. LEE: Thanks.

CHAIRPERSON RYAN: Latif?

MR. HAMDAN: Joe, excellent presentation as usual. I just have one question. How confident is the DOE staff, technical staff, and the contractors in characterizing the chemical environment in the drifts for the performance assessment?

MR. ZIEGLER: I think we've done a good job. This was the subject of an NWTRB meeting not too many months ago. We particularly addressed the issue of deliquescence, you know, condensation at higher than boiling temperatures, and I think we successfully gave our position to the NWTRB staff who had been fairly critical. I think NRC staff gave similar presentations, and EPRI came up with similar results.

How confident. We validated our models. I mean we've gone through the process to validate the models. I think in general our analyses have conservative inputs to them, but how confident, again, this is out of my area of technical expertise, but I think we've done a good job. I mean we've got the national labs, we've got kind of the best and brightest the country's got working on these problems. Does that mean there won't be any problems or issues associated with the licensing space, I'm sure there will be questions that we'll have to answer, but I know of no questions that are insurmountable at this point in time. But you have an almost infinite array of possible conditions that might exist in a repository.

I know repository opponents like to focus on the microscopic scale and what might happen in a laboratory versus what might happen in a more natural geologic setting. And I think the focus needs to be on what could happen on a large scale, not what could happen on a microscopic scale. A lot of things can happen on a microscopic scale, but nature tends to go -- nature looks for equilibrium.

CHAIRPERSON RYAN: Neil, any questions?

MR. COLEMAN: Just one. You touched on performance confirmation earlier and mentioned that it's a separate document from the LA. Is there a plan to publicly release that along with these technical basis documents, AMRs, many of which are out now, before the license application?

MR. ZIEGLER: I don't know about before, but the performance confirmation plan revision, I think previous revisions have been made available publicly. I see on reason why this one would be treated any different. It will be treated just like the AMRs and the other major documents produced by the program. So, yes, it will be made available.

CHAIRPERSON RYAN: Anything else? Any other questions or comments? Could you identify yourself at the microphone, sir?

MR. MALSCH: I'm Marty Malsch.

CHAIRPERSON RYAN: Please use the microphone so that we're sure everyone can hear you. Thank you.

MR. MALSCH: I'm Marty Malsch. I'm with the law firm that represents the state of Nevada. I had two questions, two quick questions. One is in response to a question from, I think, a member of staff. Mr. Ziegler gave an accurate account of the definition of Category 2 event sequences in Part 63, and my comment or question is whether there are any areas in the design, for example in seismic design, in which the DOE is using a different definition of Category 2 event sequence, for example, a lower probability sequence for a cutoff? And if so, does DOE plan to ask NRC to amend the regulations in Part 63 to redefine the definition of Category 2 event sequences?

And my second question is are there any structures, systems and components that are necessary to assure retrievability that are considered to be important to safety? And if not, how does DOE plan on keeping the retrievability option open?

MR. ZIEGLER: Okay. I'll answer the first one first, is that the seismic design criteria is being -- we're applying the same applicable criteria for seismic design that a commercial power plant would, and it doesn't require a modification of Part 63. Sixty-three point one-oh-two(f) talks about the application of requirements, and those requirements have to be reasonable, and reasonable is defined in that section as what's done for similar or higher risk nuclear facilities licensed by NRC. So we're doing our seismic design based on precedent set for higher risk nuclear facilities, nuclear power plants.

The second one about is anything ITS because of retrievability, I don't think so because I don't think there would be a circumstance that would prevent us from retrieving with components that -- I can't think of any components that would be, but I can't guarantee you that without going back and looking at the analysis. But I can't think of any components that would be required to be important to safety for retrievability. We're not required to retrieve, we're required to maintain the capability to retrieve. Our systems are designed to be available for 100 years, our subsurface systems. So I would expect the capability to retrieve to be there, but I can't think of anything that would be important to safety just because of the capability to retrieve.

Retrievability is basically the reverse of emplacement. I'll give you an example. The carriers that take the waste packages underground are shielded. They also have the capability to withstand rock fall within the main access drifts, okay, to protect the waste forms. I would expect the carriers that take the waste forms out of the mountain would have that same capability, and that would be ITS. So I would expect the breaking systems on the carriers that would remove the waste packages from the mountain to also be ITS because the emplacement breaking systems would be ITS to prevent transporter runaway. But I wouldn't have called that just because of retrieval, but it's basically the reverse operation of emplacement.

CHAIRPERSON RYAN: Questions or comments? Well, Joe, over the course of the last few years, I guess, maybe more than a few, your staff and through Carol have participated in many of the working group meetings that the ACNW has held to advise the Commission about the staff's readiness and preparation for a license application, and we've reviewed many aspects of what you've summarized so well today. And I would be remiss if I didn't thank you on behalf of the Committee as well as our past two chairmen, Drs. Hornberger and Garrick, for all the hard work and giving us many thoughtful and informative presentations. And I just want to go on the record as thanking you very much for all that participation over the years as we lead up to an LA.

MR. ZIEGLER: Thank you very much.

CHAIRPERSON RYAN: Thank you.

MR. ZIEGLER: And I appreciate the opportunity to speak to this group again.

CHAIRPERSON RYAN: Thank you very much. Any other last questions or comments? We've lost Howard Larson, so are we ready for our next presentation?

Okay. The break is 10:10 to 10:40. We're now at 10:40, so why don't we break for 15 minutes instead and come back just a few minutes before 11. So, again, thank you, Joe.

(Whereupon, the foregoing matter went off the record at 10:40 a.m. and went back on the record at 10:58 a.m.)

CHAIRPERSON RYAN: NMSS Division Director's Annual Briefing. The Committee will be briefed by the Director of the Division of High-Level Waste Repository Safety and the Director of the Division of Waste Management and Environmental Protection and recent activities of interest. I guess, Dan Gillen, you're going to go first. Welcome. Thanks for being with us.

MR. GILLEN: Is this on? Is the mike on?

CHAIRPERSON RYAN: Yes.

MR. GILLEN: Okay.

CHAIRPERSON RYAN: I might add that we've had a change that John Flack is the TFO for this session. Howard Larson had to step out to deal with a personal item that came up quickly.

MR. GILLEN: Okay. I'm here primarily to talk about the activities of the Division of Waste Management and Environmental Protection. This is a semi-annual informal discussion. Particularly, I'll focus on decommissioning. I'm happy to be the Deputy Director in charge of decommissioning, but I'm also acting for John Greeves as the Division Director at this time. I'm not acting for John Greeves, John Greeves retired, so I'm acting for whoever's going to take his place.

Recently, as you're probably aware, and we came to the point in time in the year where the Decommissioning Program presents its annual report and it's annual briefing to the Commission. So just recently we have gone through a summary and I'll talk a little bit about some of the things we presented but not get into the details because I'm sure you may have read those documents.

But September 21 of this year we presented a draft annual report to the Commission. The Commission responded with an SRM on October 21, which essentially accepted that annual report with minor modifications. So we're in the process right now of finalizing that document to a NUREG document, which will be the first of the NUREGs that we publish on an every-other-year basis.

In addition, on October 13, we did the annual briefing to the Commission. We have since received an SRM from them on that briefing also, and I'll get into that in a minute. But during the briefing we really focused on what were the accomplishments during the year for the Decommissioning Program and what were some of the innovative approaches we've been taking, some of the policy and technical issues we're dealing with, and then where are we headed in the coming year and beyond.

So I don't want to get into too many details on accomplishments but of course that's always a good thing, you want to pat yourself on the back for what you've done, but the Decommissioning Group has really moved forward in trying to achieve its goal which is to safely decommission sites. In getting to that point we've done a number of acceptance reviews of decommissioning plans, license termination plans for reactors. The regions have done 96 inspections during the year of sites. We've taken 50 other licensing actions related to those decommissioning plans and license termination plans. And we, actually, during the past year terminated four licenses.

In the past, there had been a goal really of the program to eliminate or terminate one SDMP site from the list, Site Decommissioning Management Plan list. One of the things we did programmatically during the past year was to actually eliminate that as a separate list. We now have incorporated the former SDMP sites into a more comprehensive program where we have basically reactor sites and decommissioning and complex materials sites. So we sent a Commission paper to the Commission on the elimination of the SDMP and got their buy-in to that process. We now do not have a goal of taking one site off the decommissioning list. My goal is more focused on taking major steps to terminate all of those sites under the comprehensive program.

In addition to getting the Commission's acceptance of eliminating the SDMP, we took some programmatic actions to follow up on the license termination rule analysis. I think you're fairly familiar with that. Robert Johnson and my staff has done a separate briefing for the ACNW on LTR analysis and where we're going on that. And I think that's one area where we have already started to focus our implementation of some of those recommendations from the LTR analysis and where I can probably use ACNW's assistance in the future most.

The types of issues I'm talking about in the LTR analysis are the use of realistic scenarios and dose assessment, widening our options for restricted use type actions, the soil mixing issue that we had about intentional mixing of soil on sites and then prevention of future legacy sites by improving licensees' operational activities as well as their financial assurance requirements.

All of those things have led us during this past year to use innovative approaches at some of our sites, even before we've gotten to the point of formally installing the analysis issues into our guidance and into our rules. For example, at Kiskee Valley, a site in Pennsylvania, which really is not a licensed site but is one which we had a responsibility for, and that is a site where we actually did a dose assessment ourself, analyzed the realistic scenarios of Kiskee Valley, either leaving the material on the site of maybe the state of Pennsylvania coming in at a future time and removing the material and putting it in a landfill. Under both of those scenarios, we analyzed that the license termination rule criteria would be met. So we sent a Commission paper up on that also and got Commission approval to issue a draft environmental assessment for comment and then, providing no substantial comment to the contrary, to go ahead and eliminate that site. Can't say terminate because there's no license to terminate. It would be just basically removing NRC from activities on that site.

And we got that approval and we have since issued the environmental assessment, got absolutely no comments, and we're now finalizing the environmental assessment in the Federal Register, and we'll be, within the next week or so, issuing a letter to Kiskee Valley and the state of Pennsylvania cc'd on it that we are done with that site.

Fansteel's another site where we've had use of realistic scenarios, and that's one where we actually applied a realistic scenario of industrial use to the Fansteel site in Oklahoma and got state of Oklahoma disagreement hearing request, and then the Board ruled in favor of the NRC that the realistic scenario we used was the appropriate course of action.

So those two are examples of a realistic scenario. Shield alloy is an example of where we are starting to move forward in the use of restricted release, other options for institutional controls and the use of a long-term control license. I think Robert Johnson in his presentation to you discussed the fact that we had issued some interim guidance but in the future we'll be -- as part of our guidance developing on all of these issues, we'll be addressing that guidance.

So what I would like to say at this point in time here is that I see ACNW in this area as a resource that I can use to, as we get into the formal development of the guidance on all these type of license termination rule analysis issues, to use ACNW and to use the concept that I think Mike Ryan addressed in the last briefing we had on this about developing a workshop where you bring in other parties from the outside to give their thoughts on some of these issues. There may be a lot of people out there who have some significant input on intentional mixing issue, and we can use that approach and use your review as well as -- and I'm thinking of a concept during the coming year of a workshop that's not just focused on one issue, that's maybe broadened out to kill more than one bird with a stone, so to speak. So that's one area.

So what's really happening in the coming year beyond our taking actions to write the guidance and to develop a draft rule to address all these license termination rules issues? Well, we're of course looking to continue our reviews of sites, and issues will come up on some of those sites, as they will, and I'll talk a little bit about some of the difficult sites that we have under my challenges part here. But my goal during this coming year is to try and terminate at least two reactor sites and probably five or more complex materials sites. I think that realistically, looking at the forecast for the year, that's something that we can accomplish.

I'm also looking to improve upon the goal of openness that we have in the program to develop a communication strategy that includes a decommissioning site database of all of our sites that will be tied into the web, along with that web page improvements we're working on right now for the Decommissioning Program that's sadly in need of web page enhancements.

Also to develop a decommissioning brochure, which is something that we go out on every one of these sites, as we get into the DP review or the LTP review and we have public meetings and to just plop down an annual report, which is comprehensive of a whole bunch of sites and may be a couple hundred pages long, to have a more simplified brochure that we can hand out to people in the public as what's involved in decommissioning, what's the criteria, what we're dealing with. And then, of course, have the biannual NUREG report, which is really a comprehensive document that the staff can use as well as other interested stakeholders, congressional members and things like that.

The challenges I spoke of during the coming years, the difficult sites are certainly a challenge. I mean not only do we have a number of sites that are not even licensees, those are always difficult to deal with. I mean it's easy to hold a license over a licensee but when you're dealing with a non-licensee, I mean it's a little bit different situation. We have to work with them very closely and I have a goal of trying to take significant advances. Kiskee is one of them where we've done that, and there are other sites out there that we need to do the same on.

Then there's the site that are financially troubled. Fansteel that I talked about is one of those sites. They recently went through bankruptcy. Safety Light in Pennsylvania is another one, and we're working to get that on the EPA list for EPA to come in and take over the actual work there. It's obvious that Safety Light could never afford to clean up that site, so we're looking at other avenues.

Then difficult sites, West Valley,

particularly. I mean you've already been briefed on the West Valley activities. NRC's in kind of a different role. It is not the holder of a licensee over DOE but working with DOE through the law to oversee that site through review of the decommissioning plans to be submitted at a later date and also cooperating agency on the environmental impact statement.

Another challenge is in the multiple regulator situation, EPA and NRC both having a role and of course we've issued the EPA MOU -- EPA/NRC MOU and they're in the process of working through consultation with EPA on a number of sites where we have already recognized that we have approved decommissioning plans or license termination plans that have triggered the values in the EPA MOU, which then triggers a need for consultation with NRC. So we have identified 13 sites in that category at this point in time, have issued letters to EPA informing them of that.

Let me just step back a second. The process that we identified that we would follow through consultation with EPA is if you identify a site at the time you're about to approve a DP or an LTP that triggers those values, then we send a level one consultation letter to EPA. The 13 sites I spoke of when we decided on this had already passed that point in time. They already had approved DPs or LTPs. So what we're saying we're essentially doing in lieu of a level one consultation we're sending notification letters to EPA to tell them of these sites.

Of the 13 sites, we've sent six letters already to EPA. Two letters are in concurrence right now. Three sites during that time, as we recognize they had triggered the values, we've gotten to a point in those three sites where we've done final status surveys and found that those levels are no longer triggered. Rather than the levels that were approved in the decommissioning plan, it was cleaned up to a level better than that, gotten down below the MOU trigger values, so we're taking no action with EPA on those three sites. So that's 11 of the 13. There are two other sites that are of complex enough situation that it requires in following the SRM we got from the Commission when we brought the EPA consultation process up to them, that we would have to go back to the Commission to get their input on how we would deal with EPA on those two sites.

The only thing I wanted to mention in the way of challenges coming up, the SRM that I got from the Commission following my briefing, which was set up in the format of the staff give a portion of the briefing and then we brought in a panel of three stakeholders from the industry and the state of Pennsylvania to give their insights into how decommissioning is going. Based on some of the issues that were raised there, the SRM sort of focused on next year when we come before the Commission they'll want to hear how we've worked to address -- primarily, one thing they want us to focus on was lessons learned and not only lessons learned like the decommissioning staff, what lessons we're learned as we go through this, but working with the industry find out what lessons they're learning as they go through so we can work with other sites coming down the road in the future and entering into decommissioning as well as maybe even operating reactors that haven't even thought about decommissioning yet and what things they might be able to do during operations to avoid problems as they get to the decommissioning stage.

In addition to that, some of the issues raised by the stakeholders that were there were, again, discussed in the SRM along the lines of improving radiological monitoring. I think that's not how we do monitoring, that's more timing and scheduling and being responsive to licensees that are ready for us to come out and do monitoring. Establishing measures to provide finality in the decommissioning process, and that again alludes to the EPA concern of dual regulation. Improving consistency among state and federal regulators, again, kind of a dual issue. And enhancing guidance to better address issues of flexibility and decommissioning approaches and institutional controls for restricted release scenarios, which is something we already are working on and I just discussed as some of the issues. We're addressing the license termination rule analysis.

How am I on time? I'm over my time? Okay. Just shifting a little bit more into looking at other things that we do in the Division now, as we were recently reorganized and High-Level Waste split off and what was left was primarily decommissioning but also low-level waste and the performance assessment activities that support decommissioning in other areas and the Environmental Group that does all the environmental impact statements that the NMSS produces.

Tomorrow you'll be getting a briefing from staff and from our Division on the WIR issue, waste incidental to reprocessing, and risk-based end states' involvement, both those areas that we're having with DOE. So I won't get into that but that's on your agenda for tomorrow. We'll give you where we stand on some of those activities.

In addition, I think on your agenda tomorrow is a clearance presentation, and our role on that is support from the environmental impact statement that would be involved in the clearance rulemaking. So you may get some of my staff involved in that presentation also.

Low-level waste, it's really a small aspect of our Division FTU-wise, but significant activities are probably down the road. We're kind of at a crossroads, as you well know, of low-level waste when you have a situation where as Barnwell closes we'll be faced with most states not having a place to dispose of B and C waste. Basically, what we're doing in this area is -- well, of course, we recognize that there is some support out there. The recent GAO report indicated a need for some sooner rather than later activities to establish disposal for B and C. The Senate Committee on Energy and Natural Resources in hearing from GAO on that responded favorably, even thinking about the need for a federally sited low-level waste disposal facility.

But in the meantime, until some action can be taken legislatively, we're doing things like supporting EPA's ANPR on low-activity waste in RCRA-safe facilities. We would support any action that DOE would take for greater than Class C, although they haven't developed anything yet. We're reviewing requests for alternate disposals on a case-by-case basis, as we get some in Decommissioning on perhaps disposal on-site or disposal of some very low-activity material in landfills or in RCRA C sites.

And then through our approaches, as I discussed, of realistic scenarios, restricted release, soil mixing, all of those things can lead to instances where we're limiting or decreasing the amount and volume of low-level waste needed to dispose of. So through those actions we're addressing the concern about disposal areas.

That's pretty much what I wanted to say this morning. If you have any questions or did you want to hear from Bill first and then ask questions?

CHAIRPERSON RYAN: Sure, we could do that. Bill, would you want to give your presentation and then we'll just kind of open it up for questions, in general?

MR. REAMER: Be happy to.

CHAIRPERSON RYAN: Thank you.

MR. REAMER: I'll talk about the status of the High-Level Waste Program that is the NRC staff High-Level Waste Program. I have to acknowledge right at the outset the uncertainties that exist with respect to the national High-Level Waste Program, the uncertainty with respect to the schedule for the submittal of the Department of Energy license application, and I'm sure that there will be more information forthcoming from DOE on what schedule we all are working to. We have a public meeting with the Department on November 22, a week from yesterday, and hopefully this will be an opportunity for DOE to clarify, to some extent, their plans, specifically plans with respect to December 2004, although we know that the Department is reevaluating that date and considering options in that connection.

So there is the uncertainty with respect to the schedule, but in the meantime we obviously -- the staff continues its activities at the pace it can, given the funding, which is another uncertainty I'll talk about, to be ready to review the license application when it is submitted.

Another uncertainty with respect to the program is the EPA standard. Last summer, the Court of Appeals struck down the portion of the standard that describes the compliance period as 10,000 years. We're looking to EPA to provide some indication of what their time table will be to respond to the Court's decision through a revision to the standard. Also, hopefully, some information with respect to what we can expect in the way of scope and nature of the revision. This impacts our regulatory activities because we are required by the Energy Policy Act to be consistent with EPA. So we will have to plan for a revision to our Part 63 regulation governing DOE license application for Yucca Mountain repository. So, obviously, we have follow-up activities that we'll have to take.

Also, it impacts the nature of the consideration that we will give to a license application. Because if a license application is submitted before the EPA standard is revised, then the question that's already been put on the table is can we docket such an application given the fact that the EPA is going to be revising the regulation? And we'll be looking for at least initially DOE to present its view in the license application about how docketing would be consistent -- docketing of the application would be consistent with our regulations.

Another uncertainty I would need to acknowledge is the Licensing Support Network and the order that the Licensing Board or the Preapplication Presiding Officer issued last summer in which the certification that DOE had made of compliance with the LSM requirements was set aside. DOE did appeal a portion of that order but also indicated that they are taking steps to conform to the order's requirements with respect to reviewing and processing additional documents. We're interested in what the schedule is that DOE will be working to to respond to those portions of the order that they did not appeal. And we'll be looking obviously at the schedule DOE sets on how they intend to deal with that.

Another uncertainty is the budget, and there have been articles in the Trade Press I'm sure that the Committee is aware of indicating that there is a distinct possibility that Congress will continue the continuing resolution, which means funding NRC at the fiscal year 2004 funding level. That's substantially less than the Agency requested for funding for 2005.

The Agency's request for 2005 included not only increased staffing to prepare to conduct a license application review but monies also to support readiness in the area of information technology, information management, the Licensing Support Network, the electronic hearing docket, the wave of systems, the plethora of systems that the Agency has put into place to try to meet Congress' mandated three- to four-year review of the license application.

Hopefully, by the end of this week, maybe next, we will have some indication from the Congress of what the funding level will be, but continuation of funding at the '04 level clearly will impact the schedule that the staff can meet with respect to conducting a license application review. There's a substantial difference between, as I said, between what we've asked for in '05 and what we would get under the '04 continuing resolution.

Let me go on and talk about some other pending activities that we have. We're doing a rather extensive project plan, a license application review project plan, a multi-layered plan for how we will carry out the license application review. We have the assistance of a contractor in doing this. We have received a draft already that we're reviewing from the contractor. We hope that our planning and document activity will be completed by the end of December of this year. There are obvious insights that one gets in going through such an extensive planning process, insights with respect to staffing levels for particular technical issues, training and development needs, the adequacy of existing review tools, the availability of necessary information from DOE. And so this is an iterative process, the planning process in which we're gaining insights on what additional time permitting and money permitting we can do to improve our readiness to carry out a license application review.

Also, with respect to key technical issue agreements, the Committee is aware, of course, that years ago the staff, in order to systematize its preapplication consultation activities, identified nine key technical issues umbrella as an umbrella for the system and the issues that the staff wanted to put on the table as regulatory issues that DOE would need to address. In the course of preapplication activities, we identified on the order of 293 additional information needs, which DOE agreed to fill. We have thus far received responses from DOE on all of the 293 agreements. Our review has been completed with respect to on the order of 125 of those agreements. A number of agreements that we've identified as being of high-risk significance, meaning that they potentially have an impact on the estimate of repository performance, a number of those agreements continue outstanding on the order of 25, maybe slightly a few more than.

We have a schedule and a commitment to provide feedback to the Department of Energy on those high significant agreements by the end of this calendar year. That feedback would be typically in the form of a letter describing either the staff's view with respect to the information that's received or potentially the staff's view with respect to additional information that it feels that it will need in order to complete a license application review.

One of the key technical issues obviously is igneous activity and we're working on a response to the Committee's letter of November 3 and providing Committee views on that. Also related to key technical issues is a document called the integrated issue resolution status report, which provides a summary of technical bases for the staff's progress to date on key technical issues. And I hesitate to again give another date for when that document will be issued publicly, because I've already missed my initial date of September, but I am hopeful that we will be publishing that for all stakeholders by the end of November. I believe the Committee has had an interest in that document in the past. I know that we are committed to make it available and provide any follow up to the Committee in the way of briefings that the Committee wants.

The next topic I would address is inspection. Inspection is an adjunct, can be and will be an adjunct of reviewing the license application. We anticipate that there will be needs to go to the site to provide information, whether it's in response to concerns that may come our way from external sources or whether it's internally driven information needs that could be handled through an inspection program. We have a manual chapter that we're about to issue that will summarize our inspection program, called Manual Chapter 2300, and we will be looking to develop plans to implement that during the license application review process.

We continue also in the area of quality assurance to monitor the Department's quality assurance related activities. Quality is very important as an independent topic. With respect to model software and data that support the license application, we've provided views and feedback and comments to DOE to date in the quality assurance area.

We continue to monitor DOE audits, observe DOE audits, monitor DOE improvement efforts in this area. Also related to quality assurance, we have a revision under review to the Department of Energy Quality Assurance Requirements Document; it's Revision 17. Roughly approximates how DOE would -- the Quality Assurance Program that DOE would submit to comply with relevant provisions in Part 63 and the license application.

I'll also mention another topic that we've been addressing with the Department in prelicensing consultation, that's the level of detail of information with respect to design that would be included in the license application. We had written the Department a letter in October identifying several areas of the design where we anticipate that we will need more information to complete our review. I believe the Committee has received a copy of that letter and we're continuing to interact with DOE on it as part of our preapplication activities.

So that pretty much summarizes the status of the High-Level Waste Program.

CHAIRPERSON RYAN: Thanks, Bill. Let's see, Dan, let me start with a couple of questions. It sounds like NORM materials, which are not NRC regulated, of course, are they on -- I mean are they mixed into this question of complex sites and non-licensed sites? The reason I'm asking is I know states deal with NORM in many states a lot. It's the same staff that does agreement state licensing and management of radioactive material. Do you see that as being involved here or not?

MR. GILLEN: No. No.

CHAIRPERSON RYAN: I know it's not part of your regulatory responsibility, but there's a lot of NORM stuff out there is why I ask.

MR. GILLEN: Well, there is, yes, but at this point in time we haven't been considering it as part of our -- as you say, it's not --

CHAIRPERSON RYAN: I mean you see it as source material, of course. It's uranium and thorium. But if it's not source material, by definition it's NORM, but it's the same radioactive material. I wonder if there's any experience to be gained from thinking about what the NORM folks are doing.

MR. GILLEN: Yes, there would be, I think, so we'll have to --

CHAIRPERSON RYAN: Just something to think about because I guess I've run into it a number of times, and it's a barrier you cross based on the definition of source material, not on the specific dispositioning of decommissioning issues related to uranium or thorium in diluted concentration. So something to think about.

I had one other question I wanted to ask you. I can't think of what it is, so, Allen, take it away. I'll come back.

VICE CHAIRMAN CROFF: Okay. I guess maybe this is addressed to Bill, I'm not sure. Anybody leap in. But I don't think you mentioned anything about the greater than Class C business. Are you involved in that or are the NRC staff involved in that?

MR. GILLEN: We would be. I mean we've been given legislative oversight if DOE develops a greater than Class C facility. But at this point in time, I don't think we have any actions right now.

VICE CHAIRMAN CROFF: I'm not sure what you mean. You mean regulatory oversight?

MR. GILLEN: Yes. I think, and maybe somebody in the audience can correct me if I'm wrong, but I thought there was some amendments to low-level waste legislation that gives us involvement over DOE.

MR. LEE: Yes. Under Part 61, if DOE chooses to come in with a -- it can come in with a design subject to Part 61 or another design that NRC has to approve, but it's basically in 61. But DOE's already on record not intending to put GTCC waste into Yucca Mountain.

CHAIRPERSON RYAN: I guess I have a practical question about greater than Class C, Allen, if I may --

VICE CHAIRMAN CROFF: Go ahead.

CHAIRPERSON RYAN: -- and that is how much is there in the commercial sector? Is there a good inventory of greater than Class C materials at licensee locations?

MR. GILLEN: I'm not sure what quantities there are or whether there's --

CHAIRPERSON RYAN: The examples I know about are stellate balls and reactors and a few other irradiated components, but beyond that -- and shield sources but it's interesting to think about what is the inventory on the commercial side. How big is the problem?

MR. GILLEN: There is information on GTCC waste in the Yucca Mountain final EIS. I'd have to -- I mean someone would have to go back and look to see if there's specific information.

CHAIRPERSON RYAN: Yes, but I'm curious, is that an accurate accounting? And then when you think about 10 CFR 61 being the operative risk assessment tool, it's not very well risk-informed, and I wonder if you did take a risk-informed approach toward thinking about particularly the irradiated hardware, if you'd end up with the same assessment. You know, 61 relies on an agricultural intruder scenario that's pretty -- first of all, the probability is one that it happens at year 100, and it maximizes through every conceivable parameter the exposure of the individual.

So I just wonder if that's something to think about. That might be an opportunity there, both from an inventory and an assessment scenario perspective. And that gets back to your point then about realism in assessment scenarios. That may be a way to address it. And then if you get through that kind of thought experiment, maybe that reshapes your thinking on what really is greater than Class C waste.

The other side of that, just to finish the story, is very concentrated small sources, strontium 90 eye applicators that ophthalmologists use, for example, on the face of the source are greater than Class C waste. It's curies per cubic meter. But in terms of activity, it's a millicurie. So I mean something happens at the very concentrated end and at the very dilute end of the concentration scale in terms of being risk informed. Very small sources, physical small sources that have a little bit of a radioactivity can calculate to be greater than Class C, but there's not a lot of radioactive material that otherwise in a different physical matrix would be perhaps of no consequence at all. So it's something to think about in that area. So thank you.

VICE CHAIRMAN CROFF: Let me make sure I understand what you're saying and that is that on greater than Class C the ball's in DOE court right now to figure out sort of what they want to propose or a slate of options to be decided. And you would have some regulatory involvement depending on that decision at some point in the future.

MR. GILLEN: That's what I understand, yes.

VICE CHAIRMAN CROFF: Okay. On the high-level waste side, the list of uncertainties is almost so overwhelming as to throw up your hands and say, "Let's wait." But the list was largely procedural, I'll call it, all sorts of scheduling and other things. Are there any technical uncertainties that come to the front of your mind as being really important at this point?

MR. REAMER: Well, I think those

agreements that we have identified as high priority, using our system of ranking based on potential to influence the estimate or where we want to be focusing our resources. Of course, right now what matters to us is a license application that provides the information we need to do a review. We're not reaching substantive-type, determinative-type outcome decisions. That can only come after a full safety review, after a license application and after a full safety review. But our focus is clearly on those agreements that we've identified as high.

VICE CHAIRMAN CROFF: Okay. And you may have said this but there are still open high-priority, high-significance KTIs?

MR. REAMER: Yes, open in the sense that we have not completed our review of the response that the Department has provided in response to the agreement. There were on the order -- my numbers are close but they're not probably exactly -- on the order of 45 of the 293 we call high. And I believe that 25 to 30, somewhere in that range, we still have not completed our response to DOE.

VICE CHAIRMAN CROFF: But you have a response in hand.

MR. REAMER: We have the DOE response,

that's right.

VICE CHAIRMAN CROFF: Yes.

MR. REAMER: We want to provide feedback. We're going to do that by the end of this year.

VICE CHAIRMAN CROFF: Okay. Thanks.

MR. REAMER: We'll do that by letter, and the Committee will get copies of that.

CHAIRPERSON RYAN: Well, based on a comment that we heard earlier that the schedule is not determined at this point from Joe Ziegler, it raised the thought in my mind that if that doesn't become clear and it's out in the future at some point, I don't know what the future would be, of course, is there any particular working group meeting along the lines of what we've had in the past or other activities you could think about that would be productive to support a high-level waste program? I'm putting you on the spot, I don't mean to, but that might be something to think about, that once the schedule does become clear, that may refocus us on issues of importance to you. So I open that door to maybe --

MR. REAMER: Sure. I think that's a logical question because once the schedule becomes clear, if it is not December of 2004 but some later date, obviously preapplication period continues. Again, our goal in preapplication is to try to identify issues, get information with those issues that can support our review. So we will be -- clearly, it will be in our interest to move forward in preapplication and activities with the Department. The Committee has historically played a key role in helping us, assisting us, looking at our -- the way in which we're addressing issues, our readiness to deal with issues. So that's a good suggestion.

CHAIRPERSON RYAN: I guess with that mind, maybe we ought to think about perhaps a January or so follow-up briefing to maybe explore that question a little bit more in detail and hear where you are and where the schedule might be and so forth. Does that seem like a reasonable --

MR. REAMER: Sure. We'd be willing to do that, provided the outcome with respect to the license application date is consistent with that.

CHAIRPERSON RYAN: Sure. Understand. Okay. Thanks. Ruth?

MEMBER WEINER: Just a clarification first because this keeps coming up. The Yucca Mountain EIS considered as greater than Class C only high-level waste that was vitrified in glass logs in cans and looked at the number of those, so on. So a greater breakdown of what constituted greater than Class C I don't believe is considered.

I had just a couple of questions. You mentioned the need -- once again the need, pointed out in the GAO report and that we have all heard from the congressional hearings, of a site for Class B and C waste, the upcoming need, and you mentioned alternate disposal. Could you expand a little bit on what alternate disposal is considered?

MR. GILLEN: Yes. The alternate disposal I talked about was really some of the case-by-case decisions we're making in Decommissioning. For example, the Big Rock Point Reactor decommissioning got approval to dispose of some concrete-type, very low radioactivity waste in a local landfill. We also have 20.2002 process for on-site burials. Some sites, I can't think of any particular examples, but there are sites that have requested disposal of low-activity waste in some certain RCRA C facilities that allow those types.

MEMBER WEINER: Have you applied this notion of an alternate disposal to any higher activity waste, to Class B and C waste or B or C waste?

MR. GILLEN: Not that I'm aware of.

MEMBER WEINER: Okay. So this is just -- the alternate disposal is just something to consider for very low activity.

MR. GILLEN: Low.

MEMBER WEINER: Material that is less active than the current LSA?

MR. GILLEN: Probably because of --

MEMBER WEINER: Okay.

MR. GILLEN: Yes.

MEMBER WEINER: I'm just using it as a benchmark. So it would be less than -- that or less or something similar.

MR. GILLEN: Similar.

MEMBER WEINER: Okay. Bill, you mentioned that there were outstanding KTIs that you're still reviewing, and I assume your prioritization of the KTIs is a risk-informed prioritization. We had a meeting on that. Do you want to provide any more detail on generally what the outstanding KTIs refer to or don't you want to do that at this point?

MR. REAMER: Specific areas?

MEMBER WEINER: Yes.

MR. REAMER: I'm probably not equipped today to do that. We can surely provide after the meeting if you'd like an -- we can identify the specific agreements that remain open, the KTI areas that they're in. I'd be happy to do that.

MEMBER WEINER: That would be helpful to us.

MR. REAMER: Sure.

MEMBER WEINER: Finally, I just have another question on low-level waste. Are there any areas of Part 61 that you think would deserve a closer look, a review, just something to look at, either in the implementation or in the wording of the reg itself?

MR. GILLEN: I don't really feel that I can probably respond to that at this point in time. You're picking on me on low-level waste all the time, and I'm a decommissioning guy.

MEMBER WEINER: Yes.

MR. GILLEN: That's not an excuse, but I could probably when I come back in December and talk to you, I can have the right people with me and we can talk in those areas too.

MEMBER WEINER: Fine.

MR. GILLEN: Yes. I don't don't particularly have any things that I've seen in my history with the NRC where I would want to improve Part 61, I can tell you.

MEMBER WEINER: That's very helpful, and I sure didn't mean to pick on you.

MR. GILLEN: No, I didn't mean to find an excuse either.

CHAIRPERSON RYAN: Yes. I think that's an interesting jumping off point for us to think about a working group meeting where there's a string of a variety of issues related to the kind of dilute concentration and the disposition, using that in a very broad sense. So maybe that's the focal point where we begin to shape a working group meeting and bringing in lots of stakeholders and hearing different views on that that might help you in your deliberations.

MR. GILLEN: Right, because the soil mixing type issues and those all contribute to that.

CHAIRPERSON RYAN: All those are -- there's a thread that runs through all of those and I'd like to point out that sometimes these disposition decisions sometimes drive the thinking on what the right decommissioning activities ought to be. Some people would spend a lot of money to analyze samples to make a decision if the disposal was very expensive, for example, where they might take a different strategy if there were different options for disposition of material. So it's very much a dynamic system, and I think you've got to remember it's a system. It's not just one decision, it's a whole bunch of decisions that interrelate. So maybe that's a theme for us to think about.

MR. GILLEN: I'll keep that in mind as we interact then to develop that, yes.

CHAIRPERSON RYAN: Sure. Questions? Mike? Sorry, Jim? Excuse me, Mike.

MR. CLARKE: Excuse me, just one comment and then a question for Dan. As part of their environmental restoration efforts, as you know, the Department of Energy has built and is building several disposal cells on site for management of clean-up residuals. Those disposal cells, they're called CERCLA-RCRA disposal cells, they are designed in accordance with either the RCRA prescriptive standards or a design that's been shown to be equivalent. So for what it's worth, this is happening. This technology is being used for low-level waste as part of environmental restoration efforts.

The question I had for you, Dan, it may take me a minute to get to it, but you mentioned four areas where you've been working on the LTR recommendations that you've made and approvals that you've had. You mentioned the merits of a workshop, and you also mentioned that you'll be working with the DOE on a risk-based end states initiative. And it strikes me that two of the areas that you mentioned, realistic scenarios and prevention of future legacy sites, are very important to them as well. In fact, the end use part of risk -- or the end state part of risk-based end states is the more realistic future land use scenario.

And then the issues that everyone seems to be struggling with are of course the long-term performance and engineered barriers and the long-term performance of institutional controls and how do you get there.

So I wondered if -- you mentioned intentionally mixing of soils as a workshop component, but I wonder if these other areas would be of interest to you as well.

MR. GILLEN: Well, certainly, yes. The institutional controls, the realistic scenarios, all of those are components of, as I talked about, the potential workshop. It's pretty much our experience in some of these areas and our interaction with DOE in various forum that have led us to involvement in their risk-based end state approach, and we're basically at the formative stages of our interaction with them, but we're looking to almost consult with them on our experience and what we see in their program as ways they might be able to improve it or ways we -- commonalities across our involvement and their involvement and use that as a way to focus their risk-based end state program.

MR. CLARKE: Just trying to get a little more feeling for what topics might be of most interest to you in such a workshop.

MR. GILLEN: Okay. Yes. Well, the four that I mentioned are of particular note, the type of things coming out of the LTR analysis, which really had about nine issues but they could be lumped into the four main ones that we're focusing on, I think. And you'll hear more about risk-based end states tomorrow from Robert Johnson and at the same time the WIR presentation.

MR. CLARKE: Sure.

CHAIRPERSON RYAN: Mike?

MR. LEE: Just a couple questions. One, just an observation for Dan as a follow up to comments from Dr. Ryan and Weiner. Part 61 is basically a deterministic regulation that was written prior to the PRA policy statement published by the Commission.

Previously, the staff issued a staff technical position on how to do some performance assessments and in a way try to risk inform the existing regulation, but if the existing regulation is going to see more action in the future, going back and looking at whether or not there's a need or a desire to modify Part 61 may have some merit, and that's something that the Committee might want to consider exploring.

I guess I've got two questions for Bill. If I heard you correctly, is the NRC waiting for a DOE position on whether it can submit a license application, given that the post-closure performance objective is under reconsideration now?

MR. REAMER: We're not waiting for DOE. We are aware, acknowledge, as the state of Nevada has argued in their letter to us, that the effect of the Court's decision with respect to the EPA standard creates a hole in the standard and raises the question can a license application be docketed in the face of that? That's what I was acknowledging as an uncertainty, and I was saying our view is it's up to the Department to decide whether and when. And if it makes that decision to submit prior to the EPA rulemaking to revise, then our expectation would be the Department would explain how submittal and docketing is consistent with the NRC regulations.

MR. LEE: Okay. Thanks. And just one other comment or observation. I guess as EPA considers how it would amend its existing 197 regulation to deal with the 10,000-year issue, previously the Committee's written a number of letters on the time period of compliance as well as conducting a working group several years ago. Do you envision or seek any or encourage any Committee insight as you talk to EPA on this issue?

MR. GILLEN: Well, the Committee will make whatever decision it makes about where it believes it should be spending its time and efforts. It's not my role to make that decision. But the way I see things the responsibility is in EPA's hands to decide on the timing and the nature, the scope and nature of the revision and to move forward. We will have to be obviously making amendments to Part 63 to be consistent with that EPA change, but we don't know what those amendments will be until we understand what the EPA change will be.

MR. LEE: The motivation behind the question is that the Court decision was pretty clear that EPA didn't follow the NES recommendations, which themselves I think were pretty clear. So I was just looking as to what type of path forward might ensure a higher outcome of success. So I'll just leave it at that.

CHAIRPERSON RYAN: Thanks, Mike. I guess to close up, we want to thank you for your time and presentations, but one last note, apart from the sites that Ann listed which were just a few of the more significant and complex sites, you also terminate 300 or so licenses a year from much less complicated licensing activities. And that's, I'm sure, a significant part of your workload. We don't want to just --

MR. GILLEN: Primarily the regions. I get all the complex ones.

CHAIRPERSON RYAN: Nonetheless, it's an important part of Decommissioning, and, certainly, even though they're small licensees, they're no less important to do it correctly, and you certainly have that workload to manage too. So you've got a lot on your plate, and we just didn't want to not recognize all those activities as well and all the people that do that work. Thank you both very much.

MR. GILLEN: Thank you.

MR. REAMER: Thank you.

(Whereupon, the foregoing matter went off the record at 11:54 a.m. and went back on the record at 11:57 a.m.)

MEMBER WEINER: I'd like to welcome Bill Brach, Director of SFPO, and Earl Easton, and I take it you're going to talk about the international transportation and give us a report from PATRAM.

And there are two videos imbedded in the presentation as I understand. I'd like to finish the presentation and the discussion, and then there are a couple of other videos if people would like to see them. These two videos are very, very short I understand.

So go ahead, Bill.

MR. BRACH: And I told Dr. Weiner that the two videos that we have imbedded in the presentation also are very short, and that's measured in seconds.

With me is Earl Easton. Earl is our senior level transportation expert in the Spent Fuel Project Office.

So, one, I want to thank the committee for the invitation to meet with you all this morning -- I think I can still say "morning" -- to discuss with you some of the NRC Spent Fuel Project Office activities in the international transportation arena.

I'm moving to the second page, and while

I get that on the overhead, the second page gives a brief overview of the topics I'd like to discuss with you. One, our engagement activities with the International Atomic Energy Agency and roles that NRC in the last few years has taken in that regard; the PATRAM conference, that's the Packaging and Transportation of Radioactive Material conference, held back in September in Berlin. That's a conference that's held every three years, and we'll give an overview of the conference and also Earl will be giving an overview of the presentation of some of the testing, physical testing that was carried out as part of the PATRAM conference.

And then at the end of the briefing I'll conclude with a brief overview on accompaniment by staff, by myself with the National Academy of Science on a visit to the U.K. to review the U.K. transportation, if you will, infrastructure for transport of spent fuel.

I'm trying to be sure we don't jump too many slides. I apologize.

First, with regard to the comments on the International Atomic Energy Agency, I want to briefly first mention why the interest or involvement. The IAEA, the United Nations International Atomic Energy

Agency, sets the international transportation standards for transportation of radioactive material, and through the IAEA and member state participation the standard, the documents referred to oftentimes as TSR-1 -- that's the international transportation standard -- sets the base on which member states or countries across the world, throughout the world use as fundamental fuel underpinnings for the transportation regulations and approach that the respective countries implement in their country.

In the U.S., NRC and DOT represent the U.S. at the IAEA in the area of transportation, and our two regulations, 10 CFR 49.171 and NRC's 10 CFR Part 71, implement the transportation standards within the U.S. and both the DOT and the NRC standards are built on the IAEA international transportation standard, TSR-1.

Now, the overhead, the first bullet notes NRC taking a leadership role. I want to clarify two aspects of that. One is we in the last few years have approached or taken a very technical leadership role, if you will. Clearly, the leadership in the U.S. is the Department of Transportation with regard to transportation. DOT is the U.S. competent authority for transportation. Both NRC and DOT co-represent the

U.S. at the IAEA.

With regard to what do I mean by taking a more extensive leadership role in transportation, over the past few years our NRC staff have been engaged with the IAEA on an approach and resolution of a number of technical issues that have been before the IAEA with regard to changes in considerations in the international transportation standard.

A few examples include, for example addressing surface contamination limits on transportation packages. Grandfathering provisions on the international verbiage is referred to as transitional arrangements.

Fissile exemptions with regard to transportation and also exemption levels for transportation, that is, at what level additional transportation standards and requirements would be applicable for the transport of radioactive material.

A number of NRC staff have from my perspective received prominence internationally engaging in these and other technical areas. I just want to mention a few because they stand out.

John Cook, Dave Pstrak, Nancy Osgood on our staff have been significantly engaged in working with the IAEA. Rob Lewis, who is Chief of the

Transportation Section sitting to my left; Earl Easton, our senior expert, extensive involvement.

And from that, the reason I mention their names and also mention the areas is what we've seen in the past few years is a markedly expanded NRC engagement in working with the IAEA in technical issue resolution, standards development, guidance development.

And you might ask for what reasons are we doing that. As I mentioned, the transportation standard is the underpinning on which we, NRC, as well as the rest of the world base our regulations and our programs. And so to the extent that NRC can be more directly and early engaged in the process, we can help influence and provide, if you will, risk informed and technical direction to the outcomes of these activities.

So we over the past few years have had a markedly stronger, if you will, engagement in that regard.

I also want to mention a transportation conference that occurred in Vienna in July of 2003. There have been internationally a number of efforts and issues involving the questions with regard to the safety of international transportation, especially maritime transportation. The IAEA held a special conference in July of 2003, and NRC at that conference as well had a major, if you will, technical leadership role, engagement in the conference, as well as in follow-on activities with the IAEA in helping develop the actions that resulted from the conference in follow-on actions by the agency.

The overhead in the second bullet notes an acronym TRANSSC, and of course, we wouldn't be a good government bureaucrat if we didn't have an overhead with acronyms that nobody can figure out. The TRANSSC is the acronym for the Transportation Safety Standards Committee. That's the committee at the IAEA that develops and has oversight responsibility for the development of the transportation standard in the guidance document. That's the activity in the committee I mentioned before that both NRC and DOT co-represent the U.S.

And the second or third acronym listed there or -- excuse me -- the third bullet but second acronym is TRANSAS, and that standards for Transportation Safety Appraisal System. That's an activity that the IAEA engages in offering to member states to conduct a review or an assessment of a member state's transportation program. It's led by the IAEA with member state support.

The overhead highlights the most recent mission in France that was completed, and NRC has participated in both the TRANSAS mission to France as well as previous missions in the last few years to the U.K. and Panama.

And you might ask why are we participating in those reviews. There's a couple, if you will, three basic reasons i'll mention. One is very clearly to provide technical support and expertise to the IAEA review of those programs in those respective countries, but also I'll mention France and U.K. as examples.

Those are two countries that have a fairly large program with regard to transportation and package development, package review and certification. In which, there's quite a few -- in the area of international commerce, there are quite a few packages that are designed and certified by France and U.K., for example, that oftentimes transit the U.S. as well or are used in commerce here in the U.S.

That process requires the U.W. to review and approve the use of those packages in the U.S. So our participation in the TRANSAS mission in, for example, the U.K. and France, helped us gain a better understanding of the programs as implemented in those countries so that when the packages and the designs are provided to us for review and approval, that having that background information and knowledge with regard to how those countries operate their programs facilitates our review and understanding of the process and approval process internally here in the U.S.

And the third item I'll mention is that, again, looking at the U.K. and France, those are both very well developed programs. So there's an aspect of what can we learn or what can we gain from other national programs with the fact that we may be in the position of carrying back and considering here in the U.S., if you will, lessons learned or good practices.

Let me move now to the PATRAM Symposium. I mentioned this was a conference held in Berlin, Germany this past September. I mentioned this is a conference that occurs every three years. The conference alternates between a U.S. location and a foreign location.

Three years ago, 2001, the conference was held in Chicago, Illinois; the conference this past year in Germany; and in three years will be, again, in a U.S. location.

The PATRAM conference in Germany was the largest attended PATRAM conference at an international location. There were over 700 representatives from 25 countries at the conference. That's the second PATRAM conference I've been to. Staff have attended a few more.

One thing I will offer from the standpoint of the engagement internationally of the industry and the public and the stakeholders in discussing transportation issues, whether it be technical issues needing technical resolution, discussing processes and other aspects, it's a very from my perspective, a very, very good conference and very engaged conference. The most interesting sessions are those that are panel sessions, if you will, where there are folks sitting, participating and answering, responding to questions that are from the audience. It's a very, very well attended conference and so, I think, a very valuable conference.

Noted in the overhead is the prominent role that the NRC played a this conference in representing the U.S. We had five staff from the Spent Fuel Project Office engaged in the PATRAM conference, presenting plenary speeches, presenting papers, chairing sessions, and providing poster sessions.

I would note as well that the director of NMSS, Jack Strosnider, was the opening plenary speaker at the conference in Berlin, and Jack attended the entire conference as well.

I will note that the next conference in 2007 will be in the U.S. The plans are for the conference in 2007 to be a thee U.S. federal agency sponsored conference: Department of Energy, Department of Transportation, and the NRC.

Earl is our lead within the NRC to work with the other agencies, and we've already initiated interactions and meetings with the other agencies to start the early part, if you will, of the planning for the 2007 conference.

Now, the last overhead notes that associated with the conference were the sessions and panels and poster sessions. There were two drop tests of full scale spent fuel transportation packages. I'll offer for myself this is the first full scale package testing that I had seen.

There were two tests conducted, one on the CONSTOR, which is a German cask design, full scale cask, multi-purpose casks drop test, and the second was a Japanese design cask by Mitsubishi, also a dual purpose cask.

At this point I'd like to turn the presentation over to Earl who will walk through some background on the testing facility as well as the conduct of the test and has, as I mentioned, two imbedded video clips to show the tests that were carried out.

Earl.

MR. EASTON: Thank you, Bill.

Today I'd like to share with the committee some photographs and some videos of two areas that we talk about often in transportation but we really don't get to see first hand.

The first one is an unyielding surface. What is an unyielding surface? And I have some videos of the construction of an unyielding surface, and I'd like to make some comments and commentary on how important an unyielding surface is to the area of transportation.

And the second, as Bill mentioned, we were fortunate to witness not only one, but two full-scale drop tests of spent fuel casks for shipment by rail.

First, let me just make a few remarks about the importance of an unyielding surface. In about 1961, the IAEA came up with standards to approve spent fuel packages and other radioactive material packages, safety standards in 1961. That said, for accidents packages must be analyzed for the maximum credible accident.

Of course, back in those days, unlike today, they had trouble defining the maximum credible accident and they spent a couple of years trying to actually define it and implement it, but they had trouble because each country has a different concept of maximum credible accident, different rail systems, different transportation systems.

About 1964, they said, "Hey, you know, we need to develop a standard test." So they came up with a 30 foot drop onto an unyielding surface. What was one of the reasons they came to such a test? Well, it's reproducible. It means the same thing in each country, and you could analyze it pretty readily using analytical tools.

Unyielding surface is a unique boundary condition, I guess, in analytical calculations where it reflects all of the energy back into the cask. Okay? And so you can just set that reflection and do an analysis, and when you actually go to drop something, if it's not unyielding, some of the energy goes into the surface. So a lot of care has to be taken into building an unyielding surface if you're actually going to do a drop test.

The IAEA rule of thumb for an unyielding surface is that the surface itself must weigh about ten times what the object being dropped on it weighs.

So let me go through some of the videos. The first one is dated to about April. I think it's actually April 7, 2004. This is the initial construction of the drop test facility in -- forgive me -- Horstvalde, Germany. I hope I have that pronunciation correct. It's on a former East Germany test site, although they were testing tanks, military hardware.

And for those of you who might have seen the test where they blow a propane tanker up against next to a CONSTOR cask, it's at the same site.

This is the initial excavation. What they're doing is they're putting what they call dwells in the ground to lower the water table, to control the water table.

After that, they excavate and line a pit in which they're going to pour concrete, reinforced concrete. That pit is about 46 by 46 by 16 and a half feet deep. These are approximate. Of course, in Germany, they're all in metrics. So I converted these. So these are approximate dimensions. But here you see the excavation pit on the next slide.

And here's what I really wanted to impress upon you. This is reinforced steel being put into that pit. There's about 225,000 pounds of steel reinforcement bars, and imbedded somewhere in that mess are force and strain gauges so that when an object is dropped, they can get measurements on how well this performs as an unyielding surface.

Now, this was done about the third week in May, which was about a month after they had prepared the cavity. They're getting ready for the pour. The inset just shows a perspective on how deep it is. Again, it's 16 and a half feet deep.

Here's the actual finishing up of the concrete pour, five and a half million pounds of concrete poured into that pit around the reinforcement bars.

On top of the pad, and you can't see it very well, but in this area here, they're preparing that to put a steel plate, about a three-quarter inch steel plate on top of that, and that's the actual dropped surface.

CHAIRPERSON RYAN: And that is one pour?

MR. EASTON: That I don't know.

Okay. After they've prepared the surface, they've built a test building around the surface, which is independent of the surface, not connected to the surface. It's built around, and this is for cask preparation. It's an all weather type preparation facility.

This is as it nears construction. This is the skeleton of the test building, and they're going to hoist this. This is an 80 ton crane. They'll hoist this drop tower on top of this structure.

Here, in fact, they're doing it.

After they completed the skeleton of the structure and enclosed it, they put a 200 ton winch on top. That's to list items up to 200 tons because they're anticipating that they'll test rail casks that might weigh up to 180 tons or so, and this has a lift capacity of 200 tons.

The release mechanism, which is shown in the right lower corner, very precisely engineered, and the reason they had to do that is the regulations require that a cask be dropped at the worst orientation. Oftentimes that is at a precise angle attacking the lid or CG, center of gravity, over corner. And so when they drop it, it can't have any wobble to throw that angle.

So this release mechanism or it was engineered with that in mind so as to maintain a drop angle to the ground.

Here's the completed facility. I think it was completed around the beginning of September, end of August. It costs about four million euros, which is about four and a half million dollars, and again, it shows the enclosed building. The hoist is up here, and this is actually taken at PATRAM where people are gathering to witness a test.

Here's some of the statistics. As I said in the beginning, the rule of thumb is that the unyielding surface weighs ten times the object being dropped. So if you have a 200 ton cask, if my calculations are correct, that's about 400,000 pounds. You've got five and a half million pounds of concrete, which is more than ten times the 400,000 pounds of the cask being dropped.

So it meets the IAEA guidance on an unyielding surface. Okay.

They built this. They're going to use it for something. So I'm going to go into a couple of videos. I'm going to describe the cask being dropped, show a couple of short videos of the actual drop tests that were done in Germany in conjunction with PATRAM at the end of September.

Okay. The first one is the CONSTOR cask. It happened on September 21st, and if I have everything working correctly --

MEMBER WEINER: Get the sound.

MR. EASTON: It's more dramatic with the sound.

CHAIRPERSON RYAN: Could you tell us a little bit about the cask. It's obviously a spent fuel rail cask.

MR. EASTON: Yeah, I'm going to. In the next picture where it's actually a picture of it sitting on the ground, I'm going to explain what type of cask it is or what it is.

Okay. Here's the cask.

Okay. Here's the cask after it has landed, and you can see deformation of the impact limiters. This was a side drop in which, you know, both impact limiters hit at the same time. Okay?

CONSTOR cask designed for 69 BWRs or 32 PWRs held in an internal basket. The heat load is 30 kilowatts per cask. It's intended to ship middle to high burn-up fuel. The length with the impact limiter is about 24 and a half feet. The outer diameter with the impact limiter is about 11.5 feet, and without the impact limiter, about 8.5 feet.

Okay. The way it's constructed, it has inner and outer steel shells, and it's filled with a somewhat novel material which is heavy concrete with heavy iron nodules. Okay? And that's between the inner and outer shell.

What you see here is an over pack. This gray thing is then an over pack that goes over that, and it is bolted together along the center line and then bolted to the impact limiters.

Okay. The impact limiters are basically divided into compartments and they're filled with wood because wood is a very good energy absorbing material.

They had strain gauges on the cask cavity wall, on the outer liner and on the lid and bottom. And after the test, the idea was to compare this to computer analysis and do a leak test. The bottom line, the leak test is a pretty good test on whether you've held integrity.

This is just, again, the corner view of the deformation.

Okay. The second test was done --

CHAIRPERSON RYAN: One question if I may. There's a lot of deformation on the bottom of an impact limiter. Is there any deformation of the cask?

MR. EASTON: I don't expect any, but we haven't really seen the results yet.

CHAIRPERSON RYAN: Oh, okay. All right. Thanks.

MR. EASTON: And this may be the first of a series of tests, and we have representatives from the department Research going over in December.

CHAIRPERSON RYAN: So this is a work in progress.

MR. EASTON: Right, a work in progress, exactly right.

Okay. The second cask. This is the Mitsubishi's heavy industry cask. The other one was 182 tons with impact limiters. This one is a little lighter cask, 126 tons, with the impact limiters as 141 tons, designed to house 69 BWR assemblies in the inner basket. Heat load, 22 kilowatts per cask. Average burn-up fuel, 40 gigawatt days per metric ton. Twenty-two foot long with impact limiters and ten foot diameter. So it's a little smaller and a little lighter.

The impact limiter is honeycomb metal. Rather than wood it's a honeycomb metal. It has an outer steel shell, a neutron shield, and then a monolithic steel body. Okay? So there are different construction than you've seen before.

Here since I didn't have videos of them listing it, this is them lifting it. The reason I wanted to show you, this is an angle drop where they're going to drop it at about a ten degree angle. It's going to impact and slap down. Okay?

Okay. I missed the video here. Bear with me here. Modern technology, right?

Okay. We're back to the cask in the air. Okay. This is from -- well, what you would have seen is a clip from the German television station VOX, which is put up here for two reasons: one, so you can see the drop test itself, and the other to let you know that the German public has a keen interest in this area, and this was one that was televised.

Maybe we can get that video later. I don't know, but this is the cask after the drop test, and you can see the deformation on its impact limiter is greater than this and there's less space here. That means that the impact limiter came closer to being exhausted, if you will, absorbing the maximum amount of energy it could without engaging the cask directly.

And this is the side view of that same

cask on the most damaged end.

CHAIRPERSON RYAN: I would assume that was the end that hit first.

MR. EASTON: That's the end that hit second. The most damage --

CHAIRPERSON RYAN: It's knocked down, and that's where the energy is --

MR. EASTON: Right, right. It hits and then it slaps down, and that's where you get the most energy, and that's the reason for doing the test.

CHAIRPERSON RYAN: Okay.

MR. EASTON: So that's basically what I wanted to show you about the test. The Germans are pouring through the results right now, and we hope to be able to share with the Germans GAM, the results, and see what we can learn from these tests.

And with that I'll --

MR. BRACH: There's one thing I will add, that both the German CONSTOR cask and the Japanese Mitsubishi cask, neither of those casks are either reviewed and certifies by the NRC or are applications before us. The CONSTOR, the German designed cask, we've had over the last two years numerous pre-application meetings with the German designers on that cask application or on that cask, and in anticipation of an application to the NRC we had significant meetings going through a lot of the pre-test calculations, modeling and analysis on the CONSTOR.

On the Mitsubishi, we have had zero interactions with Japanese on that package design, but one thing I did want to identify. At least on the CONSTOR cask, I'm assuming perhaps on the Japanese cask as well, is that many of the same modeling and analysis techniques that are used by the Germans in their cask design, cask model and analysis are the same codes and same modeling approaches that are used domestically here in the U.S. in cask design and cask analyses.

So clearly from the standpoint of what we're looking to learn and gain from this testing, one, clearly as it might relate to an application before us, very particularly for the CONSTOR cask, but secondly, to the extent what we can gain and learn from the testing carried out in the ability to have pre-test modeling and predictions and compare that to actual physical tests and give us confirmation and information with regard to modeling capability and confirmation of that.

So as Earl mentioned, we do not yet have that information from the Germans, but it's being carried out, and so we're looking forward to that information when we receive it.

The last aspect of briefing that I wanted to give you an overview on is accompanying the National Academy of Science on a visit to the U.K., the NAS is carrying out a transportation study, a study actually sponsored by the NRC, the DOT, and DOE, and I believe EPRI as well.

And the objective of the study is to conduct an independent assessment and comparison of the risks of spent fuel transportation with other societal risks. The study began in May of 2003. It's a two-year study. We're anticipating completion of the study spring of next year.

One committee member from the NAS did participate in the entire PATRAM conference. Other members of the committee joined, came to Berlin near the end of that week of the PATRAM conference and were there to observe the Japanese cask testing as well, and then moving on to the U.K.

Now, why the visit to the U.K.? As I mentioned, the NAS is carrying out a study of spent fuel transportation here in the U.S., and they were very interested in learning what other countries are doing, and the purpose of the visit to the U.K. was to gain an understanding of the infrastructure in the U.K. in spent fuel transportation.

The NAS visited the Sellafield reprocessing facility. As you're aware, in the U.K. spent fuel is reprocessed. All of the spent fuel in the U.K. is sent to the Sellafield facility for reprocessing.

The NAS visited the cask receipt as well as the cask maintenance facility at the Sellafield site. It also visited the Carlisle headquarters of a company called Direct Rail Service. Within the U.K., there is one railroad company, Direct Rail Service, that's responsible for all of the rail movement and transfer of spent fuel in the U.K.

Will mentioned that the British Nuclear Fuels, Limited, BNFL, not only is the owner-operator of the Sellafield facility, but also is the owner-operator of the Direct Rail Services. So if you step back, BNFL in the U.K. as an entity is responsible for all aspects of the transport spent fuel management.

The NAS team also visited an intermodal transfer facility in Bridgewater outside of Bristol in the U.K. That's an intermodal transfer facility where spent fuel in casks is transported from truck from the reactor sites to this intermodal transfer point where the casks are literally and figuratively lifted by crane, lifted up off the track and placed on a rail car, and then by rail transferred on to the Sellafield site.

In the U.K., all spent fuel transport is carried out by dedicated trains run, again, by the Direct Rail Services, a single company.

The NAS also had an evening meeting with members of the stakeholders in the U.K., which included a range of organizations who are not necessarily supportive, if you will, of nuclear power and nuclear transport in the U.K.

From my perspective it was a very informative meeting. The stakeholders were clearly making a point that they safe that to be, if you will, part of the solution, they need to be part of process, and that they were actively engaged in working with BNFL on a host of issues, including spent fuel transportation.

They had pointed out that at one point BNFL had proposed a particular intermodal transfer staging area at one location, and by engaging all of the stakeholders in that process, they were able to work forward in identifying a resolution and path forward that was clearly acceptable both to BNFL and to the parties involved.

It was a very informative process, and BNFL saw that as an entity, and the stakeholders saw that as a very successful interaction.

Note on the overhead in addition to use of dedicated trains, BNFL has carried out what they call a safety review of all the routes that are used for transport of spent fuel by rail, and what that means is they have teams that have gone out and reviewed the condition and periodically, clearly, on the condition of the tracks where the spent fuel is transported, but also have looked at all aspects of overpasses, under passes, trestles, bridges with regard to safety issues and considerations and done a safety analysis for all of those routes.

One aspect I'll close with on this slide is I will note that a clear message that I heard, and that I believe the NAS heard as well, that in the U.K. if there are significant, clearly, amount of spent fuel being transported, that spent fuel transportation by rail in the U.K., while it's closely monitored and managed, is reasonably accepted as a routine activity. It really has a lot of attention, a lot of management focus, but it's a routine practice in the U.K.

Concluding remarks. Just a statement, if you will, that based on our engagement internationally, we clearly, as I mentioned before, in some of our support to the LEA on TRANSAS activities, we're looking to learn and gain from others. We feel fairly confident or very confident in the transportation programs and requirements that we have in place. We're clearly always looking to aspects where improvement can be made, risk informed information can be brought to bear, and new information as well.

And as noted in the last bullet, clearly we all, both internationally as well as domestically, have a responsibility to maintain that vigilance to insure the continued safety of transport.

And the last question, and this slide has already been up there once when we had a little trouble, but at this point, any questions we'd be glad to entertain.

I think, Ruth, maybe you also have some videos you wanted to show as well.

MEMBER WEINER: After we finish the question session, since we're pushing on time, apparently there are a couple of videos that operate on my computer and off of my Flash memory and nobody else's. I'll be glad to show them.

But for right now I'd like to move to questions. Allen.

CHAIRPERSON RYAN: Yeah. First of all, thanks for an interesting presentation. It's always interesting to see the tests at least in video if you can't get to them and be shaken apart or seeing them live.

How many casks do you have under review for licensing action now? New casks, whether it's high level waste or low level waste.

MR. BRACH: Well, we typically in our review have anywhere from 15 to 30 transportation packages under review.

As far as new spent fuel transportation casks, I believe the GNP -- anticipation of the GNS CONSTOR would be the only at this point new cask design that we're anticipating in the very near future.

There are, however, a number of amendments to existing cask design, and today while we're talking transportation, typically we're talking about dual purpose casks, that is, a cask that would we used both for storage of spent fuel at, for example, a power plant, as well as for eventual transport where the canister would be integral to both the storage and the transport.

CHAIRPERSON RYAN: Right.

MR. BRACH: There are, if I remember correctly, seven approved dual purpose cask designs. Each of those cask designs has had numerous amendments to those casks to support different fuel needs at different power plants. Sometimes longer fuel, BWR/PWR fuel, thermal loadings of the canisters, different enrichments of material have all resulted in numerous amendments to those casks

The actual number, I don't have the number, but it would typically have in the neighborhood of 15 to 30 --

CHAIRPERSON RYAN: Significant amendments would you call them?

MR. BRACH: Some are very significant, especially as we're looking at cask applications where higher burn-up, higher thermal loading of the canister is being requested or where burn-up credit, for example, is an element being considered. So those are from a technical complexity standpoint marked more complex.

Other amendments you can clearly imagine have some varying degrees of complexity, but some that involve high burn-up fuel and burn-up credit are very complex.

CHAIRPERSON RYAN: How about in the non-fuel area?

MR. BRACH: The non-fuel area, the non-spent fuel area --

CHAIRPERSON RYAN: Right.

MR. BRACH: -- we have quite a heavy case load. That's to support whether it be fabrication of fuel for reactors, fissile material shipments of fresh fuel, say, from a fuel facility to a power reactor; numerous new cask designs for transport of fresh fuel assemblies in the byproduct arena, Part 30, if you will, fuel Part 30 series arena; or transport of cobalt and other materials that are used both in nuclear medicine applications and industrial applications. We have a significant work load with regard to non-spent fuel.

CHAIRPERSON RYAN: Irradiated hardware and things of that sort from power plants as well for low level waste disposal?

PARTICIPANT: Yeah, if it's enough activity.

CHAIRPERSON RYAN: Yes. There's a couple of Type B packages out there zooming around now, but you know, I guess I'm just curious to get a general sense that are all of these kind of updates and changes in new casks because of evolution of technology or the changing environment that the IAEA regulations brings to us or both?

MR. BRACH: It's a little bit of both. In the spent fuel arena, it's principally driven by I'll say the industry's needs for storage and eventual transport of spent fuel that is of higher burn-ups and perhaps trying to look to optimize cask loadings --

CHAIRPERSON RYAN: Sure.

MR. BRACH: -- with regard to content.

In the non-spent fuel arena, clearly there are aspects of the changes in the international transportation standard that I mentioned before in the grandfathering or transitional arrangements it's kind of a sliding continuum; that some of the older package designs for non-spent fuel based on the change in the rules and requirements -- well, there's a staggered time frame, but may no longer be certified or available for use. So that's resulted in an evolvement in development of new packages.

And oftentimes with the evolvement in development of new packages comes improved uses of different materials and different designs, a change in a number of different aspects.

CHAIRPERSON RYAN: Thanks. That's an interesting summary. I appreciate it.

MEMBER WEINER: Jim, I have a couple of questions. The first one is could you just briefly outline what NRC's role is in transportation. this is just to clarify for our records.

MR. BRACH: NRC is responsible for the review and certification of all Type B packages. A Type B package is a package that transports radioactive material of certain specified amounts.

A Type A package, which is the category, if you will, below that, those packages are reviewed and approved by the Department of Transportation.

We also have responsibility for review and approval of all transportation packages containing fissile materials, and that would be special nuclear material. The example I used before, for transport of fresh fuel from a fuel fabrication facility to a power reactor would be an example of a second category.

We also in the spent fuel arena, not my office, but the office of nuclear security and instant response, has the responsibility for the review and approval of transportation routes and security plans that are used to assure the security of the transport of spent fuel.

MEMBER WEINER: Let me clarify that. So as far as routes are concerned, your office is responsible for safety and security, but not for -- does it end there with security concerns?

MR. BRACH: Well, Spent Fuel Project Office, our office, has responsibility for the safety aspect, if you will, of transportation. The review of routes from a security perspective and security plans is an NRC responsibility. That responsibility rests with the Office of Nuclear Security and Incident Response, NSIR.

MEMBER WEINER: I see. Okay. Since the analyses of these tests are still being done, do you have any idea how these compare to the analyses that were published in NUREG CR-6672 or in the modal study or any of the other studies that have analyzed damage to Type B casks?

MR. BRACH: We don't have the results yet. So I'm not in the position to say how they compare, but I had mentioned before, Dr. Weiner, a number of the modeling analyses and techniques, ANSIS (phonetic) code is an example. A lot of the same modeling and analysis techniques that were used in the pre-test calculations for the CONSTOR cask for which the physical tests will be compared to are the same modeling and analysis techniques that are used here in the U.S. by the cask designers.

But we don't have the results yet to say how the analyses compared, but the methods and analysis of computations are very similar.

MEMBER WEINER: So you would expect to get some comparisons actually.

MR. BRACH: Earl has been in touch with them. We are expecting hopefully in the next year, early part of the next year, to receive some of that information.

MEMBER WEINER: Do you see any difference or any substantive difference in protection using the DU lined and lead lined steel, lead steel or steel DU, steel casks and using what the CONSTOR uses, which is concrete with iron nodules?

MR. BRACH: Let me look to Earl for a little help on that with regard to --

MEMBER WEINER: Do you get the same external dose or better, worse?

MR. EASTON: Well, of course, they're designed to meet the same regulations. So the expectation is that they have the same performance.

I think one of the things we'll learn from CONSTOR is how well our codes can model materials, such as concrete with iron nodules in them, which is a unique design compared to what we do. So there may be some things to learn from that.

CHAIRPERSON RYAN: These iron nodules, you're making a ball this big with your hand. Do you mean big, huge slugs or do you mean relatively fine powder or beads?

MR. EASTON: No, they're nodules. I wish I had brought a picture. I do have a picture, but don't quote me too literally, but if you look at it, it looks like a chocolate chip cookie.

CHAIRPERSON RYAN: Got you.

MEMBER WEINER: Okay. With the iron being the chocolate chips?

MR. EASTON: Yeah, being the chips, yeah. So I think we have to see how well those models do with those materials.

MEMBER WEINER: Yeah, you can just see that.

Did you gain any perspective on the future of testing programs in the United States, what we're going to do, what you would recommend be done?

MR. BRACH: That's a difficult question to answer in a broad sense, but the short answer is yes. Also Earl had mentioned Office of Research within the

NRC has our lead for the package performance study. Office of Research has staff that are going to Germany next month or they're going to be in Europe for a number of reasons, but they'll be visiting the Germans at BAM, a meeting of the folks that operate the facility and talk to them about the test capabilities and test plans that they have as well.

There's clearly a broad interest not only just here in the U.S. on cask and cask testing, but also internationally with regard to cask testing, especially of full scale casks, and the two demonstrate tests that were carried out with PATRAM are some of the first that I'm personally familiar with with regard to full scale regulatory testing of a cask.

MEMBER WEINER: Our concern, the concern of the committee has been that when tests are done that there is new technical information, that these tests have technical value, and I'll just leave you with that thought.

Anyone from the staff have questions?

(No response.)

MEMBER WEINER: No? Anyone else? Any member of the audience? Questions, comments?

(No response.)

MEMBER WEINER: Hearing none, I'll turn the meeting back to the chair.

CHAIRPERSON RYAN: Thank you, Ruth.

Thank you very much, both, for an interesting presentation. It's nice to get the update. It sounds like you've got lots of good work to do.

MR. BRACH: Thank you.

CHAIRPERSON RYAN: Okay. Thanks.

On our agenda, I guess that closes out our morning session. Are there any other comments?

Oh, you wanted to show your videos, Ruth?

MEMBER WEINER: If anybody wants to stay to see the videos, we're going to try them.

PARTICIPANT: It's crash and burn.

MEMBER WEINER: Yeah, it's crash and burn. It is.

CHAIRPERSON RYAN: Okay.

MEMBER WEINER: We're not sure we can get this going.

CHAIRPERSON RYAN: So far no.

MEMBER WEINER: So far no.

MR. HAMDAN: I thought you promised.

MEMBER WEINER: Well, if you want to come see it on my computer, okay.

CHAIRPERSON RYAN: Okay. Well, we'll be formally adjourned.

(Whereupon, at 12:45 p.m., the meeting was recessed for lunch, to reconvene at 2:00 p.m., the same day.)

Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title:	Advisory Committee on Nuclear Waste 155th Meeting
Docket Number:	(not applicable)
Location:	Rockville, Maryland
Date:	Tuesday, November 16, 2004
Work Order No.:	NRC-122 Pages 1-176

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

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155th MEETING

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TUESDAY

NOVEMBER 16, 2004

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ROCKVILLE, MARYLAND

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

MEMBERS PRESENT:

MICHAEL T. RYAN Chairman

ALLEN G. CROFF Vice Chairman

RUTH WEINER Member

ACNW STAFF PRESENT:

JOHN T. FLACK	Acting Branch Chief, ACNW
JOHN T. LARKINS	Executive Director, ACRS/ACNW
HOWARD J. LARSON	Special Assistant, ACRS/ACNW
RICHARD K. MAJOR	ACNW Staff
NEIL M. COLEMAN	ACNW Staff
LATIF HAMDAN	ACNW Staff
MICHAEL LEE	ACNW Staff

ALSO PRESENT:

JAMES H. CLARKE	Consultant, ACNW

P R O C E E D I N G S

(8:38 a.m.)

CHAIRMAN RYAN: The meeting will come to order. This is the first day of the 155th Meeting of the Advisory Committee on Nuclear Waste. My name is Michael Ryan, Chairman of the ACNW.

The other members of the Committee present are Allen Croff, Vice Chair, and Ruth Weiner. Also present is consultant Jim Clarke.

Today the Committee will hear a briefing by a DOE Representative on the general DOE format and content of the forthcoming DOE license application , hear the semi-annual briefing from the Director, Division of High-Level Waste Repository Safety and the Director of Waste Management and Environmental Protection.

We'll also hear a report on International spent fuel transportation-related meetings by the Director of the Spent Fuel Project Office.

Howard Larson is the Designated Federal Official for today's initial session.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act.

We have received no requests for time to make oral statements from members of the public regarding today's sessions. Should anyone wish to address the Committee, please make your wishes known to one of the Committee's staff.

It is requested that speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so they can be readily heard.

Before starting the first session, I would like to cover some brief items of current interest.

On October 28th, Jenny Gallo as well as Sharon Stone who was here on a rotational assignment received certificates as graduates of the one-year long Leadership Potential Program in a ceremony conducted in the TWFN Auditorium. Commissioner Merrifield provided the keynote address.

Patricia Norry, NRC Deputy Executive Director for Management Services announced her intention to retire at the end of January 2005. She commenced her career as staff assistant to then AEC Chairman Glenn Seaborg in 1961.

We wish these folks congratulations and good wishes in their future endeavors.

With that being said, I'd like to welcome Joseph Ziegler, Director of the Office of Licensing

Application and Strategy who is going to provide us with an update on the Yucca Mountain Project license application. Joe, good morning and welcome.

MR. ZIEGLER: Thank you, Michael, appreciate the opportunity to be hear and I appreciate you arranging the schedule so that I could speak in the morning.

I'm basically going to go over our application and describe the format of that application and what it contains. And then I'm going to do a comparison between our application and the Yucca Mountain Review Plan so you can see how it aligns. And it aligns rather well but it's not absolutely exact.

The primary emphasis of our application is on meeting the requirements of 10 CFR 63 and addressing all the review criteria of the acceptance criteria in the Yucca Mountain Review Plan.

The Safety Analysis Report maps the Yucca Mountain Review Plan. It also considers recent precedent in other licensing actions. We looked at the private fuel storage application. We looked at the MOX Fuel Facility in South Carolina.

We looked at the LES Enrichment Facility that's now being proposed in New Mexico. And we looked at several reactor SARs, you know, and basically the lessons learned there not only just to prepare the license application and Safety Analysis Report but to keep the Safety Analysis Report up to date over time because periodic updates are necessary and required.

We put crosswalks in our application to 10 CFR 63 and the Yucca Mountain Review Plan so at the beginning of each section, each major section starts with a crosswalk to the acceptance criteria in the Yucca Mountain Review Plan and the regulations that that acceptance criteria is related to.

Now I'll highlight, as I go through this, any deviations or apparent deviations from the Review Plan just to let you know because there are some apparent deviations that in my mind aren't really deviations.

On to page 2, this is just an outline of what I'm going to go through, an overview that I've just started. The general information outline, there's two basic sections of the application: general information and the Safety Analysis Report, as required by the regulations.

So I'll go through the general information outline. Then the Safety Analysis Report outline.

I'll key that relationship to the Review Plan. I'll give you a sample of what that crosswalk looks like at the very end of the presentation. And then I'll summarize what I've been through.

Page 3, the overview does consist of the GI section, general information and Safety Analysis Report. It does conform with NUREG-1804. That is the Yucca Mountain Review Plan, Rev. 2.

And it is responsive to the acceptance criteria. And we did the crosswalk to absolutely make sure and positive that it is. And make sure it's very clear. And it facilitates the review by the NRC staff.

The key parts of the Safety Analysis Report are in two parts, the Pre-closure Safety Analysis, which covers a 100-year period, 50 years of active surface facility operations but an additional 50 years before closure of the repository, and it covers post-closure, the Total System Performance Assessment, that's a 10,000-year analysis.

And our application today deals with 10,000, not beyond 10,000 years. And there's some issues there with the remand of the EPA standard that we have not actively done that analysis to deal with that remand yet. And we don't know exactly what the standard beyond 10,000 years is going to be either.

The next slide just gives an outline of the general information section at a very high level of the application, a general description. This aligns to Section 1 of the Yucca Mountain Review Plan so 1.1 would be general description. We call it GI-1.

Basically just some lead-in information, give a general description of the repository, the repository facilities, the repository location, a little bit about Yucca Mountain.

GI-2, again, these align exactly with the Review Plan 1.1 through 1.5. Its proposed scheduled, it gives the schedule for construction, receipt, and then emplacement of waste.

GI-3 is the Physical Protection Plan. At this point in time, the Physical Protection Plan and GI-4 as well, the Material Control and Accounting Plan, are more conceptual plans. We give commitments to what those plans will contain in detail.

Those commitments will be to have those plans available, I believe, six months before we make the update to the license application, which is required by the regulation.

We sent a letter to the NRC staff and got a response where they agreed that these sections would contain more detail further along in the licensing process. We really need a facility to describe this in detail. So we don't have the facilities yet, but -- so those plans will be developed in more detail and refinement later on.

And then we talk about site characterization activities. This is, by length, the longest part of the Review Plan. It goes through the 20-plus years of site characterization that's been done on the Yucca Mountain site. It gives some of the results of that scientific analysis as it leads into the safety analyses that come later.

This slide on 5 just basically shows you the Yucca Mountain site and how we've defined the boundaries, you know, in the regulation, and how our terminology aligns with that.

The green line along the outside is what we have been calling the land withdrawal boundary or proposed land withdrawal boundary. At this point in time, the land withdrawal boundary will equal the site, which will equal the pre-closure controlled area. So all of that information and all those terminologies will be the same in our definition.

We also show the surface GROA and the subsurface GROA. The surface GROA, and it's a little bit odd shaped maybe even than what you've seen before, basically shows the maximum extent of the surface GROA.

There will also be where the openings to the underground, that will also be designated as GROA. And I'll show you on, I think, the next slide how the GROA will move over time.

On the left side, you see the subsurface GROA, the left in blue. And that shows the subsurface as it develops and the geological repository operations area, it also will move over time.

So as the repository is developed and as nuclear material is handled or placed in the repository, the GROA will expand to cover the areas of nuclear operations. So this shows the maximum extent of the subsurface GROA as well.

And I will point out, and you can see, the blue area. That's the controlled area which would be the post-closure controlled area. And again, defined by regulation, it can't be more than 300 square kilometers. And this is about a 300-square kilometer depiction here.

Basically it extends south in the predominant direct of ground water flow per the regulation again.

I think you can see 40-mile wash over to the right side of that blue area that kind of meanders back to the middle.

It's where 40-mile wash crosses the southern boundary of the controlled area, which aligns with the southern boundary of the Nevada Test Site. That would be where the ReMi would draw water and where the water concentrations are calculated or the dose.

The next slide shows the GROA as it may expand over time. On the lefthand side, it shows an initial operating capacity of what we call the fuel handling facility.

I think you've had -- I know you've had presentations on the design of the repository. Right now there are several different surface facilities that would be developed in a phased manner. So the first facility to be built would be the fuel handling facility.

Perhaps the canister handling facility, which is the second from the left, would be completed at the same time and available for nuclear operations. But as the facilities, and kind of diagonally from left to right, are developed -- in this depiction -- this is a north being up depiction -- as the areas expand, as the aging facilities are developed in modules, 5,000 metric ton modules for aging facility, then the GROA boundaries would expand to cover the extent of the nuclear operations.

So where there's nuclear operations, that is geological repository operations areas.

There would be separation, and this is outlined in the application. We calculate, I believe, the Part 20 dose limit requirements. And our regulation is a little unique in that Part 20 and important to safety are tied together in the regulation.

Those Part 20 on-site requirements, on-site public requirements, are calculated, I believe, at 100 meters from any nuclear potential point of radiation release. And we would make sure we maintain that as the GROA boundaries are managed. And as construction on the other side of the boundaries are managed.

So in the full operating capacity, you'll see the outline and the shape of that matches the shape on the previous slide. That would include fuel handling facility, canister handling facility, dry transfer facility 1, dry transfer facility 2, and a fully developed aging facility.

And that facility now is 21,000 metric tons, 20,000 metric tons, and 5,000 metric ton modules, and 1,000 within the immediate handling facility operations.

Slide 7 gives you the general upper tier outline of the Safety Analysis Report. The Safety Analysis Report in the Yucca Mountain Review Plan is Section 2 of the Review Plan. And in our terminology, it's SAR Chapter 1 through 5. So instead of 2.1 through 2.5, it's SAR 1 through 5.

We start with repository safety before permanent closures. The Pre-closure Safety Analysis, that's 2.1 of the Yucca Mountain Review Plan. We go repository safety after permanent closure. Our total system performance assessment is 2.2 of the Review Plan.

Research and development programs to resolve safety questions, Chapter 3 of the Safety Analysis, 2.3 of the Yucca Mountain Review Plan. And I'll go ahead and say -- we're probably not going to talk about this later -- this, for us, right now is a placeholder.

We believe we have adequate information and have performed an adequate safety analysis to show that a repository can be operated safety both in the pre-closure period and it will be safe over 10,000 years.

If issues come up during the licensing reviews or other issues for any other reason and we need a research program to resolve those questions, then we would have to modify and put that information in here. But right now, that's a placeholder section.

Then the Performance Confirmation Program and I know back then, I think the last time was July of `03, you had quite an extensive presentation on the Performance Confirmation Program.

We were on Rev. 3 of our Performance Confirmation Plan at that time. We are getting ready to issue Rev. 5 of the Performance Confirmation Plan, which should be done about the end of this month or the first of next month.

This section is a summary of the Performance Confirmation Plan. And like other parts of the application, there's extension referencing to the underlying basis documents that we prepared on the project.

But the Performance Confirmation Plan itself is not part of the LA. But it's just a summary description that appears in the license application. But it is referenced extensively. And it will be available for the NRC staff review.

And then --

CHAIRMAN RYAN: Joe, just a quick question.

MR. ZIEGLER: Yes?

CHAIRMAN RYAN: It's not part of the LA but it is one of the requirements you have to meet?

MR. ZIEGLER: It is a requirement that we have a Performance Confirmation Plan. But it's not required that that plan be part of the LA.

The problem comes making a lot of these plans actually part of the LA is changing the application means a license change. And so changing the Performance Confirmation Plan in relatively minor ways would not necessarily require a license application change or a license change. So --

CHAIRMAN RYAN: So it's really to address the procedural aspect? But as I read the regulation, it's obviously one of the major requirements.

MR. ZIEGLER: It is required, right. It's like Radiation Protection Program.

CHAIRMAN RYAN: Got you.

MR. ZIEGLER: We have the program but the program has minor modifications to it, you know, as time goes on but the program itself is not part of the

LA. It's described in the LA.

And then we go through management systems. And I'll go into detail what that entails later. But that's the organizational structure, key positions, things like that.

To just show you a little bit of an out line here of the surface facilities because all the front end of the application is that. And this shows kind of the layouts that I was talking about before. It was in the GROA depiction.

But development of the surface facilities kind of starts in the lower left portion. And then it kind of moves up diagonally to the right. So the communication center, central communication center, fuel handling facility, canister handling facility, dry transfer facility 1, dry transfer facility 2.

The aging area is up in this area, cask waste prep and receipt building is right here, so canister and waste package receipt building -- so you'll see on these lines is what we call site specific casks can either go in this prep building or they can go up here directly into these facilities.

A site specific cask would be an aging cask. So we've developed site specific casks. We outline that in Section 1.2.6 when we discuss our aging facilities. And so those aging casks would come in that direction.

The blue line shows the direction that waste packages could come in. They could either go into this prep building and then into the aging facilities before loaded or we have the capability to take them directly into each of the handling facilities.

Once they are loaded, then they come back out and go into the ground here. Here's the tunnel that exists today that goes underground.

And transportation casks. Again, transportation casks can come in and go through the prep building and into these major facilities or they would have to go directly into the fuel handling facility. So -- and then they would be unloaded. And the waste material that's inside then would be put either in a site specific cask to go to the aging facility or they would be put in a waste package to go underground and be in place.

Going into a little bit more detail now about what the Safety Analysis Report contains. Chapter 1 of the Safety Analysis Report is on the order of about a thousand pages plus many other hundreds of pages of tables.

We use a tabular format in many cases, and I'll get into some of that later, especially when we were doing in pre-closure in the determination of what is important to safety and what's not important to safety and what's the probably subject of technical specifications.

1.1 gives the site description as it pertains to pre-closure safety. That's things like climatology, meteorology, geography, seismology, land use tomography. This basically says what we need to know in order to do an adequate pre-closure safety analysis and to construct and operate the surface facilities.

1.2 goes through the surface structure systems and components and the pre-operational process activities. It's an overview. It talks about option in construction activities. It talks about what the major facilities of the repository that I just basically went over with you in a little bit more detail than that though. And it just sets the stage for the subsequent sections.

Then we go through -- okay, on the surface. Then on the subsurface structure systems and components and operational activities are in Chapters 1.3. Again, overview, design considerations, emplacement and non-emplacement areas of the subsurface are described.

Then we talk about infrastructure, system structures and components, the equipment, the operational process activities, things like electric power, controls and monitoring, fire protection, waste management as far as onsite-generated waste, those facilities and services, heating, air, water, fuel, all those types of things. That's discussed in Section 1.4.

And then the waste form and the waste package itself, that's spent fuel and high-level waste, and our waste package, which is the Alloy 22 outer shell with an inner shell of stainless steel is described in Section 1.5.

Moving on through the pre-closure safety analysis on Slide 10, we identify the hazards and the initiating events that need to be analyzed, need to be considered for safety analysis for the pre-closure period.

Once the hazards are identified, we identify event sequences per the regulation. And the event sequences are sequences of events that could lead to radiological releases or radiological exposures.

We determine the probability of those event sequences. The probability plays into whether the event sequence is categorized as a Category 1 event, which is something that is expected to occur at least once over the period of operations or a Category 2 event, which is something that's not expected to occur over the period of operations but it has a one in one hundred chance of occurring over the period of operations.

Or whether it's beyond Category 2. And that's important because the regulatory limits that apply to these event sequences are dependent upon their probability. And it's risk-based regulation.

Then we go through the consequence analysis. For the event sequences that are Category 1 or Category 2 event sequences, we calculate consequences.

Our safety philosophy, I'll just tell you right now, is prevention first. So if we can prevent an event sequence from occurring in a reasonable manner and at a reasonable cost, then we prevent the event sequence from occurring. Or we reduce the probability to force it into a Category 2 event sequence or beyond Category 2 event sequence.

Secondary is mitigation. In all of this, we don't eliminate one or the other, you know, if we get to a probability that's nearly Category 2 but it's still Category 1, we still provide mitigation.

If it's a little bit beyond Category 2 as far as on the lower probability side, we still provide mitigation. So there is the defense in depth there. So we're not trying to cut the margin so fine that we don't protect our workers, and the public, and the environment. So we do.

1.9, and this is one that is table intensive, there's probably 10 to 20 pages of text in this section but it's mostly tabular information. And these are the SSCs, or the structure systems and components important to safety, the safety controls that will be applied to those SSCs, and measures to ensure the availability of safety system.

The table actually shows important to safety and important to waste isolation. We decided to put our classification information in one section. That's really a post-closure item.

But because we might have to put operational controls on important to waste isolation components, for instance the waste package, we want to make sure that the waste package stays in good shape during the pre-closure period so, like I said, our post-closure safety analysis continues to be valid.

So there are operational controls. Within this tabular format, we not only depict the classification, important to safety or not important to safety, and why, we also, on the important to safety and important to waste isolation, SSCs define whether or not they are the probable subject of technical specifications.

I think they call it licensing specifications in the Review Plan. I think the traditional name in nuclear facilities has been tech specs. So we call it technical specifications but we do define the probable subject of tech specs and the nature of those specifications and what they'll be.

So they will either be limiting conditions of operation or other operational controls on those structure systems and components.

Chapter 1.10 deals with meeting the ALARA requirements for normal operations in Category 1 event sequences. ALARA will be implemented. Our project, under the auspices of a comprehensive Radiation Protection Program, we've included that as a later section with a description of the Radiation Protection Program. And this section refers heavily to that section that will come later on.

And we included that in a later chapter of the Safety Analysis Report. But this gives a fairly comprehensive description of ALARA and managements commitment to maintaining doses as low as reasonably achievable.

1.11, you'll see the plans for retrieval and alternate storage of waste. Again, this is a conceptual plan at this point in time. It goes to the element of what a plan for retrieval would contain. It makes commitments that if we ever decide to retrieve, then we would go through detailed planning and a more detailed, refined retrieval plan based on the circumstances that exist at the time.

But we do not believe that it was necessary nor prudent to go through a detailed planning for something one, that may never occur, and if it did occur, it would be at least decades into the future. And we've written a letter to NRC staff on that. And I believe we have their agreement on this concept as well.

1.12, plan for permanent closure, decontamination, dismantlement, it's just what it says. And, again, a fairly high-level plan at this point in time. This would be at about 50 years, anywhere between 40 and 50 years for the surface facilities or planned dismantlement of most of those facilities but not all of them. And 100 years is when we have analyzed closure, when we anticipate closure of the repository.

And we've added two sections that are not in the review plan. We added a section on equipment qualification program. It's been kind of a longstanding issue in the commercial power business. We wanted to address it.

It turns out there's not very -- this is basically on our important to safety and components, are they going to operate under the environment and are they qualified to operate under the environment that they will have to see.

And as it turns out, as you would expect, there's not a lot of very harsh environments at a repository. It doesn't have the very harsh environments of high temperature, high humidity. It does have high radiation fields that are typical in a nuclear power plant.

And it doesn't have the accident conditions where you get much higher levels of those three components, radiation, temperature, and humidity. And what it sees under normal operations. What this facility sees under normal ops is pretty much what it would see under any accident conditions so the equipment should operate. But we wanted to cover that more explicitly.

We also wanted to cover nuclear criticality safety. We believed it will be an important aspect of licensing the repository. So we've included a separate section on nuclear criticality safety.

Now I'm going to Chapter 2. Chapter 2 is our post-closure safety analysis. And that's done in what we call total system performance assessment. This aligns, I believe, with Section 3 of the Review Plan. I have a detailed comparison here later.

2.1 talks about the system description and a demonstration of multiple barriers. And on the next slide I'll give you a graphic depiction of the way we have defined barriers. And it's a little different than what we have -- we've grouped it differently than what has been presented in the past at ACNW.

Let me just go ahead and flip to the next slide. And then we'll have to come back for this.

Basically our modeling and our barrier description follows the path of water, okay? The only way any substantive radionuclide releases could occur in a repository is ultimately through water infiltrating -- you know, through precipitation infiltrating through the mountain eventually seeping into the repository drifts where the waste would be located creating a mechanism for corrosion of the engineered barriers and degradation of those barriers.

So basically the way we've defined the barrier systems, we've define it upper natural barrier. And this would include the topography, the surficial soil, the rock, and the unsaturated zone above the repository. So the modeling then, to climb it down through there down to the repository proper, that's just a depiction of a drift within the repository.

Our second barrier is the engineered barrier system. And we basically are looking at several things here. We're looking at the emplacement drifts themselves. The shape and the size of the drifts will limit the size of rock pile, they will limit the way water could ingress into the repository through seepage, and the way it would disperse around -- in most cases disperse around the walls of the repository.

Dripping is, however, possible. Therefore there's a drip shield that's a primary component of the engineered barrier system. The drip shield and then the waste package under the drip shield.

Ultimately, once moisture and water get in, it is possible that this barrier would degrade over long periods of time. So once these barriers are degraded and moisture gets in, there's some additional engineered barriers. There's the cladding, in particular, on spent nuclear fuel and the waste form of the other waste.

There's the invert under the drift. This is a pallet with waste packages sitting on it. The inverts under the drift would be filled with crushed stone. But there is some absorption and diffusion through that invert.

This is the drift T-way. And we've also called that important to waste isolation. The t-way basically is backfill plugs at the end of each drift in the primary access mine. The reason this is important to waste isolation is in an igneous event scenario.

There were questions raised as to whether or not magma, once it came up through the repository, even though a very low probability event, whether it might snake its way back and forth along the drift. This backfill plugs at the end of the drifts helps address that question so that's part of the design.

Once the engineered barriers are taken into considered, this engineered barrier system, second barrier, our third barrier is the lower natural barrier system. And the lower natural barrier system, again, following the water.

Once it got through, water got through the invert, it might have some radiological contaminants in it. It still has about a thousand feet of the unsaturated zone that it has to penetrate before ultimately reaching the saturated zone.

So -- and each of these provides its own hold up, its own dispersion, and own performance aspects. And they're all part of the engineered barrier -- all part of the barriers in repositories. So we've defined three primary barriers, upper natural barrier, which contains several features, the engineered barrier system, which contains several features, and the lower natural barrier system, which contains several features.

Going back to Slide 11, Section 2.2 is the scenario analysis and event probabilities, what we call the FEP section. This is another section that is largely tabular in nature. It goes through the screening analysis of all the features, events, and processes that we consider in evaluating safety of the repository over long period of time.

We're required to consider events that have at least one in 10,000 probability over a 10,000 year, nominally a 10 to the minus 8 per year probability event. So we go through a long list of features, events, and process, screen them.

Either they're in or they're out. If the probability is above 10 to the minus 8 or at 10 to the minus 8 per year or higher, it is screened in unless there is reason to show that it is of no consequence to the performance of the repository.

So events that meet the probability threshold and are of consequence to performance of the repository are considered in the safety analysis.

Section 2.3 goes through the model extractions. It will show the components of the repository, the basis for the presentation, and the order of that. And I'll show a little more detail about 2.3 because 2.3 is probably, volume-wise, the most voluminous part of the application because it goes through the different model components that are considered in the post-closure safety analysis so more detail later.

And then 2.4 is the demonstration of compliance with the pre-closure public health and safety and environmental standards. That's where we go through the model description of the integrated TSPA model. So there is some lead in information there.

Once we go through the individual model components in Section 2.3, we go through the model description of the integrated TSPA models and how they fit together in 2.4.

There's a little bit of that in a lead-in section. It's 2.0. I didn't put it down here but that gets into more detail in Section 2.4.

Then we go through the results and present the results based on the individual protection standard, the human intrusion standard, and the groundwater protection standard. And we give the results in each of those area.

CHAIRMAN RYAN: Joe, I think I heard you say pre-closure but I think you meant post-closure.

MR. ZIEGLER: I mean post-closure, excuse me.

Okay. And I've been through Slide 12. We'll go to Slide 13. Thirteen goes through Chapter 5 of the Safety Analysis Report. And I skipped from 2 to 5. If you'll remember Chapter 3 was the R&D programs. It's basically a placeholder section.

Chapter 4 is the Performance Conformation Program. So it's about a 50-page summary description of our Performance Confirmation Program that relies heavily on the Performance Confirmation Plan.

Chapter 5 goes through the management systems. And it's the whole long list of management systems. Quality assurance program, we reference our quality assurance and requirements description. It's in Reg 17 proposed right now.

And we plan to just continue to revise the program that's in existence. It largely meets the review plan criteria. As a matter of fact, I think the review plan was largely written around our existing program.

Not only do we reference it, we will include it as part of the application because it's required by the regulation. So we will do that.

Record reports, tests and experiments, general records program, retention, storage, disposition requirements are all talked about in that section. That also talks about the provision of space to the NRC at our location for resident inspectors. And we've had a recent request from NRC about providing more space. And we've agreed to provide more space as they plan to provide inspection activity for the project.

Qualification of personnel, 5.3, that gets into the organizational structure for both construction and operations of a repository. It gets into what the key positions are and the qualifications of those key positions are.

We have not named people to fill most of those key positions at this point in time because we're years away from those positions needing to be filled. We don't need an operations manager or a construction manager today.

We're years away from that but we do give -- we do define the organizational structure and the minimum set of requirements for those positions.

We go through expert elicitation. And we talk about the elicitations that we've already done. And we talk about how we do elicitations according to NUREG-1563, which is the NRC Branch Technical Position on Expert Elicitation.

Some of those that we've already done are probabilistic vulcanic hazards analysis, probabilistic seismic hazards analysis. There's an elicitation done on FC flow and transport. And then if we ever do any in the future, then they would need to come back and be described in this section.

5.5 talks about the plans for initial start up activities and testing. That is a brief section at this point in time. And would be more fully developed in detail once the facilities were actually -- construction was nearing completion. And then a submittal and an update to the application would be made at that time to the Nuclear Regulatory Commission.

5.6, plans and procedures for the conduct of normal activities, maintenance surveillance, periodic testing, again, that's a brief section. There's commitments to have various and appropriate operating maintenance, surveillance, and test programs and procedures in place before those activities need to occur. And again, we're years away from any of those activities.

Emergency planning, again a conceptual plan with a commitment for more detailed planning once the facilities were more fully developed. There won't be any nuclear material on site until after 2010. And so we're years away from that. The emergency plans need to be done and then kept up to date.

So we make many commitments for the detail and the content that will be in the ultimate emergency plan. It's more conceptual at this point in time.

Controls to restrict access and regulate land uses. We talked about land ownership, controls, the need for withdrawal of the Bureau of Land Management properties for permanent use for the repository. We talked about pre-closure controls. We'd also talk about the permanent marker systems that are required post-closure. And so there is a fairly extensive discussion of what those markers will be.

5.9, we talk about uses for other uses of the repository. Basically we recognize that there are Native American activities that have gone on in this area and will continue into the future. We talk about protection of resources, performance monitoring, pre-closure and post-closure.

We talk about other activities will be allowed only if there is a specific analysis that shows that those activities can be done safely. So we'd make sure that there is no harm to the public or the environment.

Tech specs and license conditions, 5.10. It talks about the structure of our tech specs. It's what the review plan, I believe, calls licensing specifications. We call them tech specs. And the probable subjects of technical specifications. This section points back and relies heavily on the tables in Section 1.9 that go through the classification of what's important to safety and what's important to waste isolation. And identifies specifically the probably subjects of the tech specs.

And then 5.11 is the Operational Radiation Protection Program. We go through that in more detail here. There's about a 25-page summary section of what the Operational Radiation Protection Program have in it. And a commitment of more fully develop that program as we get closer to the time where the program will actually be needed. And it reiterates the commitment keeping doses as low as reasonably achievable.

I'd mentioned earlier that I wanted to go into a little bit more detail about Section 2.3 2.3.X, as we call it, basically are the component models of the total system performance assessment. And these sections are developed in a standard format. And it covers quite a few of the acceptance criteria in the review plan.

There's acceptance criteria that requires system description and model integration, data and model justification, data uncertainty, model uncertainty, and general references.

We have structured this to talk about the role of the model component in the TSPA. And how each particular model component fits within the entire analysis or the integrated analysis.

We talk about a summary of the features, events, and processes, the FEPs, that are evaluated in that particular model component. Now we will point back to Section 2.2, which goes through the entire FEPs screening, which screens some things in, it screens some things out.

The things that are screened in that need to be considered within each model component are discussed in more detail in each model component section.

Then we talk about the overview and a summary of that model component. Again, trying to say what's in it, how it integrates in more detail.

And then we go into several subsections, typically it's 2.3.X.4 through 2.3.X.7. Sometimes it goes through .8. And it talks about the things particularly in these middle acceptance criteria. Data and model justification, data uncertainty, model uncertainty. Make sure we go into that in detail.

Sometimes there's submodels within the models so the models so it's broken out into subsections.

And then a section on general reference that, again, points back to the bases analysis. That's the basis of what actually goes into the license application.

And again, I want to reiterate that we tried to reference within the text of the application where the basis documents that make up the bases for the application, where that information is contained in more detail. Again, that's to facilitate the NRC review of the license application.

Safety Analysis Report outline. These next two slides I'm going to kind of reiterate what I said when we define the barrier system is our organization is to follow the flow of the water. We start with the climate and infiltration. We have precipitation and some infiltration into Yucca Mountain.

We talk about the water and how it may flow through the unsaturated zone. Ultimately some of that water would reach the drifts and seep into the drifts. Some of the water might drip, okay? Most of the water will not be dripping water when it gets into the drifts. But there is the possibility in some parts of the repository there will be dripping water.

So we talk about the drip shields. And we talk about the waste package. And we talk about the mechanisms that could degrade the drip shield and the waste package.

We talk about the chemical environment in the drift, okay? And how that chemical environment either promotes or protects the engineered barrier system. And then leading up to corrosion of the system.

Then we talk about the end package environment because once the waste package would be degraded, which is possible over very, very long periods of time, then the chemical environment and the way the waste form degrades and the solubility of the materials that make up the waste form and water become important into the performance.

Then ultimately for the nuclides that are dissolved, radionuclide transport through the remaindered of the engineered barrier system and then into the unsaturated zone below that. Now we're into the third barrier I mentioned.

Saturated zone flow, eventually the water reaches the saturated zone. It eventually gets to the point where the ReMi would be using water or withdrawing water. That would be -- and it would go into biosphere transport and exposure. So it's how the water is taken up, how it's used.

The ReMi drinks two liters a day, uses it to grow crops based on the average in the town of Amargosa Valley. And that's based on food consumption surveys that have been done.

Section 2.3.11 is igneous activity. And igneous activity is a little bit different because there's two part of that disruptive event scenario. There's an intrusive igneous event and the intrusive igneous event could damage some of the waste packages but would not actually result in a volcano.

Once the waste packages are damaged, then basically the engineered barriers are not as effective or not effective at all in some cases. And then the rest of the modeling is still applicable.

For the extrusive igneous event, for the volcano scenario, it's a different set of analyses. And that's why we divided igneous up into a separate section of the Safety Analysis Report. And so that's modeled separately.

It goes through, at least as far as the way the event propagates, and then it leads to a deposition in the form of vulcanic ash at the ReMi location. And then it gets back into part of the biosphere calculations.

This just shows what I've already said in words is that, you know, the way the process works, we've identified the features, events, and processes. We've screened the features, events, and processes. If it's of a less than 10 to the minus 8 per year probability, it's screened out. If it's of no consequence to repository performance, it's screened out.

The FEPs that are screened in are a nominal scenario class that's basically, you know, through the groundwater class.

Seismic scenario class is included within the model components that I described earlier. There are seismic scenarios that cause some of the engineered barriers to degrade faster at different times or to make those engineered barriers not available during certain seismic events. So that's included within the modeling components that I described earlier.

The igneous scenario class I just went over. And it's divided into those two components, extrusive and intrusive.

And then we basically, again, just follow the water. Unsaturated zone flow to the repository system, engineered barrier system, waste package.

Then we get to biosphere. And from the biosphere is where -- the output of that is where we actually feed and calculate radiological dose.

And we can get a dose from igneous scenario, the nominal scenario, and the seismic scenario. Those doses are weighted and summed. And that gives us the results that we use in Section 2.4 to show how we address the radiological protection standards.

Slide 17, it -- and I'm not going to spend as much time on these slides because it's a repeat of what I've already gone over but I did want to show a comparison to the review plan. We have been asked questions about why we didn't align with the review plan in certain instances. And my answer is is that we do align with the review plan.

So this just shows the general information section. It's Section 1 of the Yucca Mountain Review Plan. It's the GI section of the license application. And as you can see, Sections 1 though 5 align just almost perfectly and they're modeled almost identically so that those sections align fairly obviously. I won't dwell on that.

Page 18, that goes through Section 2 of the review plan. Section 2 of the review plan is safety analysis report, Section 1, in our license application terminology. And that's the repository pre-closure safety analysis. It aligns very well also.

We start with just a general lead-in section. We talk about the site description as it pertains to that pre-closure safety. Then the review plan goes into Section 2.1.12, a description of the structure, systems, components, and equipment, and operational process activities.

The review plan, and if you'll just glance at the next page, divides a description of the structure system and components. If you look at Section 2.1.17, it talks about the design of the structure systems and components important to safety and safety controls.

We've combined those two sections. But we've combined it then we sliced it a little bit differently.

We talk about the description and the design of the structure systems and components in the same sections. We start -- but we have broken it out into various major pre-closure facilities. The surface structure, systems, and components, the subsurface structure, systems, and components, the infrastructure SSCs, and then the waste form and the waste package.

And in each of those we go through both the description and the design of those components. So we just sliced it a little different. The same information is there.

And this was more for -- one, there was a lot of redundancy we were finding, and two, is the Safety Analysis Report has to be kept up to date. So if we keep all of that information in one place, there's less likely to have a disconnect and not get part of the information updated. So it's also a configuration management concern on our part.

Going back to Slide 18, the rest of Chapter 1 of the LA, again aligns, I believe, perfectly with the review plan.

Go through page 19, let's see -- get to 1.9 up at the top of page 19, structure, systems, and components. This is, again, that large set of tabular information where we do the classification analysis. I will mention here that this has caused us some problems.

And it's because of the little bit of a difference -- and problem is probably not the right word -- it's caused some consternation on our part.

It's 63-111A talks about the requirements for repository, 63-111B talks about classification and what's important to safety.

63-111A says we have to meet 10 CFR 20, which we knew that. You know all nuclear facilities licensed by the NRC meet Part 20. 63-111B, though, talks about classifications. So as it turns out, our regulations requires that SSCs that are required to meet Part 20 onsite dosage requirements are important to safety. That's a little bit different treatment than what you would see in a commercial power plant.

And because of that, we're having to define certain components of the repository, certain SSCs of the repository as important to safety, make them safety grade, apply QA controls and such that aren't necessarily typical within the nuclear business for the same level of risk.

It has caused us to classify some of our systems as important to safety that may be in a power plant would not be classified as important to safety. We'll get through it. And we have. And we've described it that way. But it's a little bit different concept than what's in a typical --

CHAIRMAN RYAN: Just a quick question, Joe. Do you have an example of that? Or can you just give us an example that would help us understand a little bit?

MR. ZIEGLER: I'll give you an example of something that's ITS because it's meeting a Part 20 onsite limit. Our handling and transfer cells operate, you know, normally high radiation doses within those transfer cells where we're taking commercial fuel assemblies and taking them out of a transportation cask and putting them into a waste package.

We can show that normal operational doses are very, very low there. But we have -- typically we would not need important to safety electrical systems in our repository. Things fail safe. We try to prevent events and event sequences that would release radiation from occurring.

In this particular facility though is that in order to meet the Part 20 dose limit which, I believe, is 100 millirem, the onsite, non-rad worker, the onsite public will need those ventilation systems to be operating.

If we can show through just normal operations, one, the facility wouldn't be operating. If they're not operating, we can show redundancy. We can show high reliability of those systems. But once they become important to safety, then we are applying different criteria to those systems even though we can show they're highly reliable.

Part of the problem is is that our designers have worked in nuclear power plant design in the past. There's a lot of comfort in designing to certain IEEE codes in this case for the electrical systems.

We really don't need those codes and designs but it's difficult to get away from standard nuclear safety design, okay?

We don't have a reactor core to melt. We don't have any severe accident scenarios. And so meet this 100 millirem limit, which basically is going to be met with the reliability of the systems anyway, we go to ITS and we start applying, you know, design codes and standards that are standard for the nuclear industry.

And so it's caused us to do some things that maybe otherwise we wouldn't normally have done. And I'm not sure that it actually adds to safety but it may detract because it's money and resource spent in this area versus spending it in another area.

But anyway, it's something we will get through. We will design it and we will meet the requirements. And so that's the way the design is right now.

Okay, 2.1.18 is, again, the ALARA Program. I will point out that we included the Radiation Protection Program in this ALARA description here but it always shows up later on as well. So there's a match here in this section. But it also shows up in Section 5 of the Safety Analysis Report.

Okay, still in the pre-closure section, plans for retrieval. We put together a retrieval plan. I mentioned that that would relatively conceptual at this point in time. More detail if a decision is ever made to retrieve.

And plan for permanent closure, I've been through that.

Equipment -- we added equipment qualification. We added nuclear criticality safety. So, again, there's no specific review plan referenced to those. I've been over that already.

Okay, now we go into YMRP Section 2.2, that's the post-closure safety analysis. That's our Safety Analysis Report Section 2.

I didn't put it on here but there's actually a lead-in heading on the review plan called repository safety after permanent closure. And then it talks about performance assessment.

We've combined that repository safety after permanent closure. That's out lead-in section.

We also have some of the information required in this review plan section in Section 2.4. So we've kind of been a little bit redundant here where we have a lead-in section but when we get to the results section, we also talk about the integration of all the different model components and how they fit together.

So some of that information is also contained as the lead in to Section 2.4, particularly in Section 2.4.1 that talks about the TSPA model, the nominal, the seismic, and the igneous scenario classes.

Then we start moving down through the outline. The system description, same. Same order of the scenario analysis and event probability. That's the features, events, and processes screening. That's the same. The model extraction, that's the same.

Waste package and drip shield barriers. You'll start seeing -- we starting getting in different order here. As the ordering in the review plan is done, and I presume that ordering was done to align with the NRC modeling of total performance, their PPA code, we structured this, again, to follow the way that we modeled repository performance.

And we modeled it following the water. So our structure is ordered a little bit different but, again, it contains the same information.

And we believe that to really facilitate the regulator's review it would be -- instead of trying to force ourselves into that format in the review plan, it would be better to define our application in the way that the modeling was done so that there won't be this translation back and forth all the time so that actually the reviewers can look and see the way we did the modeling.

It will require some translation. That's one of the reasons that in the application, in each of these 2.3.X sections and other major subsections is that we include a table right up front that says okay, here's what's in this section, here's what review plan sections that it addresses. And here's what regulatory -- Part 63 and Part 20 or other parts of the regulation that is addressed within that section. So we've done that cross referencing.

And we follow the water. So that's the differences. And you can see just looking on the next two pages -- I guess three pages -- that there is some difference here. But the differences are more in ordering than they are in anything else. And that's in our 2.3.X sections versus the 2.2.1 sections of the review plan all the way through Slide 23.

And I'm not going to go through all these in detail but you can see the differences. But the differences are entirely in the ordering I believe.

There's a couple of other differences. For instance on page 23, if you'll look at review plan Section 2.2.1.311 and 2.2.1.313, 2.2.1.311 talks about airborne transported radionuclides. There's not a lot of airborne transport except in the igneous scenario. So airborne is dealt with in our biosphere description. But it's also dealt with in that igneous extrusive circumstance.

Same thing in 2.2.1.313, redistribution of radionuclides in the soil. That's dealt with in the biosphere section for the nominal scenarios, you know, where nuclides may reach the accessible environment through a water pathway.

But through a vulcanic pathway, the distribution in the soils is a little bit different circumstance where through the pathway once a volcano occurs, the primary uptake of radionuclides is through resuspension in the air whereas through the groundwater pathways, it's primary is drinking two liters of water a day.

So it's a little bit different there and we've included it where the results of the model took us.

Okay. Then we get into Section 2.4 of the review plan. 2.4 aligns with 2.2.1.4 of the review plan. That's our results section, demonstration of compliance. And, again, we go down just as the review plan does, individual protection standards, human intrusion standard, and groundwater protection standard.

Again, this shows Section 3, 4, and 5 of the review plan. I think I've been through all of these in some detail. They align with the review of the LA. The LA sections align with SAR Section 3. And research and development of programs, performance confirmation, QA, records, down the list. And we align perfectly there until the bottom of page 26.

I mentioned that we included a section specifically about the Operational Radiation Protection Program. That was not called out in the review plan but we thought that program was important enough that it needed to be called out specifically.

And there's more detail. There's a 20- or

30-page section just summarizing the Radiological Protection Program that aligns more closely with 2.1.18 of the review plan which I already went over up in the pre-closure section.

The next slide, on 27, gives you a little bit of an idea of what the outline is going to look like. So there will be tabular information in a little bit different form. But essentially in this form at the beginning of each major section.

For instance, GI Section -- General Information Section 3 is the physical protection plan. We point to Section 1.3 of the review plan. And we point to 10 CFR 7351, 72106, 6321B3.

The we go down into the subsections of the physical protection plan outline. And those subsections point to the review plan sections and the regulatory sections.

And, again, that's to facilitate the NRC reviewers' review. And, frankly, to help us make sure that we've covered everything when we're preparing the license application. So this structure is in the entire license application.

I will say although it's not part of the application, we also did a different cut on this. And then we did a reverse matrix. It's not part of the application. We do plan to provide that at the same time as we provide the application to the NRC.

That may actually help facilitate the individual reviewers that have certain responsibilities defined by review plan sections. We think that may help NRC then look and make sure that they look at each section where we've met part of the review criteria.

So we're doing it both ways and, again, we think it will facilitate review but it also facilitates completeness on our part.

So in summary, our license application format and content does align with the Yucca Mountain Review Plan with minor deviations but -- or apparent deviations but we believe they're very minor and there's reasons for those deviations that, I think, actually will facilitate its review.

The organization presents our licensing basis for the repository, both in pre-closure safety and post-closure safety. The content is consistent with the existing and supporting project documents. Things such as the site description, what we call analysis and model reports, or AMRs, for the post-closure analysis, system description documents which lead into facility description documents and are the basis for the design of the facilities.

And so those documents are heavily referenced and will be available to the NRC reviewers for inspection during the review of the application.

We also included the crosswalk in each section, the tabular information at the lead in of each major section, and we'll include that reverse crosswalk to help facilitate the review at the time we make the license application.

So with that, I hope this didn't get too long winded for you but I'll entertain any questions you have.

CHAIRMAN RYAN: Joe, thanks. That's a very detailed picture of the license application. I think that's pretty helpful for you to go through that. It's a lot of information to digest but we have a really clear roadmap of where you're going.

I guess four questions came up in my mind as you gave your presentation. One, back in June we talked with you about quality assurance. And that there had been a process of review. And at that point, you were six months away from where you are now and you had talked about that flowing into the application.

Could you talk a little bit about how that worked and, you know, how your quality assurance process helped the application be where it is today?

MR. ZIEGLER: Yes. Most of the quality assurance, as far as the safety analysis, went in to what we've done with the AMRs and with the pre-closure analysis. We've done a lot of extensive QA evaluation and assessment.

Over long periods of time, you know, we've had some problems in following procedures in the post-closure analyses parts. The AMRs are getting through that. We're doing an assessment that's being done right now. It's about halfway through looking at the quality of the underlying post-closure safety analyses and the supporting AMRs. And it's looking good.

So we believe if it continues to go the way it's going so far -- we're about halfway -- the QA organization is about halfway through that, assisted by technical experts in each field -- that's coming out pretty darn clean.

So we believe that we've added a lot of better -- what's the right word -- assurance, I guess, quality assurance that the products do meet their intended purposes, are done according to the right procedures, that the documentation and analysis will withstand whatever tests.

Pre-closure, we -- within the program a couple things happened. We were starting to look through our QA organization. But we also were encouraging, because of past problems in other areas, encouraging all of our project staff, if there were problems, to identify them.

So we had a couple self-identified condition reports on the pre-closure safety aspects of this. We went and looked, both technical staff on the DOE side and QA staff.

We were able -- actually the concerns that were raised were not exactly substantiated. But we looked further than that. And there were issues that needed to be dealt with.

So we've created the Design Integration Team. And it's to look at the design and then the pre-closure safety analysis flowing from that design work. And we're basically going back and making sure that that information is what it needs to be, it meets all the quality standards as well. And that the documentation is there to prove it when we need to do that. So we've done that.

As far as the document itself goes, we added another review to the document. A senior project manager -- John Arthur and myself and others read through the entire license application in the month of September and commented extensively on it.

A lot of it was transparency, traceability. I guess that was the biggest concern. But those were the types of things that were identified in our technical products as well.

QA participated in that review as well. And other technical specialists in various areas.

We went through it, John and I, you know, basically we'd read during the daytime and we would meet in the evenings to go through the comments and hand them back over for resolution. That review resulted in a complete revised draft of the application that was delivered on November 5th.

So I have a ten-volume license application. We have not completed our review of that to make sure that all the issues that were identified have been adequately resolved. But we're in the process of doing that. So we've done a lot actually.

CHAIRMAN RYAN: Well, it sounds interesting. I guess the documentation of all those processes and activities would be available to the review staff at some point?

MR. ZIEGLER: The management review, yes, all the QA reviews --

CHAIRMAN RYAN: Yes.

MR. ZIEGLER: The RIT effort, the Regulatory Integration Team, the Design Integration Team, yes, the documentation to all that is available.

The management reviews, documentation, I don't know if it's publically available or not because our lawyers tend to mark all this pre-decisional, you know, attorney/client work product. But it's there. I would think that the NRC would have access to it.

CHAIRMAN RYAN: The second question is we've heard a lot, of course, over the years about KTIs and resolution of KTIs. Could you maybe speak to how that stands from your view at this point?

MR. ZIEGLER: Better than the last time I talked to you. We completed all of our KTI responses in August of this year so we responded to all 293 agreements. I think since last I talked to you, I've gotten about 20, 24 more agreements closed by the NRC staff. So we're up to, I think, 124, 125 agreements closed.

We've asked and been told that we will get responses to all the high risk agreements by the end of the year. But subsequent to that, some of the final touches on some of our analysis and model reports, our schedules lagged a little bit there.

And so I have asked Margaret Federline to, you know, don't feel obligated to respond, you know, on a particular day just because you had it in your schedule if all you're waiting for is our final AMRs. And the NRC staff has told us that they have the right to come in and inspect, you know, documents that aren't complete. So we allow that.

But they won't close agreements until that information is in a public forum. We don't put it into a public forum until the AMRs are actually issued. Once they're issued, we've been putting them up on our Website.

So there's -- some of their responses are probably waiting for us to complete and issue those AMRs. I think all the AMRs are scheduled to be issued, with the exception of the TSPA analysis itself, by the end of this month. So I think we'll make that. It may be a week or so into December.

And so I would expect quite a few additional KTI agreements to be closed by NRC.

I also sent NRC letter. I can't remember -- it was about the same time frame I met with you last, basically describing our process, that we would respond to the agreements but we would probably not be able to respond to any more requests for additional --

we call them requests -- information -- additional information needs I think is what we call them in KTI space, that came prior to our application just because of the timing and being able to do that.

But whatever they told us, we would consider and try to work into the application itself. So I think since that time, we've only gotten a few agreements that they've not closed, where they responded. So I think most of the responses we've gotten to date are closures.

So I feel pretty good about where we are in the KTI process. It's not to say that some things won't be issues in the licensing proceeding once we get into more detail and the staff gets into more detail. But I think the process was useful.

And I've heard a lot of criticism from external groups about the process and how it's difficult for us and we ought to be playing in the licensing process but I believe it provided a structure to a first-of-a-kind analysis.

And as part of the structure, not that I necessarily agree with the NRC staff in every case, but that structure helped us through the process of looking at post-closure safety analysis in a very rigorous way. And I think it helped us get to where we need to be.

CHAIRMAN RYAN: Okay, well thanks. That's good to hear. I guess it sounds like the interaction with staff has been productive and moved things along in a productive way, too.

MR. ZIEGLER: I think it has, yes.

CHAIRMAN RYAN: You know I'll ask you the last two questions simultaneously. And somebody will ask you if I don't. Are we on schedule is one. Then the other is once the schedule is clear and there is an application, how will it be made publically available, and, you know, be available for anybody that might want to look at the 11 volumes or so?

MR. ZIEGLER: Okay. I'm going to dodge.

CHAIRMAN RYAN: Okay.

MR. ZIEGLER: And there's a lot of things that have happened over the last several months. You know the EPA standard was remanded. And there were lawsuits. And then the lawsuits were turned down. So the EPA standard is up in the air, you know, the post-10,000-year question in particular.

There are also -- we have had problems in our certification of LSN. There was lawsuits there and we were going to have to go back and re-certify LSN. And that work is still ongoing as well.

At the time, we have, as I mentioned to you, I have a ten-volume license application that's pretty good. And it's not that if we get more time that I wouldn't do some things to it, you know, to make it -- to facilitate its review.

But -- so my answer is there's people at higher pay grades within DOE that are considering that, including our large legal staff as to what's appropriate at the appropriate time. And I don't have an answer.

CHAIRMAN RYAN: Fair answer. I just -- I mean every body is thinking about it. So I figured I'd ask it first.

MR. ZIEGLER: I practiced that one.

CHAIRMAN RYAN: Thank you. Other questions from members? Allen?

VICE CHAIRMAN CROFF: Let me follow up on sort of what Mike just asked. You mentioned when you were talking at one point an update to the safety analysis. And then at another point, keeping it up to date.

Is this going to be some kind of a document that changes fairly frequently through time in the next few years, let's say, and how do people, you know, how does one know that there's been a change to it and where the change is in this rather massive thing?

MR. ZIEGLER: We'll have to, you know, have a configuration management process just like any Safety Analysis Report. In reactor space, Safety Analysis Reports are required to be updated once a year. Our regulation requires the Safety Analysis Report to be updated every two years.

I would expect after the initial application, and much like other licensing proceedings, especially large complex ones, this being a first of a kind, that we will probably update the Safety Analysis Report probably twice a year.

And I don't expect any particular massive changes to it. But as we get questions from NRC, as our analysis is refined -- analysis -- as our design is refined, okay, if we see things that are changing that would cause us to need to change the analysis or to update the analysis, then we're obligated to make that information known and do an application amendment or supplement.

The regulation also talks about, you know, basically two primary stages of the licensing process, Part 63. It talks about submitting the application. And then many times it talks about the Safety Analysis

Report as updated.

If you look at 6344 and some of the other change process descriptions within the regulation, it clearly anticipates the Safety Analysis Report as updated. We view that as being the version that exists, the revision that exists, okay, before the NRC is actually able to grant us a license to receive and possess waste.

But we would expect other amendments to the application, many amendments over time in the next three or four years. So I would say at least once every six months. If there's something major that actually comes up and it's not just a relatively routine update of the application, then I would expect, you know, intermediate updates in between.

VICE CHAIRMAN CROFF: Okay. And somehow the application is going to be made accessible to the public and everybody else on a Website or whatever?

MR. ZIEGLER: I can tell you a couple ways I know that it will be available. Of course once we submit it, NRC dockets it. I think it goes up within their record system. It also will be available in LSN. I'm pretty sure we're going to put it on our Website but I'm not going to commit to that right now.

But I see no reason not to. It's public

information. We've been pretty good in this program about providing documents, a lot of our technical analysis documents. So I believe it will be available on our Website as well.

Sometimes that's the easiest place to get it. If you have a broadband access, there's a lot of graphics and things, a long document.

VICE CHAIRMAN CROFF: Yes. You mentioned in a couple places basis documents I guess they were called.

MR. ZIEGLER: Yes.

VICE CHAIRMAN CROFF: Will those be available at the time the LA is submitted? The initial LA?

MR. ZIEGLER: Yes.

VICE CHAIRMAN CROFF: Okay. In the application, how is low level waste disposal handled or addressed?

MR. ZIEGLER: Right now we plan to package low level waste and send it to a licensed receiver disposal facility for low level waste. We got comments in the EIS and in other places that maybe we ought to dispose of it at the test site.

But right now that's not an option. In the future it could be. It would seem to make sense, right, because they have a large low level waste disposal facility.

You know we wouldn't even have to get on public roads. But right now what we said is we're going to dispose everything at a license disposal facility. So we'll package it for shipment offsite.

VICE CHAIRMAN CROFF: Okay. And coming to your -- I'll call it sort of the flow through kind of a mind set, if you will.

MR. ZIEGLER: Yes.

VICE CHAIRMAN CROFF: A couple of issues in that at one point I remembered there is some degree of coupling in feedback in terms of the thermal effects in water circulation, you know, I guess initially around the repository. But maybe as it cools, some of that is starting to intersect it.

How is that handled in terms of what's sort of an in and an out kind of a mind set? The feedback and the coupling?

MR. ZIEGLER: I'm not sure I understand the question. I may not be the right person to answer it.

VICE CHAIRMAN CROFF: Well, the repository is hot and then, of course, keeps water out.

MR. ZIEGLER: Right. Oh, oh, the reflux?

VICE CHAIRMAN CROFF: And then the reflux, right, right.

MR. ZIEGLER: I'm a nuclear engineer. I'll tell you what I know. And it may not be an answer and we may have to go get Bob Andrews or somebody to answer it.

But the way the modeling works is we do drive water away during the thermal heat up period. We still have thermal management criteria for loading the repository such that at least half of the space between the drifts -- and actually we get much more than that most of the time. It never going above the boiling point of water.

So things that are driven out to the side should flow down between the drift and the rock pillars between the drifts and in the fractures that exist in some of those.

All I can tell you is is that's part of the, you know, one of those 2.3.X sections. As to the way that water moves, we've done tests, including our large-scale heater tests where we actually heated up large portions -- you know, an experimental drive.

We have measured the way that the water has come back and moved back towards the drift. It actually moves rather slowly back towards the drift.

So all I can really tell you is that based on the data we've collected and the analysis we've done, that's factored into the models.

VICE CHAIRMAN CROFF: Okay. And where does the intruder business fit into this?

VICE CHAIRMAN CROFF: The human intrusion scenario is a stylized area defined in the regulation. And what it basically says it assumes that a driller on top of the mountain who would, and I think nominally would be drilling for water, which don't ask me why that makes sense. But we need to define the time at which that driller could drill without being aware that he wad hitting a repository.

Okay. So we've done an analysis to show that the engineered barriers, the drip shield, and the waste packages are intact. And I can't remember the number but it's something on the order of at least 30,000 or 40,000 years, okay?

And at that point in time, we basically said okay, just do the calculation. At that point in time, it would show up in the EIS. That's the way the regulation reads today.

Now how this remand of the EPA standard might effect the human intrusion scenario, I don't know. But we did a calculation of a driller drilling through a waste package, okay, and making the contents of that waste package available for transport down through the water system to the accessible environment.

I think also by regulation, we're not required to look at the impacts to the driller themselves.

VICE CHAIRMAN CROFF: Okay. And just out of curiosity, how long it -- how many pages is this thing roughly?

MR. ZIEGLER: The total application is about 5,000 to 6,000 pages including tables and figures.

VICE CHAIRMAN CROFF: Okay. Thanks.

CHAIRMAN RYAN: Ruth?

MEMBER WEINER: Let me get my microphone here.

Joe, first I want to thank you for a very thorough presentation. This is really good.

What do you expect are the most critical things in the license application? Where do you see that the red flags are?

MR. ZIEGLER: First I think it's a pretty good application. I'm not allowed to talk about what the dose results are but they will be comparable to what you've seen in the past in the time of the site recommendation and the FEIS.

We're pretty -- we're able to show that we meet the pre-closure standards rather easily. I'm having to make some systems and equipment important safety maybe that I wouldn't like to make but that's more from an operational cost perspective.

We've had some interchange with the NRC staff on these programs and plans is that if we look at our application versus other recent applications, the extent of the development of our application, we're comparable, probably a little more material being presented in that area than what you see in most recent applications.

It's a whole lot more than you would have seen in a reactor application say for radiological protect plan or emergency plan or physical protection plan. So Part 63 has a lot of requirements in there and a lot of expectations. If you look at review plan, there's a lot of acceptance criteria.

I guess the unknown is my biggest concern is that because -- I review the plan as the review plan not just for the time to determine whether or not construction authorization is granted but also for the time when the determination is made for a license to receive and possess.

And some parts of the review plan are very clear about what is expected when. Other parts of the review plan are not as clear about what is expected at what stage of the application.

We've used, to the extent we can, you know, intercourse with the NRC. We've had several letters back and forth, had several public meetings where that's been discussed. We've also looked at precedence as to what recent precedence and more historical precedence back in reactor licensing space that I have an uneasy feeling about exactly what the expectations are across the board in that area.

MEMBER WEINER: So is it fair to say, to say back to you what you just said, that your primary concern is something where the expectations of the licensing agency are not clear? Is that the fair thing to say? Where there is something unexpected that you can't foresee now will --

MR. ZIEGLER: I'm concerned about it because I would like to have more clarity in that area. But that clarity will come, you know, in the licensing -- I don't want to point fingers at the NRC staff.

I think they've, you know, this is a

first-of-a-kind licensing process. They've created an extensive review plan and a regulation. And, you know, we'll work with the staff as we go through the licensing process.

But yes, I have some concerns in that area.

MEMBER WEINER: And you can't -- there's -- it's nothing you could identify now?

MR. ZIEGLER: Well, the plans and the programs, we've sent to letters to NRC. Retrievability, for instance, okay? The review plan calls for, you know, plans on retrievability. And it sounds pretty explicit on some of what it is calling for.

Now I don't know if we're ever going to retrieve. If we make a decision to retrieve, it would be at least decades into the future. So it doesn't make sense to us to do a very detailed plan on retrievability.

We have built into the -- we have designed the repository such that we have not precluded the ability to retrieve. That's required by the regulation.

But do I know exactly the piece of equipment that I will use when I retrieve, if I retrieve? No, but I know equipment exists that is capable of retrieving the waste as we are emplacing, as we've designed the facility.

So we think we've done enough. Again, we've had some interchange but, you know, you never know until you get there. And I'm sure there will be some surprises. And we'll work through them. We'll work through them with the staff.

MEMBER WEINER: Related question on your diagram of the PA.

MR. ZIEGLER: Yes?

MEMBER WEINER: Is there -- are there critical points in that performance assessment? Something that is analogous to rate determining steps in a complex chemical reaction? You want to go back to the slide?

MR. ZIEGLER: Yes, I'm going to try and see if I can find that slide.

MEMBER WEINER: It's Slide 16.

MR. ZIEGLER: Well, there's some things in here that are built in. I mean first if you look at the seismic scenario class, is we had done some modeling on seismic that I think was really, really, really conservative in the past because we were getting practically infinite ground motions.

I think the things that deal with these 10 to the minus 8 per year probabilities are problematic. I don't know -- they effect the result, okay, they effect the results greatly based on these probabilities that are almost infinitely low.

And so when I look at seismic -- I'll tell you the way we did the seismic analysis in the past. Now we've done some additional work, okay, to show that there's probably maximums on actual ground motion that could ever exist regardless of the probability. And so that's built into here. But we're still probably conservative in that area.

And how that effects the engineered barriers is -- I think most of us on the project think that we've overestimated the degradation of barriers through mechanisms like that.

Volcanism is similar, okay? The whole volcanism analysis hinges on the probability of the vulcanic event. It's somewhere near 10 to the minus 8 per year. And then you take it -- it's a little bit above 10 to the minus 8 per year, therefore we go through a series of relatively precise calculations with a lot of uncertainty bands.

But still ultimately you compare it to 15 millirem. So it needs to be a -- you know the mean value needs to be a precise calculation. So we spend a lot of time doing calculations for these infinitely low events that, you know, humans don't protect at those probabilities for anything else in our normal life for people today, okay?

But this person 10,000 years from now is going to be protected to a 10 to the minus 8 event. And so I think some of that becomes very difficult. I think it's going to end up being the focus of a lot of the licensing proceedings.

And I'm not sure that the focus ought to be on the events that are very, very unlikely to occur versus things that are going to occur.

So --

MEMBER WEINER: So you think --

MR. ZIEGLER: -- I don't know if I answered your question but --

MEMBER WEINER: No, you have answered it very well. So to restate that, you think that the lower probability events are likely to have a larger influence on the licensing proceeding than --

MR. ZIEGLER: I think they will because I think they'll be challenged not because your analysis is bad or the information you used wasn't bad, but because those low probability events are going to be easier to challenge.

MEMBER WEINER: Yes. You started your presentation by talking about the repository being safe.

MR. ZIEGLER: Yes.

MEMBER WEINER: Does safe mean -- is safe equal to meeting the current EPA standard? Whatever -- I mean recognizing that that is somewhat -- the time of that is somewhat up in the air.

MR. ZIEGLER: Yes, yes.

MEMBER WEINER: But is that what you mean by safe?

MR. ZIEGLER: Well, we certainly do that. We do that with a relatively large margin.

MEMBER WEINER: Yes.

MR. ZIEGLER: So I think safe means more than that. It means that we operate responsibly once we're operating. It means that we protect our workers, that we achieve, you know, our ALARA commitment.

MEMBER WEINER: Yes.

MR. ZIEGLER: That we protect the environment. I think it means more than that. If we were on the, you know, the cusp of the standard, if I was at 14.9 millirem, I would not be comfortable, okay? Not that 15 is a magic number, you know, 15, 25, 10, it's all the same number when you're predicting the future for 10,000 years or longer.

But we're at a fraction of a millirem. And so yes, I think we're safe in the post-closure. On the pre-closure for the normal operating limits, we're way -- I mean we're orders of magnitude below just like commercial plants are.

And so I'd have a lot of margin in that safety. So it's not nearly meeting the standard even though I do believe if we meet the standard we are safe. So I'm not throwing rocks at the standard. I think it's a reasonable standard.

But we're not going to commit, you know, tens of billions of dollars to barely meeting the standard, hoping everything goes well in the licensing proceedings. We've got margin.

MEMBER WEINER: Yes, I just wondered -- when you used the term, it can cover a lot of ground.

MR. ZIEGLER: Yes.

MEMBER WEINER: What's the status of the surface facility design?

MR. ZIEGLER: Surface facility designs, we added a couple facilities over the last year. We added the fuel handling facility and the canister handling facility.

MEMBER WEINER: Yes.

MR. ZIEGLER: Those designs have actually caught up rather rapidly with the dry transfer facility. So it's -- I would like to have more detail. We have enough detail to do adequate safety analyses. I don't know if I've got enough detail to construct yet or not --

MEMBER WEINER: Yes.

MR. ZIEGLER: -- because I need to do specs on procurements and things like that. By the same token, our budget request, you know, we're in a continuing resolution right now. We had asked for like 300 million more dollars than what the continuing resolution has in it. So I'm not sure we're ready to procure most of those things anyway because of budget restraints.

But I would like to have more detail in the design just so we could proceed with the project not so much from a safety analysis standpoint but from a construction preparation standpoint.

There are things in the safety analysis where we've placed what I call engineering requirements, engineering specifications. And so I don't have the equipment set. I haven't procured it yet. You know, I don't know the vendor of this particular pump or this particular diesel generator yet because we've not done that procurement activity.

But we've put design specifications -- and they're meetable design specifications -- so we've been careful to make sure that -- Steve Hanauer works with me. He says make sure that whatever specs that we put on it, it's not a three-minute mile, okay?

MEMBER WEINER: Okay.

MR. ZIEGLER: So we make sure that the specifications are reasonable and obtainable.

MEMBER WEINER: And, finally, you said -- this is my last one -- you said at the beginning when you were describing the GROA, you said that it follows the path of the water, because this is your primary concern, that --

MR. ZIEGLER: Yes. I may have misspoke. The GROA follows the path of the development of the repository.

MEMBER WEINER: Oh, yes, but --

MR. ZIEGLER: The TSPA modeling follows the path of the water.

MEMBER WEINER: How much does the prevailing winds, since that would be important to a seismic event, how much does the prevailing wind differ from that?

MR. ZIEGLER: Not much. And the thing is if you start doing it and you look at worst case winds, it's the calm winds. So you go out there and you stand on top of the mountain and the wind blows a lot, that's not the problem. The problem is when it's calm. So when the winds are relatively calm, it's almost a circular distribution around the side. So it's maybe a little bit more to the south, and that's where the remi is. But our pre-closure calculation is actually not done at the remi location. The pre-closure calculation is done on the western boundary, so it's about eight kilometers away, I think, from the openings of the subsurface and about 11 kilometers to the west of the surface facility handling operation.

MEMBER WEINER: Thank you.

CHAIRPERSON RYAN: Jim Clarke.

MR. CLARKE: Joe, just a couple of questions by way of clarification. Michelle, can you put up Slide 10? On the pre-closure safety analysis, when you spoke to this, I missed it, but the event sequences had two categories and they were defined on the basis of probability of the event?

MR. ZIEGLER: Oh, Category 1, Category 2.

MR. CLARKE: Category 1, Category 2.

MR. ZIEGLER: Yes. Regulation, regulatory defined. The Category 1 event sequences are event sequences that are expected to occur at least once over the period of operation, okay? So it's off normal, it's not normal ops, but it's event sequences that are expected to happen at least once. So for a 50-year operating period for most of the surface facilities, that would be five times ten to the minus fifth annual probability over a 50-year period.

Category 2 event sequences have at least a ten to the minus four chance of occurring over the period of operations. They're not expected to occur but have at least a ten to the minus four chance of occurring over the period of operations. I'm looking at Tim McCartin back there. Tell me if I mess up, Tim.

And so they could be anything barely beyond Category 1 or others. The regulatory limits are different for those events. And I'll give you a for instance. Part 20 on-site dose requirements apply. Part 20 on-site dose requirements don't apply for accidents or emergencies. So the Category 2 Part 20 on-site limits would not be applicable, but the Part 63 limits are. And Part 63 defines on-site and off-site different than Part 20.

So Part 20, basically, we're saying if we're outside the GROA, then you're treated as public. For Part 63, it talks about the off-site public, so it's actually off the site that I showed on the map

MR. CLARKE: You then analyze consequences for each of those categories, and I think I heard you say that you provided mitigation even for some of the Category 2 events.

MR. ZIEGLER: Yes, for ALARA purposes. Now, that mitigation may not be important to safety, and I give you a key example. I've got a relative reliable off-site power supply, I've got six diesel generators, okay, and those diesel generators can be inter-tied, some of them manual so that we don't have common mode failure. I don't take credit for nearly all of that in the safety analysis, and yet I have highly reliable backup power supplies. So that's mitigation in case I lost my power for some other reason when I might need it.

Another example, we're designing our cranes where we do lifts inside our transfer cells. In a power plant, they call them drop-proof or single failure proof cranes. Well, when you've got as many lifts and handles as we have, it's hard to do the probability calculations and say that it's totally single failure proof, but they are designed to very, very highly reliable, okay? They're designed to withstand seismic events, design basis seismic events. So the cranes will not drop a fuel assembly or can a task during a seismic event. But we still have HEPA filter ventilation systems, even where the requirement for those ventilation systems does not exist per my safety calculation.

MR. CLARKE: Thank you. Just one more quick one. Slide 20 or 21 -- 21, please. And this is just to check my understanding. This is the fifth of a series of slides. It says safety analysis report for pre-closure, but is this not in fact the post-closure analysis?

MR. ZIEGLER: You're right, that's post-closure. Mistake.

MR. CLARKE: Okay. Thanks.

CHAIRPERSON RYAN: Okay. Thanks, Jim. Any other questions from staff?

MR. LARKINS: Just one quick question.

CHAIRPERSON RYAN: Go ahead.

MR. LARKINS: You talked briefly about an equipment qualification program and you talked about how the environment obviously wouldn't be as harsh as it is for a reactor when we do safety-related equipment. How do you define -- did you define the envelope for the environment, for the testing?

MR. ZIEGLER: Yes. What we've done, and most of the -- there's not a lot of ITS active mechanical active equipment, especially electrical. There's not very much electrical at all. It's basically the fans that run the -- that provide the flow through the HEPA filtration system where we're handling bare fuel assemblies. But what we will do is we will define the environments that they have to operate under, much as a commercial plant would. The environments will be really not nearly as harsh as the environments in an equal power plant. There will be some radiation environment, the temperatures won't be nearly as high, the high humidity conditions just won't exist, there's no mechanism to create that high humidity. So we will define those conditions.

We've not done procurement yet, but we will put those specifications on before we procure the equipment, and I would expect that we'll be able to procure that equipment nuclear grade, most of it, those active components. If we're not able to procure it nuclear grade, then we will have to dedicate it to show that it's acceptable for its use for that function. But even though they're not extremely harsh, we still have to make sure they work in that environment. I can't go down to ACE Hardware and buy it.

MR. LARKINS: I was just curious as to what's in the Part 63 requirement. Did you come up with your own standard?

MR. ZIEGLER: Well, I guess it was 50.49 in the commercial plant side. And I guess -- I used to work in the commercial business. I personally think it was -- the equipment, the safety equipment in a commercial plant, I believe, even before 50.49 existed, I believe it was a requirement to show that it would operate when it was called upon. I think 50.49 just clarified that, and it showed that just because it operated in a test mode didn't necessarily mean it would operate in the environment it had operated in.

I do think we do have an advantage and that's it in that we can operate -- most of our equipment we can operate in a test mode once the facility is operating. That test mode is probably in most cases, I think there might be a couple of exceptions, but that test mode is the environment it would have to operate in during an emergency as well. So it gives us an advantage on our ability to be able to qualify the equipment. There's not very much -- I guess on the seismic loads we'll have to put design specs on those, but a lot of the ITS equipment doesn't necessarily have to meet seismic requirements in our facility.

And I would go back to the ventilation of the HEPA system is that the combined probability of a bare fuel assembly drop with a seismic event is beyond Category 2, okay, because our facilities are designed and our cranes are designed to not drop the fuel during a seismic event. So the seismic event would not induce the drop. So the ventilation system itself doesn't have to meet for regulatory purposes seismic design criteria. On the other hand, we are designing it with certain seismic criteria as a defense-in-depth mode. Does that answer it at all?

CHAIRPERSON RYAN: John?

MR. FLACK: Yes, a couple things. When you talked about single failure proof cranes, we did studies on that and found that it doesn't buy as much as you think you buy. A lot of the accidents occur below the hook, so it's really hooking the stuff up correctly, and that of course is affected by safety culture and these other things. So just a word of caution.

Now's the time to ask that advanced reactor question. I know you talked about other reactor types, initially a consideration. Now, what about waste forms from things like HTGR and ACR 700? Are these going to be accommodated by the facility?

MR. ZIEGLER: We made some input -- we've defined the inputs to the waste forms that we've analyzed today. I keep getting asked to do a bounding analysis, and the problem with doing a bounding analysis is is that for long-term performance there are things such as the chemical characteristics of the dissolved waste form. As far as the radionuclide content, it will never be an issue, okay? I can just scale it up or down. But could there be a possible exotic chemical dissolution form of an unknown waste form? I guess it's possible. I personally think it's unlikely, but I think before we dispose those waste forms, we would have to go back and make sure that we had the bases analysis to show either that our existing analysis envelopes it or to show that -- or to modify the analysis to incorporate it. I really can't think of a waste form that would fall into that category, but I can't rule it out without doing the analysis.

MR. FLACK: Okay. So the analysis would

still need to be done.

MR. ZIEGLER: The analysis would -- I believe the analysis either to show that we were enveloped --

MR. FLACK: Right.

MR. ZIEGLER: -- or to modify our bases would need to be done.

MR. FLACK: Okay. Fine. And just one other question I had was on the 10,000 years versus a more extended period of time, do you think there are conservatisms that were built into your model that could meet the 10,000 year criteria, which will now have to be revisited if you go beyond that?

MR. ZIEGLER: That's a great question, and, yes, I do. I think there probably are, and I think that's part of the decision of when we submit, I think, and what we submit and whether we address beyond 10,000 years. We built our analysis, we actually built it for 20,000 years this time around, and we validated our modeling for 20,000 years. But part of that validation has been to include conservatisms in many factors. I think there's conservatisms in the seismic analysis, I think there's conservatisms in the waste form dissolution analysis, I think there's conservatisms in the chemical environment analysis and how that affects waste package corrosion.

Those conservatisms really don't affect the 10,000 year analysis much. I mean I'm still at a low level of comparable to what you saw at the time of the FEIS and the site recommendation. Those same conservatisms may not be appropriate for an analysis of much longer periods of time, and I think before we -- that's something we're taking a look at right now, and I believe there probably are and we may want to modify our analysis because of that. But there are known conservatisms in the analysis.

CHAIRPERSON RYAN: Mike?

MR. LEE: Yes, Joe. Has DOE done any analysis to certify that the waste forms going into Yucca Mountain aren't RCRA characteristic? Have you looked to that issue at all?

MR. ZIEGLER: The EIS is the latest, I guess, position on that, and we look at spent nuclear fuel. Spent nuclear fuel is not categorized as RCRA anywhere that I'm aware of. High level waste, I think Hanford and Idaho have made some declarations regarding the nature of their waste and whether it's RCRA or not. They could certainly get it delisted in their states. I think Savannah River site is a little more innovative in the way they've characterized their high level waste, and I don't believe it's treated as RCRA waste.

Our position is it's not going to a RCRA-permitted facility.

MR. LEE: Sure. Yes.

MR. ZIEGLER: So if we're not able to either show that the waste forms are not RCRA or get those waste forms delisted, then right now we would have a problem being able to accept that waste for disposal. The state of Nevada is obviously a recognized very vocal opponent of the repository. My understanding, and I'm not a RCRA expert per se, is that to delist a RCRA waste, the delisting has to be agreed to by both the state of generation and the state of disposal. There may be some appeal processes through the EPA itself that could overrule that if the decisions were made for not technical reasons. But right now we are not going to be a RCRA disposal facility. I think that may cause some additional work and some rulings that might be necessary for the Hanford and for the Idaho waste forms.

MR. LEE: Just one other question real quick. Should DOE receive a construction authorization, will you undertake or the Department undertake a new procurement for construction?

MR. ZIEGLER: We are looking at contracting strategies right now, and I would say that our contract with Bechtel SAIC Corporation is a five-year contract, and I think we're coming up on the end of year four right now. So I would expect to see some different contracting strategies in the future. That's one of the possibilities, yes.

MR. LEE: Thanks.

CHAIRPERSON RYAN: Latif?

MR. HAMDAN: Joe, excellent presentation as usual. I just have one question. How confident is the DOE staff, technical staff, and the contractors in characterizing the chemical environment in the drifts for the performance assessment?

MR. ZIEGLER: I think we've done a good job. This was the subject of an NWTRB meeting not too many months ago. We particularly addressed the issue of deliquescence, you know, condensation at higher than boiling temperatures, and I think we successfully gave our position to the NWTRB staff who had been fairly critical. I think NRC staff gave similar presentations, and EPRI came up with similar results.

How confident. We validated our models. I mean we've gone through the process to validate the models. I think in general our analyses have conservative inputs to them, but how confident, again, this is out of my area of technical expertise, but I think we've done a good job. I mean we've got the national labs, we've got kind of the best and brightest the country's got working on these problems. Does that mean there won't be any problems or issues associated with the licensing space, I'm sure there will be questions that we'll have to answer, but I know of no questions that are insurmountable at this point in time. But you have an almost infinite array of possible conditions that might exist in a repository.

I know repository opponents like to focus on the microscopic scale and what might happen in a laboratory versus what might happen in a more natural geologic setting. And I think the focus needs to be on what could happen on a large scale, not what could happen on a microscopic scale. A lot of things can happen on a microscopic scale, but nature tends to go -- nature looks for equilibrium.

CHAIRPERSON RYAN: Neil, any questions?

MR. COLEMAN: Just one. You touched on performance confirmation earlier and mentioned that it's a separate document from the LA. Is there a plan to publicly release that along with these technical basis documents, AMRs, many of which are out now, before the license application?

MR. ZIEGLER: I don't know about before, but the performance confirmation plan revision, I think previous revisions have been made available publicly. I see on reason why this one would be treated any different. It will be treated just like the AMRs and the other major documents produced by the program. So, yes, it will be made available.

CHAIRPERSON RYAN: Anything else? Any other questions or comments? Could you identify yourself at the microphone, sir?

MR. MALSCH: I'm Marty Malsch.

CHAIRPERSON RYAN: Please use the microphone so that we're sure everyone can hear you. Thank you.

MR. MALSCH: I'm Marty Malsch. I'm with the law firm that represents the state of Nevada. I had two questions, two quick questions. One is in response to a question from, I think, a member of staff. Mr. Ziegler gave an accurate account of the definition of Category 2 event sequences in Part 63, and my comment or question is whether there are any areas in the design, for example in seismic design, in which the DOE is using a different definition of Category 2 event sequence, for example, a lower probability sequence for a cutoff? And if so, does DOE plan to ask NRC to amend the regulations in Part 63 to redefine the definition of Category 2 event sequences?

And my second question is are there any structures, systems and components that are necessary to assure retrievability that are considered to be important to safety? And if not, how does DOE plan on keeping the retrievability option open?

MR. ZIEGLER: Okay. I'll answer the first one first, is that the seismic design criteria is being -- we're applying the same applicable criteria for seismic design that a commercial power plant would, and it doesn't require a modification of Part 63. Sixty-three point one-oh-two(f) talks about the application of requirements, and those requirements have to be reasonable, and reasonable is defined in that section as what's done for similar or higher risk nuclear facilities licensed by NRC. So we're doing our seismic design based on precedent set for higher risk nuclear facilities, nuclear power plants.

The second one about is anything ITS because of retrievability, I don't think so because I don't think there would be a circumstance that would prevent us from retrieving with components that -- I can't think of any components that would be, but I can't guarantee you that without going back and looking at the analysis. But I can't think of any components that would be required to be important to safety for retrievability. We're not required to retrieve, we're required to maintain the capability to retrieve. Our systems are designed to be available for 100 years, our subsurface systems. So I would expect the capability to retrieve to be there, but I can't think of anything that would be important to safety just because of the capability to retrieve.

Retrievability is basically the reverse of emplacement. I'll give you an example. The carriers that take the waste packages underground are shielded. They also have the capability to withstand rock fall within the main access drifts, okay, to protect the waste forms. I would expect the carriers that take the waste forms out of the mountain would have that same capability, and that would be ITS. So I would expect the breaking systems on the carriers that would remove the waste packages from the mountain to also be ITS because the emplacement breaking systems would be ITS to prevent transporter runaway. But I wouldn't have called that just because of retrieval, but it's basically the reverse operation of emplacement.

CHAIRPERSON RYAN: Questions or comments? Well, Joe, over the course of the last few years, I guess, maybe more than a few, your staff and through Carol have participated in many of the working group meetings that the ACNW has held to advise the Commission about the staff's readiness and preparation for a license application, and we've reviewed many aspects of what you've summarized so well today. And I would be remiss if I didn't thank you on behalf of the Committee as well as our past two chairmen, Drs. Hornberger and Garrick, for all the hard work and giving us many thoughtful and informative presentations. And I just want to go on the record as thanking you very much for all that participation over the years as we lead up to an LA.

MR. ZIEGLER: Thank you very much.

CHAIRPERSON RYAN: Thank you.

MR. ZIEGLER: And I appreciate the opportunity to speak to this group again.

CHAIRPERSON RYAN: Thank you very much. Any other last questions or comments? We've lost Howard Larson, so are we ready for our next presentation?

Okay. The break is 10:10 to 10:40. We're now at 10:40, so why don't we break for 15 minutes instead and come back just a few minutes before 11. So, again, thank you, Joe.

(Whereupon, the foregoing matter went off the record at 10:40 a.m. and went back on the record at 10:58 a.m.)

CHAIRPERSON RYAN: NMSS Division Director's Annual Briefing. The Committee will be briefed by the Director of the Division of High-Level Waste Repository Safety and the Director of the Division of Waste Management and Environmental Protection and recent activities of interest. I guess, Dan Gillen, you're going to go first. Welcome. Thanks for being with us.

MR. GILLEN: Is this on? Is the mike on?

CHAIRPERSON RYAN: Yes.

MR. GILLEN: Okay.

CHAIRPERSON RYAN: I might add that we've had a change that John Flack is the TFO for this session. Howard Larson had to step out to deal with a personal item that came up quickly.

MR. GILLEN: Okay. I'm here primarily to talk about the activities of the Division of Waste Management and Environmental Protection. This is a semi-annual informal discussion. Particularly, I'll focus on decommissioning. I'm happy to be the Deputy Director in charge of decommissioning, but I'm also acting for John Greeves as the Division Director at this time. I'm not acting for John Greeves, John Greeves retired, so I'm acting for whoever's going to take his place.

Recently, as you're probably aware, and we came to the point in time in the year where the Decommissioning Program presents its annual report and it's annual briefing to the Commission. So just recently we have gone through a summary and I'll talk a little bit about some of the things we presented but not get into the details because I'm sure you may have read those documents.

But September 21 of this year we presented a draft annual report to the Commission. The Commission responded with an SRM on October 21, which essentially accepted that annual report with minor modifications. So we're in the process right now of finalizing that document to a NUREG document, which will be the first of the NUREGs that we publish on an every-other-year basis.

In addition, on October 13, we did the annual briefing to the Commission. We have since received an SRM from them on that briefing also, and I'll get into that in a minute. But during the briefing we really focused on what were the accomplishments during the year for the Decommissioning Program and what were some of the innovative approaches we've been taking, some of the policy and technical issues we're dealing with, and then where are we headed in the coming year and beyond.

So I don't want to get into too many details on accomplishments but of course that's always a good thing, you want to pat yourself on the back for what you've done, but the Decommissioning Group has really moved forward in trying to achieve its goal which is to safely decommission sites. In getting to that point we've done a number of acceptance reviews of decommissioning plans, license termination plans for reactors. The regions have done 96 inspections during the year of sites. We've taken 50 other licensing actions related to those decommissioning plans and license termination plans. And we, actually, during the past year terminated four licenses.

In the past, there had been a goal really of the program to eliminate or terminate one SDMP site from the list, Site Decommissioning Management Plan list. One of the things we did programmatically during the past year was to actually eliminate that as a separate list. We now have incorporated the former SDMP sites into a more comprehensive program where we have basically reactor sites and decommissioning and complex materials sites. So we sent a Commission paper to the Commission on the elimination of the SDMP and got their buy-in to that process. We now do not have a goal of taking one site off the decommissioning list. My goal is more focused on taking major steps to terminate all of those sites under the comprehensive program.

In addition to getting the Commission's acceptance of eliminating the SDMP, we took some programmatic actions to follow up on the license termination rule analysis. I think you're fairly familiar with that. Robert Johnson and my staff has done a separate briefing for the ACNW on LTR analysis and where we're going on that. And I think that's one area where we have already started to focus our implementation of some of those recommendations from the LTR analysis and where I can probably use ACNW's assistance in the future most.

The types of issues I'm talking about in the LTR analysis are the use of realistic scenarios and dose assessment, widening our options for restricted use type actions, the soil mixing issue that we had about intentional mixing of soil on sites and then prevention of future legacy sites by improving licensees' operational activities as well as their financial assurance requirements.

All of those things have led us during this past year to use innovative approaches at some of our sites, even before we've gotten to the point of formally installing the analysis issues into our guidance and into our rules. For example, at Kiskee Valley, a site in Pennsylvania, which really is not a licensed site but is one which we had a responsibility for, and that is a site where we actually did a dose assessment ourself, analyzed the realistic scenarios of Kiskee Valley, either leaving the material on the site of maybe the state of Pennsylvania coming in at a future time and removing the material and putting it in a landfill. Under both of those scenarios, we analyzed that the license termination rule criteria would be met. So we sent a Commission paper up on that also and got Commission approval to issue a draft environmental assessment for comment and then, providing no substantial comment to the contrary, to go ahead and eliminate that site. Can't say terminate because there's no license to terminate. It would be just basically removing NRC from activities on that site.

And we got that approval and we have since issued the environmental assessment, got absolutely no comments, and we're now finalizing the environmental assessment in the Federal Register, and we'll be, within the next week or so, issuing a letter to Kiskee Valley and the state of Pennsylvania cc'd on it that we are done with that site.

Fansteel's another site where we've had use of realistic scenarios, and that's one where we actually applied a realistic scenario of industrial use to the Fansteel site in Oklahoma and got state of Oklahoma disagreement hearing request, and then the Board ruled in favor of the NRC that the realistic scenario we used was the appropriate course of action.

So those two are examples of a realistic scenario. Shield alloy is an example of where we are starting to move forward in the use of restricted release, other options for institutional controls and the use of a long-term control license. I think Robert Johnson in his presentation to you discussed the fact that we had issued some interim guidance but in the future we'll be -- as part of our guidance developing on all of these issues, we'll be addressing that guidance.

So what I would like to say at this point in time here is that I see ACNW in this area as a resource that I can use to, as we get into the formal development of the guidance on all these type of license termination rule analysis issues, to use ACNW and to use the concept that I think Mike Ryan addressed in the last briefing we had on this about developing a workshop where you bring in other parties from the outside to give their thoughts on some of these issues. There may be a lot of people out there who have some significant input on intentional mixing issue, and we can use that approach and use your review as well as -- and I'm thinking of a concept during the coming year of a workshop that's not just focused on one issue, that's maybe broadened out to kill more than one bird with a stone, so to speak. So that's one area.

So what's really happening in the coming year beyond our taking actions to write the guidance and to develop a draft rule to address all these license termination rules issues? Well, we're of course looking to continue our reviews of sites, and issues will come up on some of those sites, as they will, and I'll talk a little bit about some of the difficult sites that we have under my challenges part here. But my goal during this coming year is to try and terminate at least two reactor sites and probably five or more complex materials sites. I think that realistically, looking at the forecast for the year, that's something that we can accomplish.

I'm also looking to improve upon the goal of openness that we have in the program to develop a communication strategy that includes a decommissioning site database of all of our sites that will be tied into the web, along with that web page improvements we're working on right now for the Decommissioning Program that's sadly in need of web page enhancements.

Also to develop a decommissioning brochure, which is something that we go out on every one of these sites, as we get into the DP review or the LTP review and we have public meetings and to just plop down an annual report, which is comprehensive of a whole bunch of sites and may be a couple hundred pages long, to have a more simplified brochure that we can hand out to people in the public as what's involved in decommissioning, what's the criteria, what we're dealing with. And then, of course, have the biannual NUREG report, which is really a comprehensive document that the staff can use as well as other interested stakeholders, congressional members and things like that.

The challenges I spoke of during the coming years, the difficult sites are certainly a challenge. I mean not only do we have a number of sites that are not even licensees, those are always difficult to deal with. I mean it's easy to hold a license over a licensee but when you're dealing with a non-licensee, I mean it's a little bit different situation. We have to work with them very closely and I have a goal of trying to take significant advances. Kiskee is one of them where we've done that, and there are other sites out there that we need to do the same on.

Then there's the site that are financially troubled. Fansteel that I talked about is one of those sites. They recently went through bankruptcy. Safety Light in Pennsylvania is another one, and we're working to get that on the EPA list for EPA to come in and take over the actual work there. It's obvious that Safety Light could never afford to clean up that site, so we're looking at other avenues.

Then difficult sites, West Valley,

particularly. I mean you've already been briefed on the West Valley activities. NRC's in kind of a different role. It is not the holder of a licensee over DOE but working with DOE through the law to oversee that site through review of the decommissioning plans to be submitted at a later date and also cooperating agency on the environmental impact statement.

Another challenge is in the multiple regulator situation, EPA and NRC both having a role and of course we've issued the EPA MOU -- EPA/NRC MOU and they're in the process of working through consultation with EPA on a number of sites where we have already recognized that we have approved decommissioning plans or license termination plans that have triggered the values in the EPA MOU, which then triggers a need for consultation with NRC. So we have identified 13 sites in that category at this point in time, have issued letters to EPA informing them of that.

Let me just step back a second. The process that we identified that we would follow through consultation with EPA is if you identify a site at the time you're about to approve a DP or an LTP that triggers those values, then we send a level one consultation letter to EPA. The 13 sites I spoke of when we decided on this had already passed that point in time. They already had approved DPs or LTPs. So what we're saying we're essentially doing in lieu of a level one consultation we're sending notification letters to EPA to tell them of these sites.

Of the 13 sites, we've sent six letters already to EPA. Two letters are in concurrence right now. Three sites during that time, as we recognize they had triggered the values, we've gotten to a point in those three sites where we've done final status surveys and found that those levels are no longer triggered. Rather than the levels that were approved in the decommissioning plan, it was cleaned up to a level better than that, gotten down below the MOU trigger values, so we're taking no action with EPA on those three sites. So that's 11 of the 13. There are two other sites that are of complex enough situation that it requires in following the SRM we got from the Commission when we brought the EPA consultation process up to them, that we would have to go back to the Commission to get their input on how we would deal with EPA on those two sites.

The only thing I wanted to mention in the way of challenges coming up, the SRM that I got from the Commission following my briefing, which was set up in the format of the staff give a portion of the briefing and then we brought in a panel of three stakeholders from the industry and the state of Pennsylvania to give their insights into how decommissioning is going. Based on some of the issues that were raised there, the SRM sort of focused on next year when we come before the Commission they'll want to hear how we've worked to address -- primarily, one thing they want us to focus on was lessons learned and not only lessons learned like the decommissioning staff, what lessons we're learned as we go through this, but working with the industry find out what lessons they're learning as they go through so we can work with other sites coming down the road in the future and entering into decommissioning as well as maybe even operating reactors that haven't even thought about decommissioning yet and what things they might be able to do during operations to avoid problems as they get to the decommissioning stage.

In addition to that, some of the issues raised by the stakeholders that were there were, again, discussed in the SRM along the lines of improving radiological monitoring. I think that's not how we do monitoring, that's more timing and scheduling and being responsive to licensees that are ready for us to come out and do monitoring. Establishing measures to provide finality in the decommissioning process, and that again alludes to the EPA concern of dual regulation. Improving consistency among state and federal regulators, again, kind of a dual issue. And enhancing guidance to better address issues of flexibility and decommissioning approaches and institutional controls for restricted release scenarios, which is something we already are working on and I just discussed as some of the issues. We're addressing the license termination rule analysis.

How am I on time? I'm over my time? Okay. Just shifting a little bit more into looking at other things that we do in the Division now, as we were recently reorganized and High-Level Waste split off and what was left was primarily decommissioning but also low-level waste and the performance assessment activities that support decommissioning in other areas and the Environmental Group that does all the environmental impact statements that the NMSS produces.

Tomorrow you'll be getting a briefing from staff and from our Division on the WIR issue, waste incidental to reprocessing, and risk-based end states' involvement, both those areas that we're having with DOE. So I won't get into that but that's on your agenda for tomorrow. We'll give you where we stand on some of those activities.

In addition, I think on your agenda tomorrow is a clearance presentation, and our role on that is support from the environmental impact statement that would be involved in the clearance rulemaking. So you may get some of my staff involved in that presentation also.

Low-level waste, it's really a small aspect of our Division FTU-wise, but significant activities are probably down the road. We're kind of at a crossroads, as you well know, of low-level waste when you have a situation where as Barnwell closes we'll be faced with most states not having a place to dispose of B and C waste. Basically, what we're doing in this area is -- well, of course, we recognize that there is some support out there. The recent GAO report indicated a need for some sooner rather than later activities to establish disposal for B and C. The Senate Committee on Energy and Natural Resources in hearing from GAO on that responded favorably, even thinking about the need for a federally sited low-level waste disposal facility.

But in the meantime, until some action can be taken legislatively, we're doing things like supporting EPA's ANPR on low-activity waste in RCRA-safe facilities. We would support any action that DOE would take for greater than Class C, although they haven't developed anything yet. We're reviewing requests for alternate disposals on a case-by-case basis, as we get some in Decommissioning on perhaps disposal on-site or disposal of some very low-activity material in landfills or in RCRA C sites.

And then through our approaches, as I discussed, of realistic scenarios, restricted release, soil mixing, all of those things can lead to instances where we're limiting or decreasing the amount and volume of low-level waste needed to dispose of. So through those actions we're addressing the concern about disposal areas.

That's pretty much what I wanted to say this morning. If you have any questions or did you want to hear from Bill first and then ask questions?

CHAIRPERSON RYAN: Sure, we could do that. Bill, would you want to give your presentation and then we'll just kind of open it up for questions, in general?

MR. REAMER: Be happy to.

CHAIRPERSON RYAN: Thank you.

MR. REAMER: I'll talk about the status of the High-Level Waste Program that is the NRC staff High-Level Waste Program. I have to acknowledge right at the outset the uncertainties that exist with respect to the national High-Level Waste Program, the uncertainty with respect to the schedule for the submittal of the Department of Energy license application, and I'm sure that there will be more information forthcoming from DOE on what schedule we all are working to. We have a public meeting with the Department on November 22, a week from yesterday, and hopefully this will be an opportunity for DOE to clarify, to some extent, their plans, specifically plans with respect to December 2004, although we know that the Department is reevaluating that date and considering options in that connection.

So there is the uncertainty with respect to the schedule, but in the meantime we obviously -- the staff continues its activities at the pace it can, given the funding, which is another uncertainty I'll talk about, to be ready to review the license application when it is submitted.

Another uncertainty with respect to the program is the EPA standard. Last summer, the Court of Appeals struck down the portion of the standard that describes the compliance period as 10,000 years. We're looking to EPA to provide some indication of what their time table will be to respond to the Court's decision through a revision to the standard. Also, hopefully, some information with respect to what we can expect in the way of scope and nature of the revision. This impacts our regulatory activities because we are required by the Energy Policy Act to be consistent with EPA. So we will have to plan for a revision to our Part 63 regulation governing DOE license application for Yucca Mountain repository. So, obviously, we have follow-up activities that we'll have to take.

Also, it impacts the nature of the consideration that we will give to a license application. Because if a license application is submitted before the EPA standard is revised, then the question that's already been put on the table is can we docket such an application given the fact that the EPA is going to be revising the regulation? And we'll be looking for at least initially DOE to present its view in the license application about how docketing would be consistent -- docketing of the application would be consistent with our regulations.

Another uncertainty I would need to acknowledge is the Licensing Support Network and the order that the Licensing Board or the Preapplication Presiding Officer issued last summer in which the certification that DOE had made of compliance with the LSM requirements was set aside. DOE did appeal a portion of that order but also indicated that they are taking steps to conform to the order's requirements with respect to reviewing and processing additional documents. We're interested in what the schedule is that DOE will be working to to respond to those portions of the order that they did not appeal. And we'll be looking obviously at the schedule DOE sets on how they intend to deal with that.

Another uncertainty is the budget, and there have been articles in the Trade Press I'm sure that the Committee is aware of indicating that there is a distinct possibility that Congress will continue the continuing resolution, which means funding NRC at the fiscal year 2004 funding level. That's substantially less than the Agency requested for funding for 2005.

The Agency's request for 2005 included not only increased staffing to prepare to conduct a license application review but monies also to support readiness in the area of information technology, information management, the Licensing Support Network, the electronic hearing docket, the wave of systems, the plethora of systems that the Agency has put into place to try to meet Congress' mandated three- to four-year review of the license application.

Hopefully, by the end of this week, maybe next, we will have some indication from the Congress of what the funding level will be, but continuation of funding at the '04 level clearly will impact the schedule that the staff can meet with respect to conducting a license application review. There's a substantial difference between, as I said, between what we've asked for in '05 and what we would get under the '04 continuing resolution.

Let me go on and talk about some other pending activities that we have. We're doing a rather extensive project plan, a license application review project plan, a multi-layered plan for how we will carry out the license application review. We have the assistance of a contractor in doing this. We have received a draft already that we're reviewing from the contractor. We hope that our planning and document activity will be completed by the end of December of this year. There are obvious insights that one gets in going through such an extensive planning process, insights with respect to staffing levels for particular technical issues, training and development needs, the adequacy of existing review tools, the availability of necessary information from DOE. And so this is an iterative process, the planning process in which we're gaining insights on what additional time permitting and money permitting we can do to improve our readiness to carry out a license application review.

Also, with respect to key technical issue agreements, the Committee is aware, of course, that years ago the staff, in order to systematize its preapplication consultation activities, identified nine key technical issues umbrella as an umbrella for the system and the issues that the staff wanted to put on the table as regulatory issues that DOE would need to address. In the course of preapplication activities, we identified on the order of 293 additional information needs, which DOE agreed to fill. We have thus far received responses from DOE on all of the 293 agreements. Our review has been completed with respect to on the order of 125 of those agreements. A number of agreements that we've identified as being of high-risk significance, meaning that they potentially have an impact on the estimate of repository performance, a number of those agreements continue outstanding on the order of 25, maybe slightly a few more than.

We have a schedule and a commitment to provide feedback to the Department of Energy on those high significant agreements by the end of this calendar year. That feedback would be typically in the form of a letter describing either the staff's view with respect to the information that's received or potentially the staff's view with respect to additional information that it feels that it will need in order to complete a license application review.

One of the key technical issues obviously is igneous activity and we're working on a response to the Committee's letter of November 3 and providing Committee views on that. Also related to key technical issues is a document called the integrated issue resolution status report, which provides a summary of technical bases for the staff's progress to date on key technical issues. And I hesitate to again give another date for when that document will be issued publicly, because I've already missed my initial date of September, but I am hopeful that we will be publishing that for all stakeholders by the end of November. I believe the Committee has had an interest in that document in the past. I know that we are committed to make it available and provide any follow up to the Committee in the way of briefings that the Committee wants.

The next topic I would address is inspection. Inspection is an adjunct, can be and will be an adjunct of reviewing the license application. We anticipate that there will be needs to go to the site to provide information, whether it's in response to concerns that may come our way from external sources or whether it's internally driven information needs that could be handled through an inspection program. We have a manual chapter that we're about to issue that will summarize our inspection program, called Manual Chapter 2300, and we will be looking to develop plans to implement that during the license application review process.

We continue also in the area of quality assurance to monitor the Department's quality assurance related activities. Quality is very important as an independent topic. With respect to model software and data that support the license application, we've provided views and feedback and comments to DOE to date in the quality assurance area.

We continue to monitor DOE audits, observe DOE audits, monitor DOE improvement efforts in this area. Also related to quality assurance, we have a revision under review to the Department of Energy Quality Assurance Requirements Document; it's Revision 17. Roughly approximates how DOE would -- the Quality Assurance Program that DOE would submit to comply with relevant provisions in Part 63 and the license application.

I'll also mention another topic that we've been addressing with the Department in prelicensing consultation, that's the level of detail of information with respect to design that would be included in the license application. We had written the Department a letter in October identifying several areas of the design where we anticipate that we will need more information to complete our review. I believe the Committee has received a copy of that letter and we're continuing to interact with DOE on it as part of our preapplication activities.

So that pretty much summarizes the status of the High-Level Waste Program.

CHAIRPERSON RYAN: Thanks, Bill. Let's see, Dan, let me start with a couple of questions. It sounds like NORM materials, which are not NRC regulated, of course, are they on -- I mean are they mixed into this question of complex sites and non-licensed sites? The reason I'm asking is I know states deal with NORM in many states a lot. It's the same staff that does agreement state licensing and management of radioactive material. Do you see that as being involved here or not?

MR. GILLEN: No. No.

CHAIRPERSON RYAN: I know it's not part of your regulatory responsibility, but there's a lot of NORM stuff out there is why I ask.

MR. GILLEN: Well, there is, yes, but at this point in time we haven't been considering it as part of our -- as you say, it's not --

CHAIRPERSON RYAN: I mean you see it as source material, of course. It's uranium and thorium. But if it's not source material, by definition it's NORM, but it's the same radioactive material. I wonder if there's any experience to be gained from thinking about what the NORM folks are doing.

MR. GILLEN: Yes, there would be, I think, so we'll have to --

CHAIRPERSON RYAN: Just something to think about because I guess I've run into it a number of times, and it's a barrier you cross based on the definition of source material, not on the specific dispositioning of decommissioning issues related to uranium or thorium in diluted concentration. So something to think about.

I had one other question I wanted to ask you. I can't think of what it is, so, Allen, take it away. I'll come back.

VICE CHAIRMAN CROFF: Okay. I guess maybe this is addressed to Bill, I'm not sure. Anybody leap in. But I don't think you mentioned anything about the greater than Class C business. Are you involved in that or are the NRC staff involved in that?

MR. GILLEN: We would be. I mean we've been given legislative oversight if DOE develops a greater than Class C facility. But at this point in time, I don't think we have any actions right now.

VICE CHAIRMAN CROFF: I'm not sure what you mean. You mean regulatory oversight?

MR. GILLEN: Yes. I think, and maybe somebody in the audience can correct me if I'm wrong, but I thought there was some amendments to low-level waste legislation that gives us involvement over DOE.

MR. LEE: Yes. Under Part 61, if DOE chooses to come in with a -- it can come in with a design subject to Part 61 or another design that NRC has to approve, but it's basically in 61. But DOE's already on record not intending to put GTCC waste into Yucca Mountain.

CHAIRPERSON RYAN: I guess I have a practical question about greater than Class C, Allen, if I may --

VICE CHAIRMAN CROFF: Go ahead.

CHAIRPERSON RYAN: -- and that is how much is there in the commercial sector? Is there a good inventory of greater than Class C materials at licensee locations?

MR. GILLEN: I'm not sure what quantities there are or whether there's --

CHAIRPERSON RYAN: The examples I know about are stellate balls and reactors and a few other irradiated components, but beyond that -- and shield sources but it's interesting to think about what is the inventory on the commercial side. How big is the problem?

MR. GILLEN: There is information on GTCC waste in the Yucca Mountain final EIS. I'd have to -- I mean someone would have to go back and look to see if there's specific information.

CHAIRPERSON RYAN: Yes, but I'm curious, is that an accurate accounting? And then when you think about 10 CFR 61 being the operative risk assessment tool, it's not very well risk-informed, and I wonder if you did take a risk-informed approach toward thinking about particularly the irradiated hardware, if you'd end up with the same assessment. You know, 61 relies on an agricultural intruder scenario that's pretty -- first of all, the probability is one that it happens at year 100, and it maximizes through every conceivable parameter the exposure of the individual.

So I just wonder if that's something to think about. That might be an opportunity there, both from an inventory and an assessment scenario perspective. And that gets back to your point then about realism in assessment scenarios. That may be a way to address it. And then if you get through that kind of thought experiment, maybe that reshapes your thinking on what really is greater than Class C waste.

The other side of that, just to finish the story, is very concentrated small sources, strontium 90 eye applicators that ophthalmologists use, for example, on the face of the source are greater than Class C waste. It's curies per cubic meter. But in terms of activity, it's a millicurie. So I mean something happens at the very concentrated end and at the very dilute end of the concentration scale in terms of being risk informed. Very small sources, physical small sources that have a little bit of a radioactivity can calculate to be greater than Class C, but there's not a lot of radioactive material that otherwise in a different physical matrix would be perhaps of no consequence at all. So it's something to think about in that area. So thank you.

VICE CHAIRMAN CROFF: Let me make sure I understand what you're saying and that is that on greater than Class C the ball's in DOE court right now to figure out sort of what they want to propose or a slate of options to be decided. And you would have some regulatory involvement depending on that decision at some point in the future.

MR. GILLEN: That's what I understand, yes.

VICE CHAIRMAN CROFF: Okay. On the high-level waste side, the list of uncertainties is almost so overwhelming as to throw up your hands and say, "Let's wait." But the list was largely procedural, I'll call it, all sorts of scheduling and other things. Are there any technical uncertainties that come to the front of your mind as being really important at this point?

MR. REAMER: Well, I think those

agreements that we have identified as high priority, using our system of ranking based on potential to influence the estimate or where we want to be focusing our resources. Of course, right now what matters to us is a license application that provides the information we need to do a review. We're not reaching substantive-type, determinative-type outcome decisions. That can only come after a full safety review, after a license application and after a full safety review. But our focus is clearly on those agreements that we've identified as high.

VICE CHAIRMAN CROFF: Okay. And you may have said this but there are still open high-priority, high-significance KTIs?

MR. REAMER: Yes, open in the sense that we have not completed our review of the response that the Department has provided in response to the agreement. There were on the order -- my numbers are close but they're not probably exactly -- on the order of 45 of the 293 we call high. And I believe that 25 to 30, somewhere in that range, we still have not completed our response to DOE.

VICE CHAIRMAN CROFF: But you have a response in hand.

MR. REAMER: We have the DOE response,

that's right.

VICE CHAIRMAN CROFF: Yes.

MR. REAMER: We want to provide feedback. We're going to do that by the end of this year.

VICE CHAIRMAN CROFF: Okay. Thanks.

MR. REAMER: We'll do that by letter, and the Committee will get copies of that.

CHAIRPERSON RYAN: Well, based on a comment that we heard earlier that the schedule is not determined at this point from Joe Ziegler, it raised the thought in my mind that if that doesn't become clear and it's out in the future at some point, I don't know what the future would be, of course, is there any particular working group meeting along the lines of what we've had in the past or other activities you could think about that would be productive to support a high-level waste program? I'm putting you on the spot, I don't mean to, but that might be something to think about, that once the schedule does become clear, that may refocus us on issues of importance to you. So I open that door to maybe --

MR. REAMER: Sure. I think that's a logical question because once the schedule becomes clear, if it is not December of 2004 but some later date, obviously preapplication period continues. Again, our goal in preapplication is to try to identify issues, get information with those issues that can support our review. So we will be -- clearly, it will be in our interest to move forward in preapplication and activities with the Department. The Committee has historically played a key role in helping us, assisting us, looking at our -- the way in which we're addressing issues, our readiness to deal with issues. So that's a good suggestion.

CHAIRPERSON RYAN: I guess with that mind, maybe we ought to think about perhaps a January or so follow-up briefing to maybe explore that question a little bit more in detail and hear where you are and where the schedule might be and so forth. Does that seem like a reasonable --

MR. REAMER: Sure. We'd be willing to do that, provided the outcome with respect to the license application date is consistent with that.

CHAIRPERSON RYAN: Sure. Understand. Okay. Thanks. Ruth?

MEMBER WEINER: Just a clarification first because this keeps coming up. The Yucca Mountain EIS considered as greater than Class C only high-level waste that was vitrified in glass logs in cans and looked at the number of those, so on. So a greater breakdown of what constituted greater than Class C I don't believe is considered.

I had just a couple of questions. You mentioned the need -- once again the need, pointed out in the GAO report and that we have all heard from the congressional hearings, of a site for Class B and C waste, the upcoming need, and you mentioned alternate disposal. Could you expand a little bit on what alternate disposal is considered?

MR. GILLEN: Yes. The alternate disposal I talked about was really some of the case-by-case decisions we're making in Decommissioning. For example, the Big Rock Point Reactor decommissioning got approval to dispose of some concrete-type, very low radioactivity waste in a local landfill. We also have 20.2002 process for on-site burials. Some sites, I can't think of any particular examples, but there are sites that have requested disposal of low-activity waste in some certain RCRA C facilities that allow those types.

MEMBER WEINER: Have you applied this notion of an alternate disposal to any higher activity waste, to Class B and C waste or B or C waste?

MR. GILLEN: Not that I'm aware of.

MEMBER WEINER: Okay. So this is just -- the alternate disposal is just something to consider for very low activity.

MR. GILLEN: Low.

MEMBER WEINER: Material that is less active than the current LSA?

MR. GILLEN: Probably because of --

MEMBER WEINER: Okay.

MR. GILLEN: Yes.

MEMBER WEINER: I'm just using it as a benchmark. So it would be less than -- that or less or something similar.

MR. GILLEN: Similar.

MEMBER WEINER: Okay. Bill, you mentioned that there were outstanding KTIs that you're still reviewing, and I assume your prioritization of the KTIs is a risk-informed prioritization. We had a meeting on that. Do you want to provide any more detail on generally what the outstanding KTIs refer to or don't you want to do that at this point?

MR. REAMER: Specific areas?

MEMBER WEINER: Yes.

MR. REAMER: I'm probably not equipped today to do that. We can surely provide after the meeting if you'd like an -- we can identify the specific agreements that remain open, the KTI areas that they're in. I'd be happy to do that.

MEMBER WEINER: That would be helpful to us.

MR. REAMER: Sure.

MEMBER WEINER: Finally, I just have another question on low-level waste. Are there any areas of Part 61 that you think would deserve a closer look, a review, just something to look at, either in the implementation or in the wording of the reg itself?

MR. GILLEN: I don't really feel that I can probably respond to that at this point in time. You're picking on me on low-level waste all the time, and I'm a decommissioning guy.

MEMBER WEINER: Yes.

MR. GILLEN: That's not an excuse, but I could probably when I come back in December and talk to you, I can have the right people with me and we can talk in those areas too.

MEMBER WEINER: Fine.

MR. GILLEN: Yes. I don't don't particularly have any things that I've seen in my history with the NRC where I would want to improve Part 61, I can tell you.

MEMBER WEINER: That's very helpful, and I sure didn't mean to pick on you.

MR. GILLEN: No, I didn't mean to find an excuse either.

CHAIRPERSON RYAN: Yes. I think that's an interesting jumping off point for us to think about a working group meeting where there's a string of a variety of issues related to the kind of dilute concentration and the disposition, using that in a very broad sense. So maybe that's the focal point where we begin to shape a working group meeting and bringing in lots of stakeholders and hearing different views on that that might help you in your deliberations.

MR. GILLEN: Right, because the soil mixing type issues and those all contribute to that.

CHAIRPERSON RYAN: All those are -- there's a thread that runs through all of those and I'd like to point out that sometimes these disposition decisions sometimes drive the thinking on what the right decommissioning activities ought to be. Some people would spend a lot of money to analyze samples to make a decision if the disposal was very expensive, for example, where they might take a different strategy if there were different options for disposition of material. So it's very much a dynamic system, and I think you've got to remember it's a system. It's not just one decision, it's a whole bunch of decisions that interrelate. So maybe that's a theme for us to think about.

MR. GILLEN: I'll keep that in mind as we interact then to develop that, yes.

CHAIRPERSON RYAN: Sure. Questions? Mike? Sorry, Jim? Excuse me, Mike.

MR. CLARKE: Excuse me, just one comment and then a question for Dan. As part of their environmental restoration efforts, as you know, the Department of Energy has built and is building several disposal cells on site for management of clean-up residuals. Those disposal cells, they're called CERCLA-RCRA disposal cells, they are designed in accordance with either the RCRA prescriptive standards or a design that's been shown to be equivalent. So for what it's worth, this is happening. This technology is being used for low-level waste as part of environmental restoration efforts.

The question I had for you, Dan, it may take me a minute to get to it, but you mentioned four areas where you've been working on the LTR recommendations that you've made and approvals that you've had. You mentioned the merits of a workshop, and you also mentioned that you'll be working with the DOE on a risk-based end states initiative. And it strikes me that two of the areas that you mentioned, realistic scenarios and prevention of future legacy sites, are very important to them as well. In fact, the end use part of risk -- or the end state part of risk-based end states is the more realistic future land use scenario.

And then the issues that everyone seems to be struggling with are of course the long-term performance and engineered barriers and the long-term performance of institutional controls and how do you get there.

So I wondered if -- you mentioned intentionally mixing of soils as a workshop component, but I wonder if these other areas would be of interest to you as well.

MR. GILLEN: Well, certainly, yes. The institutional controls, the realistic scenarios, all of those are components of, as I talked about, the potential workshop. It's pretty much our experience in some of these areas and our interaction with DOE in various forum that have led us to involvement in their risk-based end state approach, and we're basically at the formative stages of our interaction with them, but we're looking to almost consult with them on our experience and what we see in their program as ways they might be able to improve it or ways we -- commonalities across our involvement and their involvement and use that as a way to focus their risk-based end state program.

MR. CLARKE: Just trying to get a little more feeling for what topics might be of most interest to you in such a workshop.

MR. GILLEN: Okay. Yes. Well, the four that I mentioned are of particular note, the type of things coming out of the LTR analysis, which really had about nine issues but they could be lumped into the four main ones that we're focusing on, I think. And you'll hear more about risk-based end states tomorrow from Robert Johnson and at the same time the WIR presentation.

MR. CLARKE: Sure.

CHAIRPERSON RYAN: Mike?

MR. LEE: Just a couple questions. One, just an observation for Dan as a follow up to comments from Dr. Ryan and Weiner. Part 61 is basically a deterministic regulation that was written prior to the PRA policy statement published by the Commission.

Previously, the staff issued a staff technical position on how to do some performance assessments and in a way try to risk inform the existing regulation, but if the existing regulation is going to see more action in the future, going back and looking at whether or not there's a need or a desire to modify Part 61 may have some merit, and that's something that the Committee might want to consider exploring.

I guess I've got two questions for Bill. If I heard you correctly, is the NRC waiting for a DOE position on whether it can submit a license application, given that the post-closure performance objective is under reconsideration now?

MR. REAMER: We're not waiting for DOE. We are aware, acknowledge, as the state of Nevada has argued in their letter to us, that the effect of the Court's decision with respect to the EPA standard creates a hole in the standard and raises the question can a license application be docketed in the face of that? That's what I was acknowledging as an uncertainty, and I was saying our view is it's up to the Department to decide whether and when. And if it makes that decision to submit prior to the EPA rulemaking to revise, then our expectation would be the Department would explain how submittal and docketing is consistent with the NRC regulations.

MR. LEE: Okay. Thanks. And just one other comment or observation. I guess as EPA considers how it would amend its existing 197 regulation to deal with the 10,000-year issue, previously the Committee's written a number of letters on the time period of compliance as well as conducting a working group several years ago. Do you envision or seek any or encourage any Committee insight as you talk to EPA on this issue?

MR. GILLEN: Well, the Committee will make whatever decision it makes about where it believes it should be spending its time and efforts. It's not my role to make that decision. But the way I see things the responsibility is in EPA's hands to decide on the timing and the nature, the scope and nature of the revision and to move forward. We will have to be obviously making amendments to Part 63 to be consistent with that EPA change, but we don't know what those amendments will be until we understand what the EPA change will be.

MR. LEE: The motivation behind the question is that the Court decision was pretty clear that EPA didn't follow the NES recommendations, which themselves I think were pretty clear. So I was just looking as to what type of path forward might ensure a higher outcome of success. So I'll just leave it at that.

CHAIRPERSON RYAN: Thanks, Mike. I guess to close up, we want to thank you for your time and presentations, but one last note, apart from the sites that Ann listed which were just a few of the more significant and complex sites, you also terminate 300 or so licenses a year from much less complicated licensing activities. And that's, I'm sure, a significant part of your workload. We don't want to just --

MR. GILLEN: Primarily the regions. I get all the complex ones.

CHAIRPERSON RYAN: Nonetheless, it's an important part of Decommissioning, and, certainly, even though they're small licensees, they're no less important to do it correctly, and you certainly have that workload to manage too. So you've got a lot on your plate, and we just didn't want to not recognize all those activities as well and all the people that do that work. Thank you both very much.

MR. GILLEN: Thank you.

MR. REAMER: Thank you.

(Whereupon, the foregoing matter went off the record at 11:54 a.m. and went back on the record at 11:57 a.m.)

MEMBER WEINER: I'd like to welcome Bill Brach, Director of SFPO, and Earl Easton, and I take it you're going to talk about the international transportation and give us a report from PATRAM.

And there are two videos imbedded in the presentation as I understand. I'd like to finish the presentation and the discussion, and then there are a couple of other videos if people would like to see them. These two videos are very, very short I understand.

So go ahead, Bill.

MR. BRACH: And I told Dr. Weiner that the two videos that we have imbedded in the presentation also are very short, and that's measured in seconds.

With me is Earl Easton. Earl is our senior level transportation expert in the Spent Fuel Project Office.

So, one, I want to thank the committee for the invitation to meet with you all this morning -- I think I can still say "morning" -- to discuss with you some of the NRC Spent Fuel Project Office activities in the international transportation arena.

I'm moving to the second page, and while

I get that on the overhead, the second page gives a brief overview of the topics I'd like to discuss with you. One, our engagement activities with the International Atomic Energy Agency and roles that NRC in the last few years has taken in that regard; the PATRAM conference, that's the Packaging and Transportation of Radioactive Material conference, held back in September in Berlin. That's a conference that's held every three years, and we'll give an overview of the conference and also Earl will be giving an overview of the presentation of some of the testing, physical testing that was carried out as part of the PATRAM conference.

And then at the end of the briefing I'll conclude with a brief overview on accompaniment by staff, by myself with the National Academy of Science on a visit to the U.K. to review the U.K. transportation, if you will, infrastructure for transport of spent fuel.

I'm trying to be sure we don't jump too many slides. I apologize.

First, with regard to the comments on the International Atomic Energy Agency, I want to briefly first mention why the interest or involvement. The IAEA, the United Nations International Atomic Energy

Agency, sets the international transportation standards for transportation of radioactive material, and through the IAEA and member state participation the standard, the documents referred to oftentimes as TSR-1 -- that's the international transportation standard -- sets the base on which member states or countries across the world, throughout the world use as fundamental fuel underpinnings for the transportation regulations and approach that the respective countries implement in their country.

In the U.S., NRC and DOT represent the U.S. at the IAEA in the area of transportation, and our two regulations, 10 CFR 49.171 and NRC's 10 CFR Part 71, implement the transportation standards within the U.S. and both the DOT and the NRC standards are built on the IAEA international transportation standard, TSR-1.

Now, the overhead, the first bullet notes NRC taking a leadership role. I want to clarify two aspects of that. One is we in the last few years have approached or taken a very technical leadership role, if you will. Clearly, the leadership in the U.S. is the Department of Transportation with regard to transportation. DOT is the U.S. competent authority for transportation. Both NRC and DOT co-represent the

U.S. at the IAEA.

With regard to what do I mean by taking a more extensive leadership role in transportation, over the past few years our NRC staff have been engaged with the IAEA on an approach and resolution of a number of technical issues that have been before the IAEA with regard to changes in considerations in the international transportation standard.

A few examples include, for example addressing surface contamination limits on transportation packages. Grandfathering provisions on the international verbiage is referred to as transitional arrangements.

Fissile exemptions with regard to transportation and also exemption levels for transportation, that is, at what level additional transportation standards and requirements would be applicable for the transport of radioactive material.

A number of NRC staff have from my perspective received prominence internationally engaging in these and other technical areas. I just want to mention a few because they stand out.

John Cook, Dave Pstrak, Nancy Osgood on our staff have been significantly engaged in working with the IAEA. Rob Lewis, who is Chief of the

Transportation Section sitting to my left; Earl Easton, our senior expert, extensive involvement.

And from that, the reason I mention their names and also mention the areas is what we've seen in the past few years is a markedly expanded NRC engagement in working with the IAEA in technical issue resolution, standards development, guidance development.

And you might ask for what reasons are we doing that. As I mentioned, the transportation standard is the underpinning on which we, NRC, as well as the rest of the world base our regulations and our programs. And so to the extent that NRC can be more directly and early engaged in the process, we can help influence and provide, if you will, risk informed and technical direction to the outcomes of these activities.

So we over the past few years have had a markedly stronger, if you will, engagement in that regard.

I also want to mention a transportation conference that occurred in Vienna in July of 2003. There have been internationally a number of efforts and issues involving the questions with regard to the safety of international transportation, especially maritime transportation. The IAEA held a special conference in July of 2003, and NRC at that conference as well had a major, if you will, technical leadership role, engagement in the conference, as well as in follow-on activities with the IAEA in helping develop the actions that resulted from the conference in follow-on actions by the agency.

The overhead in the second bullet notes an acronym TRANSSC, and of course, we wouldn't be a good government bureaucrat if we didn't have an overhead with acronyms that nobody can figure out. The TRANSSC is the acronym for the Transportation Safety Standards Committee. That's the committee at the IAEA that develops and has oversight responsibility for the development of the transportation standard in the guidance document. That's the activity in the committee I mentioned before that both NRC and DOT co-represent the U.S.

And the second or third acronym listed there or -- excuse me -- the third bullet but second acronym is TRANSAS, and that standards for Transportation Safety Appraisal System. That's an activity that the IAEA engages in offering to member states to conduct a review or an assessment of a member state's transportation program. It's led by the IAEA with member state support.

The overhead highlights the most recent mission in France that was completed, and NRC has participated in both the TRANSAS mission to France as well as previous missions in the last few years to the U.K. and Panama.

And you might ask why are we participating in those reviews. There's a couple, if you will, three basic reasons i'll mention. One is very clearly to provide technical support and expertise to the IAEA review of those programs in those respective countries, but also I'll mention France and U.K. as examples.

Those are two countries that have a fairly large program with regard to transportation and package development, package review and certification. In which, there's quite a few -- in the area of international commerce, there are quite a few packages that are designed and certified by France and U.K., for example, that oftentimes transit the U.S. as well or are used in commerce here in the U.S.

That process requires the U.W. to review and approve the use of those packages in the U.S. So our participation in the TRANSAS mission in, for example, the U.K. and France, helped us gain a better understanding of the programs as implemented in those countries so that when the packages and the designs are provided to us for review and approval, that having that background information and knowledge with regard to how those countries operate their programs facilitates our review and understanding of the process and approval process internally here in the U.S.

And the third item I'll mention is that, again, looking at the U.K. and France, those are both very well developed programs. So there's an aspect of what can we learn or what can we gain from other national programs with the fact that we may be in the position of carrying back and considering here in the U.S., if you will, lessons learned or good practices.

Let me move now to the PATRAM Symposium. I mentioned this was a conference held in Berlin, Germany this past September. I mentioned this is a conference that occurs every three years. The conference alternates between a U.S. location and a foreign location.

Three years ago, 2001, the conference was held in Chicago, Illinois; the conference this past year in Germany; and in three years will be, again, in a U.S. location.

The PATRAM conference in Germany was the largest attended PATRAM conference at an international location. There were over 700 representatives from 25 countries at the conference. That's the second PATRAM conference I've been to. Staff have attended a few more.

One thing I will offer from the standpoint of the engagement internationally of the industry and the public and the stakeholders in discussing transportation issues, whether it be technical issues needing technical resolution, discussing processes and other aspects, it's a very from my perspective, a very, very good conference and very engaged conference. The most interesting sessions are those that are panel sessions, if you will, where there are folks sitting, participating and answering, responding to questions that are from the audience. It's a very, very well attended conference and so, I think, a very valuable conference.

Noted in the overhead is the prominent role that the NRC played a this conference in representing the U.S. We had five staff from the Spent Fuel Project Office engaged in the PATRAM conference, presenting plenary speeches, presenting papers, chairing sessions, and providing poster sessions.

I would note as well that the director of NMSS, Jack Strosnider, was the opening plenary speaker at the conference in Berlin, and Jack attended the entire conference as well.

I will note that the next conference in 2007 will be in the U.S. The plans are for the conference in 2007 to be a thee U.S. federal agency sponsored conference: Department of Energy, Department of Transportation, and the NRC.

Earl is our lead within the NRC to work with the other agencies, and we've already initiated interactions and meetings with the other agencies to start the early part, if you will, of the planning for the 2007 conference.

Now, the last overhead notes that associated with the conference were the sessions and panels and poster sessions. There were two drop tests of full scale spent fuel transportation packages. I'll offer for myself this is the first full scale package testing that I had seen.

There were two tests conducted, one on the CONSTOR, which is a German cask design, full scale cask, multi-purpose casks drop test, and the second was a Japanese design cask by Mitsubishi, also a dual purpose cask.

At this point I'd like to turn the presentation over to Earl who will walk through some background on the testing facility as well as the conduct of the test and has, as I mentioned, two imbedded video clips to show the tests that were carried out.

Earl.

MR. EASTON: Thank you, Bill.

Today I'd like to share with the committee some photographs and some videos of two areas that we talk about often in transportation but we really don't get to see first hand.

The first one is an unyielding surface. What is an unyielding surface? And I have some videos of the construction of an unyielding surface, and I'd like to make some comments and commentary on how important an unyielding surface is to the area of transportation.

And the second, as Bill mentioned, we were fortunate to witness not only one, but two full-scale drop tests of spent fuel casks for shipment by rail.

First, let me just make a few remarks about the importance of an unyielding surface. In about 1961, the IAEA came up with standards to approve spent fuel packages and other radioactive material packages, safety standards in 1961. That said, for accidents packages must be analyzed for the maximum credible accident.

Of course, back in those days, unlike today, they had trouble defining the maximum credible accident and they spent a couple of years trying to actually define it and implement it, but they had trouble because each country has a different concept of maximum credible accident, different rail systems, different transportation systems.

About 1964, they said, "Hey, you know, we need to develop a standard test." So they came up with a 30 foot drop onto an unyielding surface. What was one of the reasons they came to such a test? Well, it's reproducible. It means the same thing in each country, and you could analyze it pretty readily using analytical tools.

Unyielding surface is a unique boundary condition, I guess, in analytical calculations where it reflects all of the energy back into the cask. Okay? And so you can just set that reflection and do an analysis, and when you actually go to drop something, if it's not unyielding, some of the energy goes into the surface. So a lot of care has to be taken into building an unyielding surface if you're actually going to do a drop test.

The IAEA rule of thumb for an unyielding surface is that the surface itself must weigh about ten times what the object being dropped on it weighs.

So let me go through some of the videos. The first one is dated to about April. I think it's actually April 7, 2004. This is the initial construction of the drop test facility in -- forgive me -- Horstvalde, Germany. I hope I have that pronunciation correct. It's on a former East Germany test site, although they were testing tanks, military hardware.

And for those of you who might have seen the test where they blow a propane tanker up against next to a CONSTOR cask, it's at the same site.

This is the initial excavation. What they're doing is they're putting what they call dwells in the ground to lower the water table, to control the water table.

After that, they excavate and line a pit in which they're going to pour concrete, reinforced concrete. That pit is about 46 by 46 by 16 and a half feet deep. These are approximate. Of course, in Germany, they're all in metrics. So I converted these. So these are approximate dimensions. But here you see the excavation pit on the next slide.

And here's what I really wanted to impress upon you. This is reinforced steel being put into that pit. There's about 225,000 pounds of steel reinforcement bars, and imbedded somewhere in that mess are force and strain gauges so that when an object is dropped, they can get measurements on how well this performs as an unyielding surface.

Now, this was done about the third week in May, which was about a month after they had prepared the cavity. They're getting ready for the pour. The inset just shows a perspective on how deep it is. Again, it's 16 and a half feet deep.

Here's the actual finishing up of the concrete pour, five and a half million pounds of concrete poured into that pit around the reinforcement bars.

On top of the pad, and you can't see it very well, but in this area here, they're preparing that to put a steel plate, about a three-quarter inch steel plate on top of that, and that's the actual dropped surface.

CHAIRPERSON RYAN: And that is one pour?

MR. EASTON: That I don't know.

Okay. After they've prepared the surface, they've built a test building around the surface, which is independent of the surface, not connected to the surface. It's built around, and this is for cask preparation. It's an all weather type preparation facility.

This is as it nears construction. This is the skeleton of the test building, and they're going to hoist this. This is an 80 ton crane. They'll hoist this drop tower on top of this structure.

Here, in fact, they're doing it.

After they completed the skeleton of the structure and enclosed it, they put a 200 ton winch on top. That's to list items up to 200 tons because they're anticipating that they'll test rail casks that might weigh up to 180 tons or so, and this has a lift capacity of 200 tons.

The release mechanism, which is shown in the right lower corner, very precisely engineered, and the reason they had to do that is the regulations require that a cask be dropped at the worst orientation. Oftentimes that is at a precise angle attacking the lid or CG, center of gravity, over corner. And so when they drop it, it can't have any wobble to throw that angle.

So this release mechanism or it was engineered with that in mind so as to maintain a drop angle to the ground.

Here's the completed facility. I think it was completed around the beginning of September, end of August. It costs about four million euros, which is about four and a half million dollars, and again, it shows the enclosed building. The hoist is up here, and this is actually taken at PATRAM where people are gathering to witness a test.

Here's some of the statistics. As I said in the beginning, the rule of thumb is that the unyielding surface weighs ten times the object being dropped. So if you have a 200 ton cask, if my calculations are correct, that's about 400,000 pounds. You've got five and a half million pounds of concrete, which is more than ten times the 400,000 pounds of the cask being dropped.

So it meets the IAEA guidance on an unyielding surface. Okay.

They built this. They're going to use it for something. So I'm going to go into a couple of videos. I'm going to describe the cask being dropped, show a couple of short videos of the actual drop tests that were done in Germany in conjunction with PATRAM at the end of September.

Okay. The first one is the CONSTOR cask. It happened on September 21st, and if I have everything working correctly --

MEMBER WEINER: Get the sound.

MR. EASTON: It's more dramatic with the sound.

CHAIRPERSON RYAN: Could you tell us a little bit about the cask. It's obviously a spent fuel rail cask.

MR. EASTON: Yeah, I'm going to. In the next picture where it's actually a picture of it sitting on the ground, I'm going to explain what type of cask it is or what it is.

Okay. Here's the cask.

Okay. Here's the cask after it has landed, and you can see deformation of the impact limiters. This was a side drop in which, you know, both impact limiters hit at the same time. Okay?

CONSTOR cask designed for 69 BWRs or 32 PWRs held in an internal basket. The heat load is 30 kilowatts per cask. It's intended to ship middle to high burn-up fuel. The length with the impact limiter is about 24 and a half feet. The outer diameter with the impact limiter is about 11.5 feet, and without the impact limiter, about 8.5 feet.

Okay. The way it's constructed, it has inner and outer steel shells, and it's filled with a somewhat novel material which is heavy concrete with heavy iron nodules. Okay? And that's between the inner and outer shell.

What you see here is an over pack. This gray thing is then an over pack that goes over that, and it is bolted together along the center line and then bolted to the impact limiters.

Okay. The impact limiters are basically divided into compartments and they're filled with wood because wood is a very good energy absorbing material.

They had strain gauges on the cask cavity wall, on the outer liner and on the lid and bottom. And after the test, the idea was to compare this to computer analysis and do a leak test. The bottom line, the leak test is a pretty good test on whether you've held integrity.

This is just, again, the corner view of the deformation.

Okay. The second test was done --

CHAIRPERSON RYAN: One question if I may. There's a lot of deformation on the bottom of an impact limiter. Is there any deformation of the cask?

MR. EASTON: I don't expect any, but we haven't really seen the results yet.

CHAIRPERSON RYAN: Oh, okay. All right. Thanks.

MR. EASTON: And this may be the first of a series of tests, and we have representatives from the department Research going over in December.

CHAIRPERSON RYAN: So this is a work in progress.

MR. EASTON: Right, a work in progress, exactly right.

Okay. The second cask. This is the Mitsubishi's heavy industry cask. The other one was 182 tons with impact limiters. This one is a little lighter cask, 126 tons, with the impact limiters as 141 tons, designed to house 69 BWR assemblies in the inner basket. Heat load, 22 kilowatts per cask. Average burn-up fuel, 40 gigawatt days per metric ton. Twenty-two foot long with impact limiters and ten foot diameter. So it's a little smaller and a little lighter.

The impact limiter is honeycomb metal. Rather than wood it's a honeycomb metal. It has an outer steel shell, a neutron shield, and then a monolithic steel body. Okay? So there are different construction than you've seen before.

Here since I didn't have videos of them listing it, this is them lifting it. The reason I wanted to show you, this is an angle drop where they're going to drop it at about a ten degree angle. It's going to impact and slap down. Okay?

Okay. I missed the video here. Bear with me here. Modern technology, right?

Okay. We're back to the cask in the air. Okay. This is from -- well, what you would have seen is a clip from the German television station VOX, which is put up here for two reasons: one, so you can see the drop test itself, and the other to let you know that the German public has a keen interest in this area, and this was one that was televised.

Maybe we can get that video later. I don't know, but this is the cask after the drop test, and you can see the deformation on its impact limiter is greater than this and there's less space here. That means that the impact limiter came closer to being exhausted, if you will, absorbing the maximum amount of energy it could without engaging the cask directly.

And this is the side view of that same

cask on the most damaged end.

CHAIRPERSON RYAN: I would assume that was the end that hit first.

MR. EASTON: That's the end that hit second. The most damage --

CHAIRPERSON RYAN: It's knocked down, and that's where the energy is --

MR. EASTON: Right, right. It hits and then it slaps down, and that's where you get the most energy, and that's the reason for doing the test.

CHAIRPERSON RYAN: Okay.

MR. EASTON: So that's basically what I wanted to show you about the test. The Germans are pouring through the results right now, and we hope to be able to share with the Germans GAM, the results, and see what we can learn from these tests.

And with that I'll --

MR. BRACH: There's one thing I will add, that both the German CONSTOR cask and the Japanese Mitsubishi cask, neither of those casks are either reviewed and certifies by the NRC or are applications before us. The CONSTOR, the German designed cask, we've had over the last two years numerous pre-application meetings with the German designers on that cask application or on that cask, and in anticipation of an application to the NRC we had significant meetings going through a lot of the pre-test calculations, modeling and analysis on the CONSTOR.

On the Mitsubishi, we have had zero interactions with Japanese on that package design, but one thing I did want to identify. At least on the CONSTOR cask, I'm assuming perhaps on the Japanese cask as well, is that many of the same modeling and analysis techniques that are used by the Germans in their cask design, cask model and analysis are the same codes and same modeling approaches that are used domestically here in the U.S. in cask design and cask analyses.

So clearly from the standpoint of what we're looking to learn and gain from this testing, one, clearly as it might relate to an application before us, very particularly for the CONSTOR cask, but secondly, to the extent what we can gain and learn from the testing carried out in the ability to have pre-test modeling and predictions and compare that to actual physical tests and give us confirmation and information with regard to modeling capability and confirmation of that.

So as Earl mentioned, we do not yet have that information from the Germans, but it's being carried out, and so we're looking forward to that information when we receive it.

The last aspect of briefing that I wanted to give you an overview on is accompanying the National Academy of Science on a visit to the U.K., the NAS is carrying out a transportation study, a study actually sponsored by the NRC, the DOT, and DOE, and I believe EPRI as well.

And the objective of the study is to conduct an independent assessment and comparison of the risks of spent fuel transportation with other societal risks. The study began in May of 2003. It's a two-year study. We're anticipating completion of the study spring of next year.

One committee member from the NAS did participate in the entire PATRAM conference. Other members of the committee joined, came to Berlin near the end of that week of the PATRAM conference and were there to observe the Japanese cask testing as well, and then moving on to the U.K.

Now, why the visit to the U.K.? As I mentioned, the NAS is carrying out a study of spent fuel transportation here in the U.S., and they were very interested in learning what other countries are doing, and the purpose of the visit to the U.K. was to gain an understanding of the infrastructure in the U.K. in spent fuel transportation.

The NAS visited the Sellafield reprocessing facility. As you're aware, in the U.K. spent fuel is reprocessed. All of the spent fuel in the U.K. is sent to the Sellafield facility for reprocessing.

The NAS visited the cask receipt as well as the cask maintenance facility at the Sellafield site. It also visited the Carlisle headquarters of a company called Direct Rail Service. Within the U.K., there is one railroad company, Direct Rail Service, that's responsible for all of the rail movement and transfer of spent fuel in the U.K.

Will mentioned that the British Nuclear Fuels, Limited, BNFL, not only is the owner-operator of the Sellafield facility, but also is the owner-operator of the Direct Rail Services. So if you step back, BNFL in the U.K. as an entity is responsible for all aspects of the transport spent fuel management.

The NAS team also visited an intermodal transfer facility in Bridgewater outside of Bristol in the U.K. That's an intermodal transfer facility where spent fuel in casks is transported from truck from the reactor sites to this intermodal transfer point where the casks are literally and figuratively lifted by crane, lifted up off the track and placed on a rail car, and then by rail transferred on to the Sellafield site.

In the U.K., all spent fuel transport is carried out by dedicated trains run, again, by the Direct Rail Services, a single company.

The NAS also had an evening meeting with members of the stakeholders in the U.K., which included a range of organizations who are not necessarily supportive, if you will, of nuclear power and nuclear transport in the U.K.

From my perspective it was a very informative meeting. The stakeholders were clearly making a point that they safe that to be, if you will, part of the solution, they need to be part of process, and that they were actively engaged in working with BNFL on a host of issues, including spent fuel transportation.

They had pointed out that at one point BNFL had proposed a particular intermodal transfer staging area at one location, and by engaging all of the stakeholders in that process, they were able to work forward in identifying a resolution and path forward that was clearly acceptable both to BNFL and to the parties involved.

It was a very informative process, and BNFL saw that as an entity, and the stakeholders saw that as a very successful interaction.

Note on the overhead in addition to use of dedicated trains, BNFL has carried out what they call a safety review of all the routes that are used for transport of spent fuel by rail, and what that means is they have teams that have gone out and reviewed the condition and periodically, clearly, on the condition of the tracks where the spent fuel is transported, but also have looked at all aspects of overpasses, under passes, trestles, bridges with regard to safety issues and considerations and done a safety analysis for all of those routes.

One aspect I'll close with on this slide is I will note that a clear message that I heard, and that I believe the NAS heard as well, that in the U.K. if there are significant, clearly, amount of spent fuel being transported, that spent fuel transportation by rail in the U.K., while it's closely monitored and managed, is reasonably accepted as a routine activity. It really has a lot of attention, a lot of management focus, but it's a routine practice in the U.K.

Concluding remarks. Just a statement, if you will, that based on our engagement internationally, we clearly, as I mentioned before, in some of our support to the LEA on TRANSAS activities, we're looking to learn and gain from others. We feel fairly confident or very confident in the transportation programs and requirements that we have in place. We're clearly always looking to aspects where improvement can be made, risk informed information can be brought to bear, and new information as well.

And as noted in the last bullet, clearly we all, both internationally as well as domestically, have a responsibility to maintain that vigilance to insure the continued safety of transport.

And the last question, and this slide has already been up there once when we had a little trouble, but at this point, any questions we'd be glad to entertain.

I think, Ruth, maybe you also have some videos you wanted to show as well.

MEMBER WEINER: After we finish the question session, since we're pushing on time, apparently there are a couple of videos that operate on my computer and off of my Flash memory and nobody else's. I'll be glad to show them.

But for right now I'd like to move to questions. Allen.

CHAIRPERSON RYAN: Yeah. First of all, thanks for an interesting presentation. It's always interesting to see the tests at least in video if you can't get to them and be shaken apart or seeing them live.

How many casks do you have under review for licensing action now? New casks, whether it's high level waste or low level waste.

MR. BRACH: Well, we typically in our review have anywhere from 15 to 30 transportation packages under review.

As far as new spent fuel transportation casks, I believe the GNP -- anticipation of the GNS CONSTOR would be the only at this point new cask design that we're anticipating in the very near future.

There are, however, a number of amendments to existing cask design, and today while we're talking transportation, typically we're talking about dual purpose casks, that is, a cask that would we used both for storage of spent fuel at, for example, a power plant, as well as for eventual transport where the canister would be integral to both the storage and the transport.

CHAIRPERSON RYAN: Right.

MR. BRACH: There are, if I remember correctly, seven approved dual purpose cask designs. Each of those cask designs has had numerous amendments to those casks to support different fuel needs at different power plants. Sometimes longer fuel, BWR/PWR fuel, thermal loadings of the canisters, different enrichments of material have all resulted in numerous amendments to those casks

The actual number, I don't have the number, but it would typically have in the neighborhood of 15 to 30 --

CHAIRPERSON RYAN: Significant amendments would you call them?

MR. BRACH: Some are very significant, especially as we're looking at cask applications where higher burn-up, higher thermal loading of the canister is being requested or where burn-up credit, for example, is an element being considered. So those are from a technical complexity standpoint marked more complex.

Other amendments you can clearly imagine have some varying degrees of complexity, but some that involve high burn-up fuel and burn-up credit are very complex.

CHAIRPERSON RYAN: How about in the non-fuel area?

MR. BRACH: The non-fuel area, the non-spent fuel area --

CHAIRPERSON RYAN: Right.

MR. BRACH: -- we have quite a heavy case load. That's to support whether it be fabrication of fuel for reactors, fissile material shipments of fresh fuel, say, from a fuel facility to a power reactor; numerous new cask designs for transport of fresh fuel assemblies in the byproduct arena, Part 30, if you will, fuel Part 30 series arena; or transport of cobalt and other materials that are used both in nuclear medicine applications and industrial applications. We have a significant work load with regard to non-spent fuel.

CHAIRPERSON RYAN: Irradiated hardware and things of that sort from power plants as well for low level waste disposal?

PARTICIPANT: Yeah, if it's enough activity.

CHAIRPERSON RYAN: Yes. There's a couple of Type B packages out there zooming around now, but you know, I guess I'm just curious to get a general sense that are all of these kind of updates and changes in new casks because of evolution of technology or the changing environment that the IAEA regulations brings to us or both?

MR. BRACH: It's a little bit of both. In the spent fuel arena, it's principally driven by I'll say the industry's needs for storage and eventual transport of spent fuel that is of higher burn-ups and perhaps trying to look to optimize cask loadings --

CHAIRPERSON RYAN: Sure.

MR. BRACH: -- with regard to content.

In the non-spent fuel arena, clearly there are aspects of the changes in the international transportation standard that I mentioned before in the grandfathering or transitional arrangements it's kind of a sliding continuum; that some of the older package designs for non-spent fuel based on the change in the rules and requirements -- well, there's a staggered time frame, but may no longer be certified or available for use. So that's resulted in an evolvement in development of new packages.

And oftentimes with the evolvement in development of new packages comes improved uses of different materials and different designs, a change in a number of different aspects.

CHAIRPERSON RYAN: Thanks. That's an interesting summary. I appreciate it.

MEMBER WEINER: Jim, I have a couple of questions. The first one is could you just briefly outline what NRC's role is in transportation. this is just to clarify for our records.

MR. BRACH: NRC is responsible for the review and certification of all Type B packages. A Type B package is a package that transports radioactive material of certain specified amounts.

A Type A package, which is the category, if you will, below that, those packages are reviewed and approved by the Department of Transportation.

We also have responsibility for review and approval of all transportation packages containing fissile materials, and that would be special nuclear material. The example I used before, for transport of fresh fuel from a fuel fabrication facility to a power reactor would be an example of a second category.

We also in the spent fuel arena, not my office, but the office of nuclear security and instant response, has the responsibility for the review and approval of transportation routes and security plans that are used to assure the security of the transport of spent fuel.

MEMBER WEINER: Let me clarify that. So as far as routes are concerned, your office is responsible for safety and security, but not for -- does it end there with security concerns?

MR. BRACH: Well, Spent Fuel Project Office, our office, has responsibility for the safety aspect, if you will, of transportation. The review of routes from a security perspective and security plans is an NRC responsibility. That responsibility rests with the Office of Nuclear Security and Incident Response, NSIR.

MEMBER WEINER: I see. Okay. Since the analyses of these tests are still being done, do you have any idea how these compare to the analyses that were published in NUREG CR-6672 or in the modal study or any of the other studies that have analyzed damage to Type B casks?

MR. BRACH: We don't have the results yet. So I'm not in the position to say how they compare, but I had mentioned before, Dr. Weiner, a number of the modeling analyses and techniques, ANSIS (phonetic) code is an example. A lot of the same modeling and analysis techniques that were used in the pre-test calculations for the CONSTOR cask for which the physical tests will be compared to are the same modeling and analysis techniques that are used here in the U.S. by the cask designers.

But we don't have the results yet to say how the analyses compared, but the methods and analysis of computations are very similar.

MEMBER WEINER: So you would expect to get some comparisons actually.

MR. BRACH: Earl has been in touch with them. We are expecting hopefully in the next year, early part of the next year, to receive some of that information.

MEMBER WEINER: Do you see any difference or any substantive difference in protection using the DU lined and lead lined steel, lead steel or steel DU, steel casks and using what the CONSTOR uses, which is concrete with iron nodules?

MR. BRACH: Let me look to Earl for a little help on that with regard to --

MEMBER WEINER: Do you get the same external dose or better, worse?

MR. EASTON: Well, of course, they're designed to meet the same regulations. So the expectation is that they have the same performance.

I think one of the things we'll learn from CONSTOR is how well our codes can model materials, such as concrete with iron nodules in them, which is a unique design compared to what we do. So there may be some things to learn from that.

CHAIRPERSON RYAN: These iron nodules, you're making a ball this big with your hand. Do you mean big, huge slugs or do you mean relatively fine powder or beads?

MR. EASTON: No, they're nodules. I wish I had brought a picture. I do have a picture, but don't quote me too literally, but if you look at it, it looks like a chocolate chip cookie.

CHAIRPERSON RYAN: Got you.

MEMBER WEINER: Okay. With the iron being the chocolate chips?

MR. EASTON: Yeah, being the chips, yeah. So I think we have to see how well those models do with those materials.

MEMBER WEINER: Yeah, you can just see that.

Did you gain any perspective on the future of testing programs in the United States, what we're going to do, what you would recommend be done?

MR. BRACH: That's a difficult question to answer in a broad sense, but the short answer is yes. Also Earl had mentioned Office of Research within the

NRC has our lead for the package performance study. Office of Research has staff that are going to Germany next month or they're going to be in Europe for a number of reasons, but they'll be visiting the Germans at BAM, a meeting of the folks that operate the facility and talk to them about the test capabilities and test plans that they have as well.

There's clearly a broad interest not only just here in the U.S. on cask and cask testing, but also internationally with regard to cask testing, especially of full scale casks, and the two demonstrate tests that were carried out with PATRAM are some of the first that I'm personally familiar with with regard to full scale regulatory testing of a cask.

MEMBER WEINER: Our concern, the concern of the committee has been that when tests are done that there is new technical information, that these tests have technical value, and I'll just leave you with that thought.

Anyone from the staff have questions?

(No response.)

MEMBER WEINER: No? Anyone else? Any member of the audience? Questions, comments?

(No response.)

MEMBER WEINER: Hearing none, I'll turn the meeting back to the chair.

CHAIRPERSON RYAN: Thank you, Ruth.

Thank you very much, both, for an interesting presentation. It's nice to get the update. It sounds like you've got lots of good work to do.

MR. BRACH: Thank you.

CHAIRPERSON RYAN: Okay. Thanks.

On our agenda, I guess that closes out our morning session. Are there any other comments?

Oh, you wanted to show your videos, Ruth?

MEMBER WEINER: If anybody wants to stay to see the videos, we're going to try them.

PARTICIPANT: It's crash and burn.

MEMBER WEINER: Yeah, it's crash and burn. It is.

CHAIRPERSON RYAN: Okay.

MEMBER WEINER: We're not sure we can get this going.

CHAIRPERSON RYAN: So far no.

MEMBER WEINER: So far no.

MR. HAMDAN: I thought you promised.

MEMBER WEINER: Well, if you want to come see it on my computer, okay.

CHAIRPERSON RYAN: Okay. Well, we'll be formally adjourned.

(Whereupon, at 12:45 p.m., the meeting was recessed for lunch, to reconvene at 2:00 p.m., the same day.)