Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

Title: Advisory Committee on Reactor Safeguards
589th Meeting

Docket Number: (n/a)

Location: Rockville, Maryland

Date: Thursday, December 1, 2011

Work Order No.: NRC-1301 Pages 1-308

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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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589th MEETING

+ + + + +

THURSDAY

DECEMBER 1, 2011

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ROCKVILLE, MARYLAND

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The Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Said Abdel-Khalik, Chairman, presiding.

COMMITTEE MEMBERS:

SAID ABDEL-KHALIK, Chairman

J. SAM ARMIJO, Vice Chairman

JOHN W. STETKAR, Member-At-Large

SANJOY BANERJEE

DENNIS C. BLEY

CHARLES H. BROWN, JR.

MICHAEL L. CORRADINI

COMMITTEE MEMBERS (CONT.)
DANA A. POWERS
HAROLD B. RAY
JOY L. REMPE
MICHAEL T. RYAN
WILLIAM J. SHACK
JOHN D. SIEBER
GORDON R. SKILLMAN

NRC STAFF PRESENT:
WEIDONG WANG, Designated Federal Official
DEREK WIDMAYER, Designated Federal Official
CHRISTINA ANTONESCU, Designated Federal Official
BRIAN ANDERSON
STEPHANIE DEVLIN
GARY STIREWALT
PRAVIN PATEL
TONY BOWERS
DAN BARSS
GREGORY SUBER
MAURICE HEATH
CHRISTIANNE RIDGE
JAMES KENNEDY
JAMES GASLEVIC

MARK KOWAL

NRC STAFF (CONT.):

EARL LIBBY

MIKE SPENCER

JIM BEARDSLEY

JOHN TAPPERT

TOM FREDETTE

ERIC A. OESTERLE

ALSO PRESENT:

JOHN ELNITSKY

BOB KITCHEN

VANN STEPHENSON

PAUL RIZZO

A.K. SINGH

JOHN COCHRAN

LINDA SUTTORA

RUSSELL BELL

T-A-B-L-E O-F C-O-N-T-E-N-T-S

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

8:30 a.m.

CHAIR ABDEL-KHALIK: The meeting will now come to order. This is the first day of the 589th meeting of the advisory committee on reactor safeguards. During today's meeting the committee will consider the following:

1, Levy County Units 1 and 2 Combined License Application; 2, revised Branch Technical Position regarding Concentration Averaging and Encapsulation of Low-level Radioactive Waste

3, proposed requirements for maintenance of inspections, tests, analyses, and acceptance criteria, and the associated regulatory guide; and 4, preparation of ACRS reports.

This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Mr. Weidong Wang is the designated federal official for the initial portion of the meeting.

Ms. Linda Suttora, from the Department of Energy's Office of Environmental Management, has requested time to make an oral statement on the revised Branch Technical Position regarding Concentration Averaging and Encapsulation of Low-level

Radioactive Waste.

We have also received a written comment from Mr. J.K. August regarding the proposed requirements for maintenance of inspections, tests, analyses, and accepted criteria, and the associated regulatory guide. His comments will be placed in the record.

There will be a phone bridge line. To preclude interruption of the meeting, the phone will be placed in a listen-in mode during the presentations and committee discussions.

A transcript of portions of the meeting is being kept. And it is requested that the speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so that they can be readily heard.

At this time we will go to the first item on the agenda, Levy County Units 1 and 2 Combined License Application. Mr. Ray will lead us through that discussion. Harold.

MEMBER RAY: Thank you Mr. Chairman. And this now represents another step along the way of the application of the AP1000 DCD. We had the Vogtle Reference COLA, which is applied at a brownfield site.

It had an ESP, then followed that with a subsequent COLA for the Summer site, which was sort of brownfield, without an ESP. And now we'll be looking at a greenfield site, also without an ESP.

The application, as you'll hear, conforms with the envelope created by the DCD and the reference COLA. There are a couple of things I'd like to mention before we get started.

We had a subcommittee meeting on October 18th and 19th. And we've not had an opportunity for any follow up until this full committee meeting, based on the progress that was made then.

There will be a few items that we may touch on here, just for the purpose of getting into the record the response to the dialogue that we had at that time.

There is a interesting foundation condition here at the site that will be discussed at some length. It involves a seismic Category 1 structure that's outside the DCD, that involves the foundation area of the plant.

And so I invite your attention to that in that it's unique as far as I know to this plant, as far as nuclear plant applications go. But it has other applications that will be talked about.

We had the benefit of Bill Hinze

throughout the subcommittee meeting and afterward. Quite a lot of dialogue on several things related to his area of expertise related to seismicity and geology.

Among the things that I'm hoping will get in the record here, which we've seen in response to comments we made at the subcommittee meeting, is a topographic map of the bedrock surface, which we discussed during the subcommittee meeting.

And that is valuable in addressing a potential for any faulting in the site area itself. That's been provided and we want to incorporate that in the record that we'll have at this meeting here.

With that I think that we talked also about seismic source model, which has been fully addressed adequately. And otherwise there isn't anything that I would invite your attention to that's particular to this site location.

It's a very good site as far as most of the things that we concern ourselves with. There's been a new reg guide issued. I think we'll have occasion to talk about, having to do with hurricane-produced missiles. We'll see how that discussion goes.

And with that I think I've covered the

ground I'd like to invite your attention to. I'll turn it over to Brian to see if you have any comments before we ask the applicant to come forward.

MR. ANDERSON: Good morning. This is Brian Anderson. I'm the lead safety project manager for the Levy County COL Application Review. The staff has prepared presentations as part of this morning's agenda.

But I just wanted to make one comment and highlight for the committee that as of this morning the Office of New Reactors has completed a reorganization change. I'd like to introduce Mr. Mark Tonacci, seated with me here to my left. Mark is the new Chief of the AP1000 COL Projects branch. Thank you.

MEMBER RAY: Thank you. And with that I think we'll invite the applicant to come forward and commence the presentation.

MR. ELNITSKY: Good morning. My name is John Elnitsky. I'm the Vice President of New Generation Programs and Projects at Progress Energy. In that regard I'm responsible for the construction, licensing and development of the Levy Nuclear Power Plant project.

I'm going to give you a brief overview

this morning for the members of the committee. And then Bob Kitchen, on my left, our licensing manager, and Vann Stephenson, on my right, our engineering manager, are the guys that really do all the hard work here.

Are going to walk you through the highlights of the Final Safety Analysis Report and the presentation that we provided to the subcommittee on October 18th and 19th.

Levy is a greenfield site. It's a site that Progress Energy selected for new nuclear generation from about a dozen different possibilities in the State of Florida.

We went through a rigorous evaluation. I'm going to lose my tent here, sorry. A rigorous evaluation of various sites. And looked at many advantages from a power generation perspective.

In August of 2009, after a public hearing, the Governor of Florida and his cabinet approved the Levy site for the selection of two AP1000 nuclear power plants.

That was part of what's called Conditions of Certification process that we use in the State of Florida. The company, Progress Energy, submitted our Combined Operating License Application in July of 2008 to the NRC. And it was docketed for acceptance and review in October of 2008.

The initial license is based on the AP1000 DCD Rev 16, but has been updated to reflect revision 19 with our most recent COLA update that we submitted on October 4th of 2011.

Our application has no departures or exemptions from Tier 1 material in revision 19 of the AP1000 DCD. And we've maintained the standard design through our continued involvement in the design-centered working group.

Nuclear power is just one element of Progress Energy's balanced solutions strategy to provide reliable power to our customers in the State of Florida.

We continue to pursue a strategy for contracting and construction of Levy that will enable us to rely on the expertise of the industry at a reasonable cost.

We initially signed an engineering procurement and construction contract at the end of 2008, in December of 2008. However, in April of 2010 we modified that contract to change the in-service dates for the first unit to 2021 and the second unit to 2022.

The planned in-service date of 2021 for that first unit supports our generation needs in Florida. And the time line extension will allow Progress Energy to complete the licensing process and benefit from the construction experience of other companies that have already begun construction of new nuclear plants.

The proposed Levy County nuclear project is expected to generate about 3400 construction jobs at its peak in Florida. And approximately 800 permanent jobs at the plant.

Carbon free nuclear power additionally will further improve Progress Energy's fuel diversity. And we estimate that Floridians will benefit from up to about a Billion Dollars per year in fuel cost savings as a result of the nuclear power plant operation.

We also estimate, depending on carbon legislation, that we would save customers approximately 500 million dollars per year and avoid a carbon emissions cost.

There are many reasons that the Levy project is important to Progress Energy and the State of Florida. And this meeting is a significant milestone for our project.

As mentioned by Member Ray we did meet with the subcommittee on October 18th and 19th and have addressed the questions identified at that meeting. We have our staff here today ready to present the license application so that you'll be able to find reasonable assurance that Levy can be built and operated without undue risk to public health and safety.

And we look forward to the successful completion of the licensing process and the ultimate start of construction activities. Finally, I'd like to say we appreciate the significant effort that the NRC staff.

And I'd like to call out particular our project manager Brian Anderson and his efforts as well as the ACRS and subcommittee put in to reviewing our combined operating license application. Staff review has been extensive and thorough and accomplished with the highest degree of professionalism.

Subject to your questions, we'll turn over our presentation to my licensing manager, Bob Kitchen, who'll walk through some of the specifics of our site. All right, Bob.

MR. KITCHEN: All right. Good morning. I'm Bob Kitchen, as John mentioned, the licensing manager. And as Member Ray pointed out Levy I think is the first greenfield site that the committee has looked at.

So you'll probably take just a few minutes and that we're clear on the site and some of the features that we'll touch on as we talk through it. John is, we've already shown the location of Levy on the map earlier.

You can see down on the right corner there the Levy County location in Florida. And then the main part of the slide there is just a blow-up of the site showing the features.

Levy is located here, obviously in Levy County. And proximity also to a nuclear plant that we have in operation in Florida. Crystal River 3 nuclear plant, which you can see here. The distance, direct line between the plants is about nine and a half miles.

So that presents some features we'll talk about later in terms of emergency plan zone, overlaps, et cetera. But it also has some advantages we think in terms of the plants.

Also some features here, you can see the main thoroughfares. Highway 19 runs more south and Highway 40 of course runs east west. And just a few of the roads that you can see around the plant that would tie in for evacuation purposes. And also for access to the site.

Also a feature here you can see that's called the Cross Florida Barge Canal. You may be familiar with this. This was a project some years ago that was intended originally to cross, as it says, cross the entire state of Florida for commerce.

And this is as far as it got, Lake Rousseau, until the project was terminated. So it provides some features that we think benefit Levy. We plan to use it for transporting material, for example, up the barge canal.

We will be putting a barge slip. And I'll show pictures of this here in just a minute. A barge slip about this location. Where we can then transport material offloaded from the barge to the site.

Also even more directly for plant operation, the barge canal is a source of water for cooling to the cooling towers for the plant site, which of course is, the source is the Gulf of Mexico.

So the cooling towers at Levy are mechanical draft cooling towers, salt water cooled. And we'll show you that as well. The site is located eight miles inland from the Gulf of Mexico, which in terms of, Member Ray mentioned hurricanes.

And eight miles, if you've ever been in hurricanes, is quite a ways, as opposed to being on the coast. It makes a big difference. So we're located eight miles inland. The site elevation, actually the natural grade is about 43 feet. But in terms of, thinking in terms of flood we plan the site design grade to be 51 feet.

So we, as part of our licensing evaluations of course, we evaluated the site for probable maximum precipitation, probable maximum hurricane, probable maximum surge, probable maximum tsunami, et cetera.

In terms of all flood analysis, and the site does not flood with plenty of margin in terms from these threats. This is an aerial photograph of the site. You can see the map that we just left here on the left corner. Just an aerial photograph of the site.

The yellow boundary here is the property that you would consider the Levy site. We also have purchased property to the south here. So when you combine these totals, well actually the Levy site is 3,100 acres. And the site below is about 2,000. Sum total we have about 5,000 acres of site property that we could use for development.

You see the Levy site here. And I've got a better layout picture than this that you can see a little more detail. But this is Unit 1 located right here in the center.

Unit 2 just to the north with the switchyard off to the east. And you can see the mechanical draft cooling towers located here. We've also purchased some parcels of land just to the west. An area here we call triangle area. But that's where we would locate, for example, visitor center, training building, support buildings.

And then the larger tract of land here, which we actually purchased for an access road. So the access road would by off Highway 19 through this area into the plant site proper.

MEMBER STETKAR: Bob, I didn't have the opportunity to sit in on the subcommittee meetings. And I was trying to look forward in your presentation here. I haven't seen it. Could you show on this map where the transmission lines that connect to your switchyard. Directions and how many.

MR. KITCHEN: I'll show that a little better picture here in a minute. But --

MEMBER STETKAR: Okay, fine.

MR. KITCHEN: -- I'll introduce that some with this. Got a quarter here that just is partial land to the south. Actually you can see the switchyard and our transmission lines run basically to the south. And then divert to the south over the main transmission grid.

MEMBER STETKAR: All of them go through the same corridor?

MR. KITCHEN: Yes, sir.

MEMBER STETKAR: How many of them are there?

MR. KITCHEN: There's four --

MR. ELNITSKY: Four 500 KeV circuits.

MEMBER STETKAR: Total of four?

MR. ELNITSKY: Yes.

MEMBER STETKAR: Okay. Thank you.

MR. KITCHEN: We also use this corridor for pipeline, blowdown pipeline as well as the intake. And it's also used during construction as a heavy haul pad, which I'll show a little bit better picture of here later.

This is an aerial photograph of the site, just to give you, you know, a picture of what does the site look like. The site was used for over 100 years for civil culture. You can see the furrows here on the land.

This is a picture looking to the west. And you can see Levy Unit 1 and2 locations. This is the intake structure. Excuse me, the barge canal where we have proposed the barge slip. You can see the location here. And then our intake structure will be located, thank you.

Our intake structure would be located just in this location. The structure you see here is existing. It's for the Inglis Loch. It's a loch to pass from Lake Rousseau to the barge canal.

And actually it's not used any longer, but it's a structure that remains there. It's not used for any purpose other than as you can see, just as a loch without boat passage.

Our plans would be to put in a heavy-haul road from this barge slip, which would basically come up across this spit of land. And then to the north on the site. That was just to give you a perspective here.

You can see in the corner, this is the Crystal River Energy Complex, which includes one nuclear plant. Then again, it's about nine and a half miles straight line to the site.

Same picture again in terms of the map.

But I wanted to show you, this is just a cartoon, literally, of the blowdown pipe. The blowdown pipe has a run from the Levy plant. Basically the total run of pipe is about 13 miles through our Crystal River Energy complex.

We had looked originally at using the barge canal for discharge. And frankly you get into problems there with having to pipe it across the seagrass, which is at the mouth of this barge canal, which is --

MEMBER CORRADINI: Across the what? I'm sorry.

MR. KITCHEN: Seagrass. Which is a very environmentally sensitive --

MEMBER CORRADINI: Okay.

MR. KITCHEN: -- area. So that avoiding that we avoid impact to the seagrass and environmental area right at the mouth of this barge canal. And then also because of the shallowness of the Gulf we would have had to pipe this a considerable way.

So we've established a route, as you can see to the south. And actually we've changed the route from what is shown here. We're going to avoid some wetland impacts we're going to actually run the blowdown pipe a little further inland here.

But down to our Crystal River station. This is the intake canal for the Crystal River station. This is the discharge canal for the Crystal River station.

And our plan would be that that pipeline that I showed you basically the general routing for, would discharge into the Crystal River discharge at about this location.

Now in terms of flow, it's a very small amount of the flow. If you look at it, it's less than five percent of the total discharge. So in terms of the impact, it's minimal.

So we think it's really a better solution in terms of integration of our impacts in that area. This is a layout I think maybe shows a little more clearly for you where things are located.

Again, Unit 1 and Unit2 locations here. The units are located 950 feet apart in terms of unit separation. The unit location and orientation was chosen for a couple of reasons.

Primarily looking at what we thought were the better geologic conditions and based on our initial investigations. And also to minimize environmental impacts on wetlands.

We have some ponds you can see here.

There's actually three ponds that are really just storm drainage control around the site. The switchyard located here.

And there was a question earlier about the transmission lines. Maybe a little clearer here. You can see the transmission line routing down the path. And just on the earlier map goes straight to the south. The heavy-haul road and pipeline corridor would also share that same route.

MEMBER STETKAR: Bob, you said that --

MR. KITCHEN: Yes, sir.

MEMBER STETKAR: -- the units are about 150 feet apart?

MR. KITCHEN: No, sir. Nine hundred.

MEMBER STETKAR: Oh, 900. I'm sorry.

MR. KITCHEN: Yes, we'd be in trouble --

MEMBER STETKAR: I misunderstood. I was going to ask, there's no concerns because of the orientation and about unfavorable orientation for --

MR. KITCHEN: We did look at the unfavorable orientation in terms of turbine missile. And in terms of distance, which are a lot of factors there in terms of missile that also crane, because we use cranes during construction. And I think the minimum separation allowed is 800 feet. We're at 950 feet.

MEMBER STETKAR: Yes. I misunderstood you.

MR. KITCHEN: I'm sorry. I should have spoken more clearly.

MEMBER STETKAR: Thank you, that's why.

MEMBER SIEBER: Your met tower on the previous slide. How far is that from the Unit 1 cooling tower roughly?

MR. KITCHEN: I don't remember that distance. I don't remember the distance, sir.

MEMBER SIEBER: It looks like it's more If the scale, if I get the scale it looks like it's more than 1000 feet.

MR. KITCHEN: It's considerable distance. And I don't remember the exact distance to answer your question directly.

MEMBER SIEBER: Okay. How high --

MR. KITCHEN: But in terms of the siting of it, it is sited in terms of minimizing impact from, for example, surrounding trees or other impediments to wind measurement. And also in terms of impact from the operational plant.

MEMBER SIEBER: How high will it be?

MR. KITCHEN: The met tower is, actually

they're now, Paul, do you remember the height?

MR. RIZZO: Sixty meters.

MR. KITCHEN: Sixty meter height to the met tower.

MEMBER SIEBER: Okay. And the cooling tower is how high?

MR. KITCHEN: Those are 200 feet, excuse me, 70 feet for the mechanical draft cooling towers, 70 feet.

MEMBER SIEBER: Okay. Thank you.

MEMBER SKILLMAN: Question please. I'm Skillman. My question is, you've got four 500 KeV circuits. Do you have any other auxiliary power circuits coming in from a different direction?

MR. KITCHEN: We do not.

MEMBER SKILLMAN: Okay. Thank you.

MR. KITCHEN: There was a question that the subcommittee asked us about operations. We've mentioned in the saltwater environment and with the, you know, potential impacts from salt and is a indicated concern about where that might be.

In our previous experience of course we have coastal plants in North Carolina, coastal plants in Florida. Actually at the Crystal River station we do have some mechanical draft cooling towers that we use in terms of similar technology. Those are helper towers so they don't run all the time.

But in terms of salt, actually our experience has been that the more challenging is just the salt environment as opposed to the cooling tower. And we've over the years have learned, you know, it's important to coat the insulators with a silicon coating, which we've applied to our insulators.

We would apply the same approach at our Levy station. We do periodic inspections to make sure we can verify the conditions of the insulators from potential salt deposition. And then reapply coatings if required. We could also wash down the insulators even while energized.

So I believe in terms of the question in terms of operation, our experience. We have experience in this type of environment and I believe we can manage it very well.

MEMBER STETKAR: Bob.

MR. KITCHEN: Yes, sir.

MEMBER STETKAR: You own the switchyard? Who owns the switchyard?

MR. KITCHEN: We do.

MEMBER STETKAR: You do? You own the transmission lines also?

MR. KITCHEN: Yes, sir, fully integrated.

MEMBER STETKAR: Okay.

MR. ELNITSKY: What do you mean by own those, sir, just to make sure we're clear?

MEMBER STETKAR: Responsible for operations, maintenance and so forth.

MR. ELNITSKY: Yes. That's correct.

MEMBER STETKAR: You don't have to interface with another organization?

MR. ELNITSKY: No, no. All part --

MEMBER STETKAR: What I was leading to was, you know, you have a nice picture of somebody spraying down insulators. That's okay if, you know, within the scope of your ownership you can control that. If somebody else owns the high lines going out from the plant, you know, you have to make sure they're maintained in a similar manner, so.

MR. KITCHEN: Right.

MEMBER STETKAR: Thanks.

MR. KITCHEN: That's it in terms of the site overview just to get everybody's perspective and understanding of where we're at in the greenfield site itself. And we'll talk a little bit more about the emergency planning features.

Actually additional site overview we're

going to go through the geotech and foundation design, which I think as Member Ray indicated would be of interest. And also emergency planning.

And then of course, the questions we have along the way. Vann Stephenson who's our general manager engineering is going to talk about the site characteristics and foundation.

MEMBER RAY: Before Vann begins, Bob, a ministerial question that's been puzzling me. We refer to it as the Levy Nuclear Plant on here and Levy County Units 1 and 2 on here. What do you prefer?

MR. KITCHEN: Levy Nuclear Plant. But we should be consistent.

MEMBER RAY: Well, I just have to put it down the way you want it in the letter here. I had to choose between the two. You could do it both ways.

MR. KITCHEN: Levy Nuclear Plant.

MEMBER RAY: Thank you.

MR. STEPHENSON: Thanks Bob. I am Vann Stephenson the engineering manager responsible for the Levy Nuclear Plant project. I'm going to give an overview this morning of the site characteristics and the foundation design concept for the Levy site.

Before I get started a couple of individuals in the audience I'd like to point out, Dr.

Paul Rizzo from Rizzo and Associates and Dr. A.K. Singh from Sargent & Lundy.

Both of these individuals were key in pulling these sections of our COL application together. So if there's any questions that come up and we need their help, they're here to help us answer those questions.

Okay Bob. This slide, as Bob showed on the layout of the plant. This shows the orientation of the two AP1000 units at our Levy site. The red dots indicate the locations of the geotechnical borings that were part of the original site characterization.

The site was characterized in accordance with Reg Guide 1.132. We used literature and map reviews, surface investigations, groundwater investigations.

We installed 16 groundwater monitoring wells in addition to our subsurface investigation program. And that consisted of 116 borings as you see on this slide.

They varied in depth between 45 and 500 feet deep. And 43 of those are under safety-related structures for the AP1000. That is the nuclear island.

Okay, Bob. This shows a typical sub-surface profile at the Levy site. As Bob mentioned, the existing grade at the Levy site is elevation 43 feet above sea level.

As you'll notice on the slide, during our investigation and our site characterization, we came up with a profile for the site. The top 67 feet is a undifferentiated sediment and weathered Avon Park.

Once we got down to 67 feet we really came up with a consistent competent Avon Park dolomitic limestone. So this is the elevation that we'll excavate down to, to actually install our nuclear island foundation.

During the original site characterization, we did encounter some isolated zones of low recovery. These were determined by review of our boring logs, looking at rod drops, drilling fluid losses, core recovery and our rock quality.

In addition we looked at our excess grout takes that we had when we were refilling the holes. During further investigation to better understand these areas of low recovery, we really undertook two additional programs, a grout test program and an offset boring program.

The grout test program we really were

trying to verify that we had accurate and conservative takes that we had measured during the original boring program with filling the holes.

And this grout test program, actually we drilled holes and we injected some grout under minimal pressure to insure we got movement of the grout down into the sub-surface.

And we did find that our grout measurements from our grout test program did correlate well with the grout takes that we saw during the original site characterization program.

The other benefit from the grout test program, and I'll get to it in just a minute in a little bit more detail, is we do have a dewatering scheme that we'll have to put in place for excavation of our nuclear island for the foundation installation.

So we'll be forming a routing zone possibly 75 feet thick into the top of the Avon Park layer that I showed you later. And I will get to that in more detail a little bit later. But this was another validation that we would get a low probability area by doing this grouting design that we had put in place.

VICE CHAIR ARMIJO: I just want to be clear. The grout take means the recovery of the core, how much of the core --

MR. STEPHENSON: No.

VICE CHAIR ARMIJO: -- from your drilling you would cover?

MR. STEPHENSON: No.

VICE CHAIR ARMIJO: What does it mean?

MR. STEPHENSON: When we drilled the holes we had some areas that we had some low recovery. So we wanted to postulate and see if we had any kinds of voids or karst in the area.

VICE CHAIR ARMIJO: Okay.

MR. STEPHENSON: So we put grout into the hole. And so the grout flow into the hole, any excess grout that went into the hole, we call that grout take.

VICE CHAIR ARMIJO: Okay. So it means there were other voids somewhere else in the vicinity of the hole.

MR. STEPHENSON: That's right.

VICE CHAIR ARMIJO: Okay.

MR. STEPHENSON: That's right. We were just trying to measure to verify what kind of dimensions we were going to have as far as any karst or void features may go.

Okay. We also undertook an offset boring program. And for this we went next to the holes where we had low recovery. And we really wanted to focus on understanding what was in these zones. And maximize the recovery from this offset boring program.

So we used a larger diameter core barrel for doing the drilling. We decreased the drilling times and the drilling speed to ensure that we could get recovery.

We also changed our drilling fluid. Because one of the things that we had postulated during the original boring program was, we used a high pressure water as our lubricant, that we had washout as we went down recovering our core.

So we changed our fluid. We changed our fluid pressure for drilling for the lubricant. And we did get much better recovery. And I'll actually cover that a little bit more in the next couple of slides.

Okay. This is a picture of a five foot section of core from our offset boring program. And this was drilled five feet. We call it offset because we actually offset five feet from an existing hole where we had low recovery.

And this was offset from the existing hole A-21, which is on the west side of the Unit 1 nuclear island. This was 180 to 185 feet deep in elevation.

But you can see we had 100 percent recovery of this core during the offset boring program.

And actually Stephanie Devlin has a piece of the core that she'll have up or maybe pass around. You can see how competent the core was in this Avon Park.

And we compared that to what we had documented during the original site characterization for A-21 hole. And it was 40 percent. So we had 100 percent recovery in this location compared to the 40 percent recovery that we had during the original site characterization, due to the more controlled drilling methods we used.

MEMBER BANERJEE: What are the dimensions there? I can't see the scale.

MR. STEPHENSON: You mean the diameter of the core?

MEMBER BANERJEE: Yes.

MR. STEPHENSON: It's a four inch core barrel. I think the diameter, Paul, was about three inches.

MR. RIZZO: Two and 7/8ths.

MR. STEPHENSON: Two and 7/8ths.

MEMBER BANERJEE: Two and 7/8ths.

MR. STEPHENSON: Okay? Okay, Bob. Two and

7/8ths inches, yes. Okay. This is another comparison of the core recovery between offset boring hole and original site characterization hole. This was offset boring hole number 2.

And it was offset five feet from 14-A, which was also at Unit 1 in the southwest corner of the nuclear island. Just to kind of orient you for this graph, it's a little busy.

On the left hand axis you see zero. That's zero percent recovery. The far right side with one is 100 percent recovery. The yellow line represents the recovery that we saw during the original site characterization at the 14-A hole. And the red line indicates the recovery that we received during the offset boring program.

As you can see, during the original site characterization our recovery varied between zero and 100 percent at depth. And for the offset boring hole we varied between 60 and 100 percent, with the majority of the hole being between 90 and 100 percent recovery.

So again it just shows that in comparison for all of our offset boring holes we had much better recovery than we got during the original boring program. Okay?

MEMBER RAY: They changed the technique, methodology --

MR. STEPHENSON: That's right.

MEMBER RAY: And the bottom line is you've got good data now.

MR. STEPHENSON: That's correct. However, that's a good segue into this next slide.

VICE CHAIR ARMIJO: Before you go to that.

MR. STEPHENSON: Yes.

VICE CHAIR ARMIJO: The deepest drill locations, down to 200 and some feet. You actually had some zero recovery in your initial --

MR. STEPHENSON: That's correct.

VICE CHAIR ARMIJO: -- condition. And that's where I guess you would expect that you'd have better quality.

MR. STEPHENSON: I think what we saw during the drilling is that we did have some areas, very small areas, where you did have some weathered Avon Park in small pockets.

And this is probably a location where that situation existed. And you can see from the offset boring hole in that very same location we basically got 95 percent recovery.

VICE CHAIR ARMIJO: Okay. So that was

right near it, using --

MR. STEPHENSON: Five feet away.

VICE CHAIR ARMIJO: -- milder lubricant?

MR. STEPHENSON: That's correct.

VICE CHAIR ARMIJO: Okay.

MR. STEPHENSON: And we possibly got some washout from our drilling fluid in the original site characterization.

MEMBER SKILLMAN: Is there a way that you could determine that you had not punctured the edge of a aquifer or some underlying water that was at that depth?

MR. STEPHENSON: Paul, you want to address that question?

DR. RIZZO: The --

VICE CHAIR ARMIJO: Stand up and identify yourself.

DR. RIZZO: I'm Paul Rizzo, consultant to Progress for the foundation engineering. The entire site is overlaying one aquifer at that depth. And when we drilled through we encountered water the entire way associated with that aquifer.

And we hit zones. These low recovery zones that Vann is referring to are zones where there was weathering. The limestone had weathered or the drilling technique was such that we went to fast, there was too much pressure, we washed it out.

We went back with the offset boring with different techniques and a larger core barrel. We were able to counteract those difficulties. Did I answer your question, sir?

MEMBER SKILLMAN: What you told me is the site is over an aquifer.

DR. RIZZO: Yes, sir.

MEMBER SKILLMAN: Thank you.

MEMBER POWERS: And the problem is that the dissolving limestone.

MR. STEPHENSON: Thank you. Okay. Any other questions before I move on. Okay, this is kind of a good segue into our foundation design. To design our foundation we wanted to insure that we designed a foundation that had a tensile capacity to be able to span over any kind of small feature that we may have.

So to do that we had to come up with a design karst feature. So even though we got really good recovery in our offset boring program. We decided to go back. Well, we did go back to our original site characterization to develop our design karst feature.

So we went back to the boring logs and

went to each individual hole and looked at the excess grout take. We assumed that that excess grout take all went into one feature within a hole.

Now some of the holes had several features in them. But for conservatism we assumed that all the grout take went into one feature. And by doing that we came up with a maximum lateral extent of any grout feature to be roughly five feet.

So for our design karst feature we conservatively decided on ten feet. So we've got ten, by ten, by ten foot deep karst feature ended up being our design karst feature that we designed our foundation for.

MEMBER CORRADINI: Can I say that back to you a different way?

MR. STEPHENSON: Okay.

MEMBER CORRADINI: Because I, maybe it's just the lingo. So you're saying you have cracks. And you did a series of analyses to say the biggest crack that would fill up with the grouting is ten by ten hole.

MR. STEPHENSON: In the lateral direction.

MEMBER CORRADINI: The lateral direction.

MR. STEPHENSON: Right.

MEMBER CORRADINI: Okay. All right.

MR. STEPHENSON: Okay. This slide --

MEMBER STETKAR: Vann, just --

MR. STEPHENSON: Yes.

MEMBER STETKAR: I'm not a geologist, so I'm struggling here a bit. What's been the historical experience within about let's say a 30, 40 mile radius with this site, with development of sinkholes and large, whatever you call them.

MR. STEPHENSON: Sinkholes.

MEMBER STETKAR: There's a term. Well, sinkhole, but there's a more fundamental term that I'm struggling with, over the last 50 years, let's say. I mean, have you done an historical geological survey to get a sense of what you might be missing with, you know, all of your individual borings here?

MR. STEPHENSON: What we did, we did an extensive survey and analysis on that. This is a little different area. This is, even though we're nine miles away from Crystal River, we're in a different formation.

They're in the Ocala limestone formation. We're in the Avon Park, which is a more dolomitic limestone. And it's not as susceptible to dissolution. But to actually answer that, because Dr. Rizzo is the individual who did that extensive study.

So I'll let him actually explain it to you.

MEMBER STETKAR: Is your microphone on by the way, do you know? There's a little switch.

DR. RIZZO: Okay. As Vann mentioned, the Levy site is actually underlaid by the Avon Park limestone, which is a dolomitic limestone. The entire area, and the one your familiar with and you read about in the papers, is the Ocala limestone, which is prone to karst. We call it karst, you call it sinkholes, development.

(Simultaneous speaking)

DR. RIZZO: I'm sorry, you got the idea. Anyway, this area is, because we're in the Avon Park the concern with karstic development is much, much diminished compared to the Ocala. Okay?

MEMBER POWERS: Why is that? Isn't dolomitic limestone older?

DR. RIZZO: I beg your pardon, sir?

MEMBER POWERS: Isn't dolomitic limestone older?

DR. RIZZO: No. Yes, slightly older than the Ocala. That's right.

MEMBER POWERS: So it's had more time.

DR. RIZZO: Yes. That's right. But we really attribute to the more, the mineralization makeup of the limestone, rather than the age. Because the ages are within tens of millions of years of each other. They're both Pliocene aged.

VICE CHAIR ARMIJO: Both the same density?

MEMBER POWERS: Dubious.

DR. RIZZO: I don't know the details of that. But I think the Avon Park is a little more dense. It's slightly more dense than the Ocala.

MEMBER POWERS: But then the problem is it's chemically distinct. And so it's subject to, I mean, you said they're ten million years apart. But clearly there was chemical distinction between the two. And we know that dolomitic limestones are not being precipitated now. So one can presume they may be more soluble.

DR. RIZZO: We didn't actually find that. We did compare solubility rates of the rocks in the vicinity of this part of Florida in our analysis, which we did talk about in our subcommittee meeting.

MEMBER RAY: Yes. We have some extensive discussion of that very point in the subcommittee meeting. And data were presented and we have it available in the subcommittee record on what should we believe about this dissolution rate, and why.

MEMBER POWERS: I mean, what you have to

confirm the issue is we're not precipitating dolomitic limestone nowadays. We are precipitating calcium carbonates. Why aren't you just precipitating dolomitic limestone?

Well, it must be more soluble. Or you'd be precipitating it, right? I mean, there's only one option as far as I can tell. Because we got lots of magnesium in the seawater.

MEMBER RAY: I can only suggest at this point that maybe that discussion we can make available to you. While it's not part of this presentation here, Bill was satisfied at least. And I'm not able to add anything to his judgment on that.

MR. STEPHENSON: And we do have dissolution rates as Mr. Ray was talking about, that many different sources for this dolomitic limestone, that was provided as part of the original question.

MEMBER BANERJEE: What depth is the aquifer?

MR. STEPHENSON: The depth of the aquifer, Paul?

MEMBER POWERS: Probably two feet.

DR. RIZZO: The aquifer is part of the Floridan system and is very deep.

MEMBER BANERJEE: Very deep, meaning?

MEMBER POWERS: It was down very deep, but I mean, it probably starts --

MEMBER STETKAR: It starts where they found it and goes a hell of a ways. That's what I think they just said.

MR. STEPHENSON: Well, the water table's very high.

(Simultaneous speaking)

DR. RIZZO: The interface is a leaky aquifer between the undifferentiated quaternary deposits and the Avon Park. It's leaky border there. So you really have aquifer the entire depth. Very deep.

MR. STEPHENSON: Any other questions?

CHAIR ABDEL-KHALIK: Could you go to slide 14 please?

MR. STEPHENSON: Slide 14, okay.

CHAIR ABDEL-KHALIK: What is the typical distance between two neighboring locations where you actually did the borings?

MR. STEPHENSON: Typically they are roughly 50 feet. Some of them were at different, depending on what we found in the original site characterization. Some of them were closer than others. But typically they were around 50 feet apart.

CHAIR ABDEL-KHALIK: So what is the likelihood that there would be plenty of greater than five foot by five foot that you wouldn't see?

MR. STEPHENSON: We don't feel like that likelihood is very high. Because we did actually orient our borings, like we said. Based on what we found we oriented directions to try to determine if we had any kind of, you know, extent from one location to another.

We obviously couldn't, 116 borings is a lot of borings in accordance with the site characterization. So, you know, we didn't bore every five feet apart.

But we did bore them 50. And we feel pretty confident that we're adequately characterize the fact that we understand what the maximum dimension of any void might be.

MEMBER RAY: Vann, if I could suggest to the committee. If you could present the solution to this problem that we're all groping with here, which is the design that you have put in place. And then come back and perhaps ask questions about whether that solution is sufficient, we may get closure here more quickly.

MR. STEPHENSON: Okay. Very good.

MEMBER BANERJEE: In other words, you're going to float something.

MEMBER RAY: That's what I characterize it as. They didn't like that characterization.

(Simultaneous speaking)

MEMBER SKILLMAN: I think we want to hear about a double-hull tanker. That's what we want to hear about.

MR. STEPHENSON: Okay. All right. So we came up with a maximum design karst feature. We said it was a ten foot, by ten foot, by ten foot deep feature. So this slide shows the actual design analysis cases we used to develop our foundation.

Again we wanted to make sure we had a tensile capacity to span over any kind of feature that we have. Now with dissolution rates it would change very little over the 60 year life of the plant.

But we did consume a conservative ten foot wide feature. So the first load case you see here is kind of a base line case, where we had no feature. Just to get a baseline for our foundation design.

For case number 2 is, we located a ten by ten feature in multiple locations under our foundation and analyzed it for that situation. Case number 3 is, we took a ten foot wide by ten foot deep feature and ran it continuously across the east west direction of the nuclear island.

So this kind of gets into, you know, if we had something that spanned all the way across, it was captured by this analysis. Even though we don't think that's, you know, the case. We feel certain that's not the case.

And for case 4 we did the same thing in a north south direction. Ten foot wide by ten foot deep feature running continuously across the foundation. For each case we also located these features at two different elevations.

In one case we located the feature directly beneath the foundation for the nuclear island. As you'll see in a minute, that's impossible for that case to even exist. Because we're grouting that area solid.

But we ran it there because we felt like that would be a worst case, right directly beneath the nuclear island. We also located down 75 feet, which would be the bottom of the area we're going to grout for our grouting zone.

So for each of these cases, 2, 3, and 4, they had two cases apiece. One run with the cavities directly beneath the foundation. And the other run with the cavities 75 feet down, directly below the grouting zone that we're using as part of our dewatering concept.

So for all these cases, analysis found that we did have tensile capacity in our foundation to span over any potential cavity that we may have. Okay? This shows our nuclear island foundation design concept. Was there a question?

MEMBER RAY: No, no.

MR. STEPHENSON: Okay. All right. This gives a little better, we can kind of start getting a picture now of what we're talking about as far as developing our dewatering concept, the grouted zone, and our foundation for the nuclear island.

As we just got through talking a while ago, it was a good segue into the fact that we do have a high water table at the Levy site. It varies between one and eight feet, based on the season, from the existing grade.

Now as Bob Kitchen mentioned, we are going to be backfilling approximately eight feet from the existing grade of elevation 43 up to elevation 51 for our finished grade.

But to be able to dewater for the excavation we're going to be installing a diaphragm wall. This is three to four foot thick reinforced wall. It will be extending about 30 feet down below the area that we're excavating into the competent Avon Park that we talked about earlier.

And it will be a circumferential wall around the area being excavated. As a part of this as we're installing the wall, we also will be installing a grouted zone.

This will be a solid grouted area up under the nuclear island. And this will really serve the purpose of making a low-permeability area between the diaphragm wall and this grouted area, that will form a bathtub, if you will, that will allow us to be able to dewater and excavate for the installation of our foundation.

It has a lot of other principles too. Obviously as far as if there are any kind of voids or grouts, these actual grouted holes are going to be on four foot centers. So it will be eight foot for our primary holes.

We could come in as close as four foot, based on the permeability we need to insure that we have a low permeability zone. So it will be basically grouted solid for 75 feet. Even though, again, we didn't take any credit during our geotechnical analysis for this zone being grouted.

CHAIR ABDEL-KHALIK: I know this is not related to the geotechnical analyses, but are there going to be cable pull boxes outside this grouted zone?

MR. STEPHENSON: Cable pull boxes.

MR. KITCHEN: You're talking for strength to hold the wall?

CHAIR ABDEL-KHALIK: No, no, no. Just underground cables.

MR. STEPHENSON: No, not --

CHAIR ABDEL-KHALIK: Cables going to the circ water pumps, for example.

MR. STEPHENSON: No, no. It would all be above, actually above the foundation, any of those locations.

MEMBER CORRADINI: Above the foundation meaning where you see the cylinder?

MR. STEPHENSON: Where you see the --

MEMBER CORRADINI: Above the bridging mat. Above the bridging mat.

MEMBER STETKAR: Above the base mat.

VICE CHAIR ARMIJO: Is the purpose of your grouting to improve the strength of that zone, or permeability? Strictly water?

MR. STEPHENSON: Permeability for dewatering available to install our foundation.

VICE CHAIR ARMIJO: Okay. And how do you measure the acceptability that the grouting has achieved what your trying to achieve?

MR. STEPHENSON: What we do in test through that whole process. Again, maybe I'll ask Dr. Rizzo to get up and explain that, how we'll be doing that.

MEMBER CORRADINI: Can he also explain what you mean by grouting? You're not going to excavate and fill. You're going to force in material to fill cavities?

MR. STEPHENSON: Before we excavate.

MR. ELNITSKY: Before you excavate. In order to be able to excavate in the first place.

MEMBER CORRADINI: Okay. Okay.

MEMBER RAY: Simply put, if the water doesn't rise, you've got to grout it.

MEMBER CORRADINI: Thank you. I was hoping for an easy explanation. That's what I guessed was happening.

DR. RIZZO: We drill the grout holes from the ground surface down to a depth of 150 feet. And in the zone between 75 feet and 150 feet is where we pump in the grout, inject the grout.

As we're injecting the grout, we're continuously monitoring the intake of the grout and the pressure, in a computerized system of measurements that allows us to determine if we're getting grout taken, and under what pressure we're getting it.

That allows us to calculate and estimate the volume of grout that we've pumped into the rock. And the extent that the grout has traveled.

VICE CHAIR ARMIJO: And is that grout basically cement or?

DR. RIZZO: It's cement and water with some additives. Yes, sir.

VICE CHAIR ARMIJO: Okay.

MR. STEPHENSON: Now if you remember a little earlier I talked about our grout test program, when I was up talking about evaluating our low recovery zones.

We actually had roughly a 16 by 16 foot area where we simulated this very process using all these computerized techniques for monitoring grout take, grout pressures.

To ensure that we would get the kind of low permeability area that we expected. And we did. So we've really already kind of done, if you will, a localized test to verify this process.

MEMBER CORRADINI: So maybe this if off topic and Harold will tell me. But so what did you have to do for Crystal River? Similar thing? I mean, it's a different limestone foundation. But so did you have to do an older version of this there?

MR. STEPHENSON: I'm not that familiar with --

DR. RIZZO: Yes.

MR. STEPHENSON: -- Crystal River.

DR. RIZZO: Crystal River was grouted with more primitive techniques, so to speak, four years ago than we're using here. Also, the grout zone is right near their surface. It's not 75 feet down.

MEMBER CORRADINI: Ah, okay. Fine, thank you.

MEMBER SKILLMAN: I'd like to ask, if the diaphragm wall has a longer term design basis?

MR. STEPHENSON: It does not. We will leave it in place. But it does not have a longer term design basis.

MEMBER SKILLMAN: It's really a construction aid.

MR. STEPHENSON: Yes.

MEMBER SKILLMAN: Thank you.

MR. STEPHENSON: And we did evaluate that in all of our further analysis when we did sole structure interaction and those kind of analyses. We did evaluate it being there, but we're not taking any credit for it.

MEMBER BANERJEE: You may have mentioned it. But what is the diaphragm wall made of?

MR. STEPHENSON: Concrete.

MR. ELNITSKY: It's a more slurry concrete, with reinforcements.

MR. STEPHENSON: And you will see we have an anchoring system that goes along with that too. I'll get to that in just a second.

VICE CHAIR ARMIJO: So these grouting holes are about eight foot centers?

MR. STEPHENSON: We'll go 16, 8 and we'll go down to four if we have to. It will all be based on the results we're getting back on our permeability. Because we'll be monitoring this as we go.

VICE CHAIR ARMIJO: Yes.

MR. STEPHENSON: We'll keep grouting to the fact to ensure that we've got a solid rock impermeable surface.

VICE CHAIR ARMIJO: Yes.

MR. STEPHENSON: Because we can't allow,

you know, ingress of water during the excavation.

VICE CHAIR ARMIJO: Okay. Thank you.

MR. STEPHENSON: Okay. So I think we left it off with. Let's go back, Paul. We're not quite finished here, Bob.

VICE CHAIR ARMIJO: They're talking about your RCC bridging mat.

MR. STEPHENSON: Yes. And I'll get to this in more detail too. This just kind of covers the whole thing real quickly. And I'll get in more detail about each piece of this.

MEMBER BANERJEE: Dimension? Roughly?

MR. STEPHENSON: Dimension roughly is 300 feet.

MEMBER CORRADINI: We've seen one.

MEMBER BANERJEE: I wasn't there.

MR. STEPHENSON: Okay.

MEMBER BANERJEE: It's Olympic size.

MR. STEPHENSON: Yes. It's a big excavation. Once we get excavated we will be leveling off the top of the competent Avon Park. We'll be using a dental cement to do that, get it good and level.

And then we'll install our foundation, which is a 35 foot thick roller compacted concrete bridging mat, which is unreinforced concrete. Once we get that installed on top of the bridging mat, we'll be installing the standard plant AP1000 basemat, which is a six foot reinforced concrete basemat.

And that's what the nuclear island will actually set on. Okay, Bob. Okay. Now we'll kind of step you through what we've been talking about already. We're kind of getting into this already. But I'll step us through. This is going to be a sequence of slides, but I'll kind of go through it. Yes.

MEMBER SIEBER: Now, let me ask a, you know, perhaps a not too great a question. But all this foundation is under the nuclear island. That does not include the turbine plant, right?

MR. STEPHENSON: No. But I'll get to that.

MEMBER SIEBER: How are you going to deal with, you're going to tell us how you deal with differential settling?

MR. STEPHENSON: Differential settling. Yes, yes.

MEMBER SIEBER: Okay. And also the seismic interaction, because the response constants are different.

MR. STEPHENSON: Yes. We'll get to that in just a second. We might ask Dr. Singh to help us with that. But, yes, we're about three slides away from getting there.

MEMBER SIEBER: Okay.

MR. STEPHENSON: Okay. This, again this is kind of a sequence again. Stepping through the actual construction of installing our diaphragm wall. We install the diaphragm wall. We install the 75 foot thick grouted zone that we just talked about.

We're a little ahead of yourself with the anchors here. We'll go to the next slide for that. Okay. Then we'll start the excavation. As we excavate we will be installing rock anchors.

And this will be providing lateral support for the diaphragm wall, once we get excavated. As we excavate, it will be a controlled excavation. We'll be excavating from the center out.

And we're doing that to allow ourselves to be able to do our geologic mapping in accordance with Reg. Guide 1.132. So we'll leave enough material on the sides to do our mapping as we're going down before it slumps off.

Okay. And once we get fully excavated we will be installing our roller compacted concrete, bridging mat. Again, this is a 35 foot thick foundation. It will be installed in one foot lifts. And I'll show that in a little bit more detail later on, on how that's actually done.

But we'll install it in one foot lifts. And between each layer we'll be putting a high strength concrete bonding mix that will actually help the bonding between each layer. And ensure we get a homogeneous foundation in the end.

MEMBER RAY: Can I just editorialize and say, this is the thing that we should focus attention on to be satisfied that it will adequately deal with the hypothetical voids, and so on, that were described earlier.

MEMBER BANERJEE: This has been done before in other places, hasn't it?

MEMBER RAY: Not for a nuclear plant but --

MR. STEPHENSON: Not for a nuclear plant. But we have, roller compacted concrete has been used in a lot of different applications. And we'll show one just a little later on. Okay, Bob.

Okay. Now we're to the point where we're talking about the support for the adjacent buildings. We're putting the nuclear island on a --

CHAIR ABDEL-KHALIK: In the one-foot layers, thickness is dictated by, this is how much you do in a shift?

MR. STEPHENSON: Well, not really. It's just the way that the RCC is being placed. And again, Dr. Rizzo may be the best one to address that, but --

MEMBER POWERS: Heat release is --

MR. STEPHENSON: -- it will kind of line up with shifts also. I mean, you want to cover that?

MEMBER POWERS: Heat release is what dictates your thickness.

DR. RIZZO: We place the roller compacted concrete in one foot lifts because we compact it with heavy duty rollers. The same as we use on highway construction. And a one foot lift has been determined by industry to be the optimum thickness that you can place and compact this material.

CHAIR ABDEL-KHALIK: And it would take roughly a shift to do a --

DR. RIZZO: In our case we have a, we can do one to two shifts per day, per 24 hour day, in this excavation. If you have multiple placements you can do many lifts. But in that case there'll be one or two shifts a day.

MR. STEPHENSON: And once we start this

we'll be doing it around the clock.

MEMBER CORRADINI: So I guess, say it back so that, due to some other construction experience one foot is optimal. And then the stuff you put in between, you said it once, just can you say it again?

MR. STEPHENSON: It's a high-strength concrete, a bonding mix.

MEMBER CORRADINI: So that means you put this one foot on, you let it cure, you put this stuff in between, we'll put a glue. And you put the other foot on. And then after you compress over it the expectation is then it diffuses and connects?

DR. RIZZO: There's no diffusion.

MEMBER CORRADINI: There's no diffusion? It just essentially, well it's got to be diffused in some layers or it's just a layer and there'll be a crack between them.

DR. RIZZO: The 12 inch layer lift on, you don't let it cure.

MEMBER CORRADINI: Oh, you don't let it cure.

DR. RIZZO: You don't let it cure. You merely put your bedding mix on.

MEMBER CORRADINI: Okay.

DR. RIZZO: Then you go to the next 12

inch layer. And when you compact them, you get them to bond together.

MEMBER CORRADINI: Okay.

MEMBER BANERJEE: So how much heat, per Dana's point, is being released per unit volume.

DR. RIZZO: I'm sorry, sir?

MEMBER BANERJEE: How much heat will be released in this process.

DR. RIZZO: The temperature control with roller compacted concrete is a key issue. We use a heavy fly ash proportion, usually it's about 50-50, to minimize temperature effects.

We monitor the temperature throughout the process with thermocouples. If the temperature gets to be higher than we predict it should be, then we stop and let it cool. But temperature control was a key aspect of this construction.

MEMBER BANERJEE: So that's the determining speed at which you can build up these layers, right?

DR. RIZZO: Yes. It would be. It's a key factor. But with roller compacted concrete the temperature rise is very much reduced as compared to conventional concrete. Because of the fly ash content we use in the mix.

MEMBER RAY: As long as we're having this extended discussion --

MEMBER BANERJEE: So that gives you thermal inertia to the problem, right? I mean, it's sort of in sync.

MEMBER POWERS: It's strictly heat capacity.

MEMBER BANERJEE: Yes. It's just a heat capacity.

MEMBER POWERS: The problem is that you develop thermal stresses in the cracks when you, things like that. I mean, when you pour heavy sections you put water pipe and cooling pipes in it to counteract the heat. I believe in Boulder Dam they still have to operate the cooling pipes.

MEMBER RAY: You're doing your prototype demonstration.

MR. STEPHENSON: We are.

MEMBER RAY: And that was brought up during the subcommittee meeting. We've been digging around to try and find where that's documented. Is that part of the license condition that exists?

Perhaps we can ask the staff for part of this question. But in any event, what we're trying to get a handle on is, where is the prototype program described? Other than what you described to us?

MR. KITCHEN: The testing program I believe, Dave, and correct me if I'm wrong. The testing program is in the FSAR. But it's not a licensing condition.

MEMBER RAY: Okay. Well we, I don't want to take up time here. But I just wanted to affirm that these are the prototypes for those who are wondering how you --

MEMBER BANERJEE: How big is the prototype?

MR. STEPHENSON: Roughly 50 by 50 feet. It'll be performed at least 180 days before construction.

MEMBER BANERJEE: You are going to tell us where this has been done before?

MR. STEPHENSON: I will.

VICE CHAIR ARMIJO: This bonding layer between the one foot lifts, what is that? And why do you really need it? I mean, it wouldn't bond if you just placed one foot layer after another?

MR. STEPHENSON: Dr. Rizzo, you want to address that?

MEMBER BLEY: And when you do, as I recall from the subcommittee, this bonding isn't complete.

There's, I forget if it was under seismic or something, there's still concern about these different layers. If you can say something about that?

DR. RIZZO: Okay. When we place the 12 inch layer, one on top of the other, our normal practice is not to use the bedding mix, except in situations where we think the lower of the two layers has set up more than it should have.

We try to keep the layers one on top of the other without set up. But in our case here the more conservative approach is to put a bedding mix between the two.

The bedding mix is generally 3/8 to 3/4 inch thick, high cement mortar mix, laid down on a very flat layer over the first lift.

VICE CHAIR ARMIJO: So that's not roller compacted. That's a different process.

DR. RIZZO: This is spread out, that's right. It's spread out after, in fact, you've compacted the lower layer. Then you put the bedding mix on. Then you put the next layer on.

MEMBER RAY: Does that not also provide a water migration seal? Isn't that --

DR. RIZZO: Yes, sir.

MEMBER RAY: -- a function of it to avoid water flow between the lifts over time?

DR. RIZZO: Yes, sir. It's a little bit lower permeability and a little bit higher strength than the parent material above and below the lift joint.

MEMBER RAY: Okay.

DR. RIZZO: The lift joint, I don't want to go on for one more second here. The lift joint is the key issue in placing roller compacted concrete. That's why we take so much pain to either control the amount of time it's exposed to the elements, or we put a bedding mix on it.

MEMBER RAY: Well let me give you one more minute then and see if you want to add anything to the discussion of the prototype that I brought up. In terms of what it's going to provide you prior to beginning the construction.

DR. RIZZO: Okay. The prototype will consist of a section of roller compacted concrete that's about 50 by 50, plus the ramps on either end. Remember, we're going to place this material either with trucks or with conveyors.

So the actual test pad is much longer than 50 feet. It's placed in 12 inch layers in the same manner we expect to place it in the actual construction. We're training, we're testing our equipment, we're testing our mixes, we're testing our placement procedures. And we're training our labor and our craftsmen to do it in the test pad.

We build it, at least six foot lifts. Sometimes we go eight, sometimes we go a dozen, depending on a situation. We get all done. It sets up. After 60 days, maybe 90 days we slice it with a diamond saw and look at the face, which is the best indication of how we built it.

It tells us how thick we got it in the field. And it tells us how effective our bedding mixes are. It tells us how effective our bonding is. So we have a, when you finish the test pad, you have a cut face with a diamond saw cut on it. You can see actually what you've built.

MEMBER POWERS: And so you only look at your interface, you don't actually shear it?

MR. STEPHENSON: No, we'll test it.

DR. RIZZO: It's tested throughout the process.

MR. STEPHENSON: We'll test the shear between the joints.

DR. RIZZO: Actually what we --

MEMBER POWERS: What kind of a shear are

you looking for? Shear strength are you looking for?

MR. STEPHENSON: Do you remember what the shear strength was, Paul, that we're designed for?

DR. RIZZO: We're designed for shear strength that is slightly less than code. We don't like to exceed 100 psi.

MEMBER POWERS: That is low.

MR. STEPHENSON: Another thing just to point out here. And a little bit out of the presentation. But our design is for 2500 psi mix. And our actual mix is going to be at 3000 psi mix.

So that's just some more conservatism we're giving ourselves going forward having a actual mix that's higher than what we used in our analysis as our design mix.

MEMBER POWERS: Those are compressive strengths --

MR. STEPHENSON: Three-thousand.

(Simultaneous speaking)

MEMBER POWERS: But it means the compressive's not going to help you there. In fact, it's going to hurt you. Because it makes the actual lifts more rigid.

MR. STEPHENSON: Makes the actual lifts more rigid?

MEMBER POWERS: Yes, to the shearing action.

DR. RIZZO: Okay. Let me just make one more comment on this shear strength. Shear strength between lifts joints is a key design issue. In our prototype testing program we will actually cut blocks, two foot, by two foot, by two foot, such that we have a joint between two blocks.

We take that block into the laboratory, put it in a machine and shear it across that lift joint to measure the actual shear strength we achieve in the field across the lift joint.

MEMBER RAY: Thank you.

MEMBER SKILLMAN: A question, please? Two different points have been made here that I think are connected. Vann, you've mentioned you're going to run 24/7 pouring these lifts.

MR. STEPHENSON: That's correct.

MEMBER SKILLMAN: And, Dr. Rizzo, you've mentioned that this grouting layer, this bedding layer is a critical component --

DR. RIZZO: Yes.

MEMBER SKILLMAN: -- to the design configuration of these one foot lifts.

DR. RIZZO: Yes.

MEMBER SKILLMAN: We're well aware of the exothermia that occurs with these thick sections. Is there a seasonal, or a weather component --

DR. RIZZO: Yes.

MEMBER SKILLMAN: -- that is factored into this? So that on the hottest day in August you're not cooking the top centimeter of the concrete?

DR. RIZZO: Yes.

MEMBER SKILLMAN: And on the rainiest day when you have a hurricane coming through, you haven't sluffed and killed all the work you've just completed?

DR. RIZZO: Well, in fact, we don't place in the rain. We have, get a surface that has been damaged by rain, we remove it. And we clean it off.

MEMBER SKILLMAN: Yes, sir.

DR. RIZZO: We have too hot of a temperature, we stop as well. We have lots of trick in our industry to deal with that. We use misters, for example. We use sprayers. We use cooling pipes, like was used at Boulder.

We're not using cooling pipes here, but that's an available technique to us. We use ice in our water. We use chillers for our sand. We use chillers for our gravel. Temperature control for the RCC is a key issue. No question about it.

MEMBER SKILLMAN: Thank you.

MR. STEPHENSON: All right? Okay. All right, now we'll get into the design concept we'll be using for the adjacent buildings. We had the question earlier.

The adjacent buildings, the turbine, radwaste, and annex buildings will be supported by drilled shafts. These drilled shafts will vary in diameter between four and six feet. They will be socketed into the top of the Avon Park at each of the locations.

And I'll show you a plan elevation on the next slide. Each of the locations, prior to drilling a hole, we'll drill a pilot hole actually down into the Avon Park to ensure that we have good quality foundation that we're going to be socketing into. And also to verify our rock quality at that location.

And we'll be drilling down at least two diameters of the caisson diameters, below the bottom of the socket, to insure that we have a solid foundation going down below the socket.

MEMBER SIEBER: These are similar to fracking piles?

MR. STEPHENSON: I don't think so.

DR. RIZZO: No. These are drilled shafts.

It's a vertical drill inside of a steel casing down the rock. Then you hammer out a socket, we call it, into the rock.

MEMBER SIEBER: Okay. All right.

MR. STEPHENSON: Okay. So again, these sockets will be a minimum of ten foot deep for the different diameters of the caissons. And again they will be supporting the turbine, radwaste, and annex buildings.

Now you talked about the interaction analysis that we performed for the drilled shafts. Dr. Singh, would you just want to address that? Sargent & Lundy actually did that analysis for us.

DR. SINGH: Yes. We addressed the interaction between the Category 2 and non-seismic buildings, which is the turbine building, annex building, and the radwaste building, and the nuclear island.

And we basically determined there's a two inch gap provided in the standard design. That our displacement for the SSC at Levy are less than 1/8. So we basically demonstrated that there is no interaction between the Category 2 buildings and nuclear island, given one is supported on drilled shafts, the other one is supported on the RCC pad.

MEMBER SIEBER: That give you longitudinal relative certainty. What about in the vertical direction?

DR. SINGH: The vertical, the relative displacement is very small because the drill shafts as well as the RCC mat are all --

MEMBER SIEBER: All going to --

DR. SINGH: -- on solid rock.

(Simultaneous speaking)

DR. SINGH: Yes. And the level which the DCD allows us is about three inches relative. But we're less than half an inch.

MEMBER SIEBER: So the limestone's pretty close to the surface, which --

DR. SINGH: Helps.

MEMBER SIEBER: -- helps simplify the problem. Okay. Thank you.

MR. STEPHENSON: Okay. All right, Bob. In this slide, this shows a plan view of the layout of the drilled shafts for the different surrounding buildings.

Again, you can see in our first bay for the turbine building we do have some closer spacing to deal with the 2-over-1 effects of the turbine building to the nuclear island. Okay, Bob.

MEMBER SIEBER: Now is there a grounding mat that goes under, between the top of all these columns and the basement of the turbine building, for example? You know, a copper mesh grounding mat?

MR. STEPHENSON: There will be a foundation mat on top of the caissons.

MEMBER SIEBER: The idea of that is to have a place to connect all the grounds of the significant electrical equipment.

MR. STEPHENSON: Yes. There will be a grounding systems design with this.

MEMBER SIEBER: Is it part of a mat or just wired?

MR. STEPHENSON: I don't think we've gotten to that point yet. We've actually go into the design part where this is in the conceptual stages. Once we design our grounding system, that will all be factored in.

MEMBER SIEBER: Okay. I'll look at it when you're done.

MR. STEPHENSON: Okay. We talked about applications of roller compacted concrete. This is an actual application. This is Taum Sauk, a roller compacted concrete dam.

It's in southeastern Missouri. It acts as a pump storage reservoir for the Taum Sauk Hydroelectric plant. This particular dam varies in height between 100 and 130 feet. And it has approximately three million yards of roller compacted concrete in it.

It was designed and construction managed by Dr. Paul Rizzo's company, Rizzo and Associates. So he was involved with that, as he is obviously the designer for our Levy County site foundation.

MEMBER CORRADINI: So just so I get a scale, that's what, about structure? Ten times in surface area? Compared to your nuclear island layout?

MR. STEPHENSON: Yes. I think, what was our yardage in our --

DR. RIZZO: Fifty-thousand.

MR. STEPHENSON: Fifty-thousand cubic yards for roller compacted concrete for our foundation. Okay? Okay, this shows the placement. We talked a lot about the placement during our discussions of roller compacted concrete.

You can see it's a very dry mix, basically zero slump. It is usually delivered, as Dr. Rizzo said, with a conveyor system. In this case a conveyor system with a elephant trunk that's actually deposited into the area that's being spread out.

We usually will spread it with a dozer. And it will be spread in lifts that will be compacted down to 12 inches in thickness. And we'll use a ten ton vibratory roller to actually do the compaction on the roller compacted concrete. And we'll be measuring density as we go to ensure we're getting the density that we expect before we move to the next lift.

CHAIR ABDEL-KHALIK: Back to the measurement of the shear stress between the layers. You said that you cut out blocks, essentially two, by two, by two. And then you test the shear strength.

MR. STEPHENSON: The test pad.

CHAIR ABDEL-KHALIK: At the interface between --

DR. RIZZO: Yes.

CHAIR ABDEL-KHALIK: -- the two layers. Wouldn't you expect the alignment of the interface with the boundaries of the two, by two, by two block to have a significant impact on the results of the test? And how would you assure the alignment?

DR. RIZZO: When we take, we cut the block from the prototype, extract it from the prototype, package it, transport it to the lab, and put it in a direct shear machine, and shear it.

You have to align the blocks, well, you

can't say perfectly, but you have to align them such that you are shearing the bedding mix, which is theoretically the strong link.

And what happens when you actually do the test, you shear just above or just below the bedding mix, is what happens in the actual test. So your link is just above it, or just below it. And that's what you actually measure. You really can't shear through the bedding mix because it's stronger than the concrete.

CHAIR ABDEL-KHALIK: Okay. Thank you.

MR. STEPHENSON: Any other questions on geotechnical foundation design? Because we're moving, we'll be moving over to our seismic response development. Okay. All right. Now I'm going to give a brief overview of our seismic response development for the Levy site.

This slide shows a regional seismicity map. You can see the Levy site is a red star. We have a 50 foot and a 200 food radius circles around the Levy site.

The small colored circles that you see are the actual events that were used in development of the Levy response spectra. These did come from the EPRI Seismic Owners Group catalog. And all that information was updated with events through 2006. Including two 2006 events that we included in the Gulf of Mexico.

I think the message you can see here, as you look at the circles and the number of colored events inside. This is a very low seismic area. And as I'll get to in just a second, what our analysis found is we do have a very low acceleration at the Levy site, compared to some of the other sites in the country. Okay, Bob.

Before we, just go back to that one second. Okay. Our analysis did find that for the Levy site that our foundation level acceleration was 0.08 g's.

We did round that up to .1g's to comply with the requirements in 10 CFR 50, Appendix S. So all of our support systems and structures at the Levy site will be designed, and have been designed at 0.1g's. Even though our actual foundation response specter came out less than 0.1 at 0.08. Okay, Bob.

MEMBER POWERS: You've got more confidence in spectra calculations than I do. If there's conservatism in those two numbers.

MR. STEPHENSON: Okay. This is a comparison of the Levy ground motion response spectra through the AP1000 certified design response spectra. The graph on you left hand side, you can see the blue line represents the Levy ground motion response.

The red line is the AP1000 certified design response. The left hand graph is a horizontal comparison. The right hand graph is a vertical comparison. And you can see across the full frequency range that we are well in the load at the Levy site for the AP1000 certified spectra.

MEMBER SIEBER: The Crystal River plant has seismic instrumentation operable all the time.

MR. STEPHENSON: Yes.

MEMBER SIEBER: Is the data that you get from the Crystal River seismic information consistent with your expectation of activity, your seismic activity, for the last 20 years or so?

MR. STEPHENSON: I'm not sure we've ever had any. And I'm not an expert in this area for the Crystal River site. But I'm not sure we've had any seismic activity at the Crystal River site that got picked up by the seismic instrumentation.

MEMBER SIEBER: Okay. That's sort of unusual. Because I think every power plant every once in a while get's a little --

MR. STEPHENSON: They have trigger levels on them too.

MEMBER SIEBER: -- little tremor --

MR. STEPHENSON: Yes.

MEMBER SIEBER: -- that you can see. It may not set off any alarms, but they're there.

MR. STEPHENSON: I'm not aware that's ever happened, have it recorded type of events that they picked up. But, you know, we could take that as a follow-up if we need to.

MEMBER SIEBER: Yes. There's information you can gain from looking at even these very minor things as far as ground permeability and strength, and so forth.

MR. STEPHENSON: You actually can go out, obviously, to Colorado to the School of Mines. And they have the data for everywhere. I just don't know if any events have been picked up on the instrumentation on the Crystal River site.

MEMBER SIEBER: Okay. Thanks.

MR. STEPHENSON: Okay. And lastly, even though as you can see on the previous slide, we were well enveloped across the entire frequency range. We did run a 3-D sole structure interaction analysis for the Levy site.

We wanted to ensure that all these

specific characteristics about the Levy site were included. Such as the roller compacted concrete, the diaphragm wall, the fill between the diaphragm wall, and the nuclear island, were all factored into the analysis.

And that our in floor response for Levy response spectra was enveloped by the AP1000 design certified spectra. And that analysis was performed by Westinghouse. And we found that we were enveloped at all of the four response locations. Okay with that, that is what I had for geotechnical foundation, seismic --

MR. KITCHEN: This is Bob Kitchen. I want to go back. And one thing I wanted to point out, there is an ITAAC on roller compacted concrete. And I thought we should point that out to the committee. But I wanted them to look at it before.

The roller compacted concrete ITAAC, really there are three pieces of it. One is that we'll do an inspection of bridging mat properties. And any deviations of the as built conditions that fall outside the range considering the design as described in the FSAR will be addressed. The second part is that --

MEMBER RAY: Excuse me.

MR. KITCHEN: Yes, sir.

MEMBER RAY: I did see that, but is that for the constructed mat? Or are we talking about the prototype, or both?

MR. KITCHEN: The constructed mat.

MEMBER RAY: Yes. That's what I thought.

MR. KITCHEN: Yes, sir. Actually the prototype is really a construction test.

MEMBER RAY: Yes. I understand that. But it's also not clear to me to what extent the parameters that you'll be monitoring for the constructed mat are derived from the prototype.

That's what was murky. And so I didn't, you know, you referred to it. But I didn't know to what extent it was a basis for the design that you're describing in that ITAAC there.

MR. KITCHEN: The test pad is a proof of technique basically. And then the actual construction --

MEMBER RAY: But you don't derive any parameters from the prototype that you then ensure are achieved in the mat that's constructed?

MR. KITCHEN: I don't want to get myself outside here. But first, the design stamp, which was required properties we verified with the test plan we can do it. Then we verify with the ITAAC we did it.

MEMBER RAY: Okay. Well, like I say, I was looking to try and see what the role of the prototype was. If it's just a proof of constructability process kind of thing, as was described.

MR. STEPHENSON: It's the proof of design also.

MEMBER RAY: I understand.

MR. KITCHEN: The other part of the ITAAC is inspection of the mix that's used for the RCC. That it meets the requirements. And then finally, the thickness of the roller compacted concrete meets the requirements. Those are in the ITAAC.

MEMBER RAY: Yes.

MR. ANDERSON: Mr. Ray, this is Brian of the NRC staff. I don't want to confuse the issue. But as part of the NRC's presentation we have a discussion on the license condition surrounding the RCC testing program. So the staff might be able to elaborate on your question a little further at the end of this presentation.

MEMBER RAY: Thank you, Brian. I did, yes, that's what I'd like you to do. Thank you very much. And we'd better move on or you won't have a chance to do it.

MR. KITCHEN: Okay, to touch on, this is Bob Kitchen. I want to just review briefly the emergency plan. Again the greenfield site and may be a little bit different than what you've looked at.

We have a single emergency plan, of course, for Levy Nuclear Plant. It's developed, as you would expect, in accordance with required new regs and the 10 CFR 50 sections applicable to the emergency plan.

We are using the standard design in that the technical support center and the operations support center, that is part of the AP1000 located in the annex building, will be what we use for our emergency plan response.

We will however, use a single emergency operation facility, or EOF, that's currently in existence for the Crystal River station. That EOF is located outside the ten mile EPZ, but within 20. It's just barely outside the ten mile EPZ.

So we'll be adopting that to accommodate the Levy. And of course, as part of our emergency plan implementation, we have to demonstrate by exercise that we can manage a two site, not two unit, two site accident.

MEMBER BLEY: But your two sites are actually in two different counties, as I recall.

MR. KITCHEN: That's correct. Levy is in Levy County. And Crystal River is in Citrus County.

MEMBER BLEY: So you have to interface with two different county organizations?

MR. KITCHEN: We do that now. Right now the Crystal River station interfaces with Citrus County and Levy County.

MEMBER BLEY: Yes.

MR. KITCHEN: When we add Levy to the mix it's Citrus, Levy and Marion. So it's one new county added. So we do have one new county. But the emergency response personal in the area are familiar with nuclear response capabilities. And of course we have Certificates of Agreement in place to support the license application.

MEMBER BLEY: Thank you.

MEMBER SKILLMAN: Just an observation to the point. It looks like all of your, particularly EOF people, are going to be bound to Route 19 by and large. From Crystal River? The seven mile road up 19? Or coming out of Levy to go down 19?

Have you given any consideration to a second logistics route for your responders so they can get to the EOF, if 19 is somehow blocked by a weather event, or a massive storm, or something that would get you to a, almost a general emergency at both units?

MR. ELNITSKY: There's an alternate route that's a longer distance from it.

MR. KITCHEN: Yes. Of course the same issue that you're bringing up. It's the same facility that Crystal River deals with it. And I can't quote you the alternate routes. But, of course, there are alternate ways of getting there. So I really couldn't address specifically the routes.

MEMBER SKILLMAN: I just remember working on Crystal River at some depth and recognizing how the storm surge could really give a challenge --

MR. ELNITSKY: There are --

MEMBER SKILLMAN: -- for teams responding.

MR. ELNITSKY: There are alternate routes further to the east. But off the top of my head I don't know what that does in terms of --

MEMBER SKILLMAN: Thank you.

MR. ELNITSKY: -- duration to get there.

MR. KITCHEN: Just to illustrate, these are the emergency planning zones, protective action zones I should say, surrounding the Levy plant. The Levy plant is located here in this star.

The Crystal River plant is located here. And of course we had some concern and wanted to make sure we addressed this properly. So we weren't creating confusion between emergency plan actions being called for from Levy and Crystal River.

You'll notice that the zones are all titled the same. So there's only one C-1 zone or one C-2 zone. They're both identical for Levy and for Crystal River.

The other thing that we'll do, is again, with our emergency operations facility. And we co-locate Crystal River and Levy. We'll have, of course, two response teams there. But one emergency operation manager will be responsible for coordinating the response.

The other think unique to Florida, is that in Florida the state agencies are located with the emergency operating facilities as well. So that in a sense of coordination of response, we have the benefit of both sides. And the state and the federal support agencies would be in the same facility. So we believe that will simplify that.

The other thing is, of course, we had to do evacuation time studies to support our application. We do them periodically for Crystal River. So we looked at evacuation time studies for Levy following Crystal River only. And joint dual site demand evacuations.

And the impact is really fairly small. In fact, if you look at the 95th percentile it's about a five minute difference in time per evacuation zones. So we feel we have a plan that we have the benefit of the standard for the TSC and OSC. And then a common facility for emergency operation. That is the last of our presentation, unless there are questions about it.

MEMBER RAY: Well, thank you. We do need to turn to the staff here. Because we're running a little long. As you're getting up I notice we're looking at Progress Energy here everywhere. I think the application is Progress Energy Florida. Is that correct?

MR. ELNITSKY: That's correct.

MEMBER RAY: All right.

MR. ELNITSKY: Progress Energy Florida is the company that owns it.

MR. KITCHEN: Thank you, sir.

MR. STEPHENSON: Thank you.

MEMBER RAY: We want to proceed I think, Brian.

MR. ANDERSON: Okay.

MEMBER RAY: We're running short on time here.

MR. ANDERSON: Sure. Good morning. This is the NRC staff's presentation of its review of the Levy Nuclear Plant COL application. My name is Brian Anderson. I'm the lead safety project manager for the Levy County review.

With me that will be presenting from the NRC staff today are Dr. Stephanie Devlin, Parvin Patel and Tony Bowers. Stephanie and Pravin are technical reviewers in the NRC's Office of New Reactors. Tony is an emergency preparedness specialist who works in the Office of Nuclear Security and Incident Response.

The staff's presentation today is going to cover the following items. I'll provide a very brief overview of the Levy Nuclear Plant COL application. Stephanie's going to discuss the staff's review of the geology, seismology and geotechnical engineering aspects of the COL application.

Pravin's going to discuss the foundation design and associated seismic analyses. And Tony's going to finish our presentation with a discussion of the staff's review of emergency planning aspects.

As the committee's aware, this is the third AP1000 COL application that's been presented.

The Levy Nuclear Plant application does incorporate by reference, revision 19 of the AP1000 DCD.

There are no site specific departures or exemptions. And as has been mentioned earlier, the Levy County proposed site is a greenfield site. There are no associated limited work authorizations or early site permits for the Levy Nuclear Plant. And there are no open items related to the Levy County review.

MEMBER BANERJEE: Is this site, I mean, I couldn't get an impression from the pictures. But is this sort of a swampy area?

MR. ANDERSON: The site for decades prior to the site characterization was used for forestry. So I think like most places in Florida, there's wetness.

But it's more of a forested area than it is a swamp. There are wetlands associated with the larger Levy County site. But if I had to characterize it in a single way, I'd say it's more forestry.

MEMBER SHACK: But moist.

MR. ANDERSON: Like most places in Florida. That's right.

MEMBER RAY: Brian, in the lineup here of the presentation, I'm not sure I see where we're going to touch on this hurricane-missiles issue. So if someone could speak to that, please.

MR. ANDERSON: I think we can speak to that. The staff doesn't have a prepared presentation for the hurricane-missiles topic. Bit if I could, if Frank Akstulewicz is in the room. I think Frank can provide an overview status on where this is.

MEMBER RAY: That's fine. Just something that gives us a anchor here for what we have to do.

MR. ANDERSON: Okay.

MR. AKSTULEWICZ: Harold, do you want me to do it now?

MEMBER RAY: Yes. Fine.

MR. AKSTULEWICZ: All right. My name is Frank Akstulewicz. I'm the Deputy Director for Licensing Operations in the Office of New Reactors. The question concerns a recent release publication of a draft, or, I'm sorry, a reg guide, that characterizes the calculation of wind speeds for hurricanes different from the calculation of wind speeds associated with tornados.

Just to put that in context. The staff has done a preliminary assessment. But we're not ready to share that assessment with the committee at the moment. We're still doing some internal QA of that.

But I think the principle issue that we've identified is that the associated wind speeds could lead to missiles that are being generated, that have a slightly higher velocity than a missile being generated by a tornado.

The difference is relatively small. I'm going to say single digit in difference in terms of missile speeds. We've done some preliminary assessment. We don't believe there's an impact at Levy.

There was an RAI that was issued as a draft to Levy, to initiate their review of this particular activity as well. We've had a conversation with the applicant with respect to what our interests would be. And what specific information they will have to confirm for us as part of a follow-up.

We are briefing, the reason we're not ready to go final with the question yet is, we're briefing senior management and OGC to talk about the number of regulatory issues associated with backfit or application requirements, or additional documentation needs in moving forward on this particular point. So that's where we stand on this particular subject.

MEMBER RAY: That's fine. Thank you very much, Frank.

MEMBER BANERJEE: What are these missiles?

MEMBER RAY: Hurricane generated missiles.

MEMBER BANERJEE: Like what?

MEMBER SKILLMAN: Cars.

MEMBER BANERJEE: Cars.

(Simultaneous speaking)

MEMBER SIEBER: Fifty-five gallon drums.

MR. AKSTULEWICZ: The principle difference is in the velocity associated with an automobile impact.

MEMBER RAY: Okay. Again we're running, we've got 25 minutes here on the clock. So we want to keep going.

MR. ANDERSON: I will turn the rest of the presentation over to Stephanie Devlin.

DR. DEVLIN: Thank you, Brian. Hello committee. We'll start with a staff assessment of section 2.5.1 and 2.5.3, the basic geologic seismic information and surface faulting.

The applicant identified karst and associated dissolution features as the only potential geologic hazard at the site. Capable tectonic structures and surface faulting are of negligible concern. Because the entire Florida platform, which consists of the site region has been tectonically quiet for more than 145 million years.

Because outcrops are sparse, core and geophysical bore hole logs were examined during multiple site audits to assess the karst and associated dissolution features.

And as Vann Stephenson mentioned, Progress Energy has been nice enough to provide us a sample of the Avon Park formation. The foundation unit for the Levy site. Okay, next slide.

The next two slides address the staff's assessment of karst. Using additional bore hole data, the staff confirmed that low recovery zones in the original site characterization bore holes were soft laterally discontinuous, weathered zones in the normal stratigraphic sequence of the Avon Park.

And were not associated with karst dissolution voids. The increase thickness of quaternary deposits seen in some site borings are likely related to deposition in paleo channels and not in karst collapse features.

And regarding dissolution rates, the upper 150 meters of the Avon Park is primarily dolomitized limestone. And therefore, less susceptible to dissolution than pure limestone.

Calculated dissolution rates for pure

limestone at Crystal River 3 was six times ten to the negative three percent over the 60 year plant life. So potential for dissolution at the Levy site is negligible during the life of the plant. Next slide.

In the site vicinity indicates a lack of subsurface conduits for rapid groundwater flow. The maximum lateral void extent in the Avon Park was calculated by the applicant to be 1.6 meters from actual grout uptakes.

The applicant then conservatively estimated the maximum lateral extent of voids to be three meters, which is the ten feet mentioned earlier. Based on increase in the grout uptake volumes by 50 percent vertically and 100 percent horizontally.

Regarding fracture and bedding plain intersections, borehole data has shown no evidence of extensive dissolution enlarged interconnected fractures or bedding plains in the subsurface at the site location.

MEMBER SKILLMAN: Dr. Devlin, springs, site vicinity. What is the radius of that site vicinity that you referred to there, please? Approximate distance from, if you will, the center of plants or the pair of plants?

DR. DEVLIN: Yes. The site vicinity,

Gary? I believe Gary --

MEMBER SKILLMAN: Like five miles, two miles, three -- you have to go over, Gary, if you could step to the microphone and introduce yourself, just for the record.

MEMBER RAY: That's the hard part.

MR. STIREWALT: Hi. Gary Stirewalt, NRC. NRO Senior Geologist. That is the regular definition that's used for site vicinity. That is a 25 mile radius from the site, as I recall.

MEMBER SKILLMAN: Thank you.

DR. DEVLIN: And then finally, the geologic mapping license condition, which relates to both tectonic and non-tectonic deformation features. So the license condition will provide a final check of dissolution voids at the site location. Next slide.

Now we move on to section 2.5.2, which is the vibratory ground motion. This slide shows the location of the Levy site relative to the surrounding seismicity and the large magnitude seismic source zones.

The closes large magnitude source zone is the Charleston Source, which is approximately 500 kilometers from the site. This is the distant source that dominates the hazard at the site.

The applicant used the EPRI-SOG earthquake catalog and updated it to 2006. Additionally, the staff confirmed that the seismicity through June 2010 was consistent with the applicant's comparison. No earthquakes larger than a magnitude 4.3 occurred in the site region.

MEMBER STETKAR: Has the staff or the applicant considered the 2008 USGS characterization?

DR. DEVLIN: We have looked at it, yes. There has not, we have not done a direct comparison of the hazard generated from the 2008 to what the applicant has done.

MEMBER RAY: John, let me say that Bill did. We have a report submitted. Brian, you received a report from Progress Energy, I believe, that responded to several questions that were a result of the subcommittee meeting.

MR. ANDERSON: I did. In fact, Progress Energy responded to the Document Control Desk at the NRC. So it's a publicly available document.

MEMBER RAY: So that will be a part of the record. And it does address what you just asked about.

MEMBER STETKAR: Thanks, Harold.

MEMBER POWERS: I'm not sure, you said at this stage we discuss tsunami events associated with sea quakes. Or any event associated with the continental shelf collapse. Or particularly the collapse in the Bermuda Zone. Or is that a separate part of the tracker?

MEMBER RAY: Well, I'm trying to follow your question and think at the same time. We did talk about tsunami at the subcommittee. And my recollection is that the shallowness offshore is such that it's very hard to generate.

MEMBER POWERS: That's not the problem. The problem is collapse at Bermuda.

MEMBER RAY: Well, that's what I was going to get to. Is it didn't go to what you asked about.

MEMBER POWERS: Well, it has to.

MEMBER RAY: Well, I'm just trying to recite what we did on recalling it, Dana. But I don't recall any discussion of the source that you're describing.

But I just wanted to mention that we had talked about tsunami otherwise. Now after the staff's done perhaps the applicant can step to the microphone and correct what I just said. But that's what I recall.

DR. DEVLIN: And tsunami is not covered in

2.5, the section I'm discussing right now. Okay?

MEMBER POWERS: I mean, the truth of the matter is that you just don't have any data for it. If I go to the other side of the slide, you really don't have any data, or earthquakes.

DR. DEVLIN: Right. There aren't very many earthquakes occurring in the Atlantic. Mid-Atlantic --

MEMBER POWERS: There are a lot of earthquakes occurring in the Atlantic. We just don't know about them.

DR. DEVLIN: Some of them are measured, but, next slide, please. From the seismologists perspective, the applicant's grouting program raised one main concern. It's whether the seismic wave velocities were the same pre and post grouting.

Velocities used by the applicant to calculate their site response were measured in the non grouted material. So the staff wondered whether the grouting would change the seismic wave velocities.

Through the applicant's grout test program, the applicant measured seismic wave velocities pre and post grouting. This is shown on this slide with four curves. The before and after measurements of P wave and S wave velocities. The measurements demonstrate that the grouting program did not alter the seismic wave velocities. Next slide, please.

To calculate the effect of site specific soils and rock on ground motion, the applicant calculated the site response. And the staff performed confirmatory analysis.

The site specific profile extends from generic rock conditions at the bedrock, to the top of the Avon Park limestone. The applicant's calculations are shown in the open circles. And the staff's calculations are shown in the black line, where the black line envelopes all of the staff's calculations.

The applicant's site response is greater to or equal to the staff's calculation at most frequencies. But the staff's exceeds the applicant's at the frequency range of 30 to 75 Hz. This exceedence is not significant. And it's related to the limitations of the different methods applied.

MEMBER CORRADINI: Where am I looking for the exceedence? I apologize.

DR. DEVLIN: it's at the far right. It's in 30 to 75 Hz. The black line is above the blue line with the open circles.

MEMBER CORRADINI: Thank you, got it.

DR. DEVLIN: Next slide, please. Finally, I'll move on to the staff's evaluation of section 2.5.4. The stability of subsurface materials and foundations.

As we mentioned earlier delimitization of the limestone decreases dissolution rate. And based on borehole data no large dissolution cavities occurred in the subsurface of the site location.

Two phase grouting of the subsurface will inhibit percolation of meteoric water at the site location. Bearing capacity of the Avon Park is adequate to support dynamic and static loads. Settlement and differential settlement are below the AP1000 DCD limits.

And lastly, liquefaction is not possible under the nuclear island due to the properties of the Avon Park formation. This concludes section 2.5. I'll entertain any other questions. I'll turn it over to Pravin Patel.

MR. PATEL: Good morning. My name is Pravin Patel, Office of New Reactors Division of Engineering. I will call three seismic analysis we look at issue of section of 3.7 and the two issues of the section 3.8 related to the foundation design.

Issue number 1, Design Ground Motion

Response Spectra. Issue number 2, Site Specific Soil Structure Analysis. Issue number 3, Maximum Relative Displacement Between the Nuclear Island and the Adjacent Building Foundation.

Ground design response factor. Engineering backfill needed to raise the plant grade to be consistent with the designed soil profiles. The applicant provided the site specific calculation for both, PBRS, which is a performance based response spectra, and GMRS, ground motion response spectra for the following guidance of the section 5.2.1 of the ISG-017.

Resolution. The staff performed the confirmatory site response analysis to all of the surface PBSRS for the site profile. At the foundation level, at elevation 11 feet, to check the maximum required peak calculation of 0.1g horizontal direction for the Avon Park.

There are no significant differences between the staff and applicant's calculated class. In conclusion, the applicant's analysis for the design basis faults, foundation and infrastruction are enveloped by the AP1000 CSRDS and hard rock high frequency. And considered to be non damaging. Next slide please.

Site specific soil structure analysis. Levy free field this one spectra analysis shows that AP1000 CSRDS for the vertical seismic excitation doesn't envelope the design grade deterministic surface spectra in the high frequency range.

The seismic horizontal and vertical SSI input developed by the applicant will be simply 3.7.2 guidance. The CSRDS envelopes for horizontal input spectra, but not the vertical SSI input spectra. SSI input spectra for the soil columns exceeded the high frequency range of greater than 30 Hz approximately.

Resolution. Applicant performed the SSI analysis using the 3DN-2DN analysis. The time history was applied in columns at minus 24, which is the bottom of the RCC bridging mat.

From three directional time histories in the structure for response spectra were generated at nuclear island key locations. These key locations are the same as AP1000 DCD requirements.

In conclusion, the Levy team's design with this response spectra are enveloped by the AP1000 and high frequency spectra. And high frequency spectra and response spectra are enveloped in sufficient margin to account for the site variation in the modeling on the two properties. Next slide, please.

Maximum relative displacement between the NI and adjacent building foundation. The seismically induced lateral formation of the soil surrounding the drill shafts need to be incorporated into the analysis in relation to the shaft deformation, which was previously there was a question about the vertical load.

Resolution. The buildings adjacent to NI are supported on drill shafts. Proposed drill shafts diameters are incorporated in six foot, as applicant stated. The applicant provided supplemental seismic analysis for the seismic displacement between NI and adjacent structures.

The calculated displacement by the applicant is .7 inch with a 2 inch gap required by the DCD. In conclusion, the staff concludes the interaction between NI and adjacent building is not a concern. Next slide, please.

These two issues are relative to section 3.8. The drilled shaft foundation and installation as it is designed and constructability verification program. This will relate mainly to questions asked by the committee. And I will address some of the issues here also.

Issue number 1, the seismic Category II

and non safety-related adjacent building to the NI, which is the turbine building, annex building and the radwaste buildings are supported on the drill shaft foundations.

In reviewing the applicant's supplement information, the staff noticed that the design methodology of the drill shaft supporting the structure adjacent to nuclear island was needed. As a result staff requested additional information.

In the resolution applicant demonstrated that the backfill provides the lateral support for the drill shaft. Applicant provided a detailed description of the construction sequence, practices to be used for the construction of the drill shafts.

Applicant's also proposed the ITAAC to ensure that the as built design provides adequate vertical and horizontal capacity to the thickness. These ITAACs are listed in FSAR 3.8.1 and 3.8.2. And those ITAACs are there.

The applicant demonstrated that the seismic separation between the buildings supported on the drill shafts is adequate to prevent the interaction of the nuclear island.

In conclusion, the staff concludes that the information provided by the applicant demonstrates the design and installation of the drill shaft foundation is very good. Therefore, there is no issue and it is being tacked as a committee items pending the revision of the FSAR. Next slide, please.

RCC strength and constructability verification program. The roller compacted concrete bridging mat is safety related. And will be used to transmit the nuclear island load.

In the field the applicant's and staff noticed that 1, the applicant did not provide enough detail to demonstrate that the RCC bridging mat is capable of transferring the nuclear island loads while providing the desired level of performance.

Second, the applicants construction verification program did not address the capacity of the as-placed material to transfer the design forces across the bedding joints. As a result, the staff requested additional information.

In resolution, the applicant committed to using RCC construction standard guidance for the United States Army Corps of Engineers Engineering Manual, entitled Roller Compacted Concrete.

The RCC construction specification will also specify a reasonable enhancement for the nuclear safety grade quality assurance. For the conceptual design phase of the RCC, applicant committed to using ACI-349, ACI-318 for the design. Thus the failure probability will be consistent within this report.

The pre-COLA and post-COLA RCC testing will be verified that the specified compressor stamp, which is 2400 psi and tensile strength 200 ppsi per the ACI-318 code.

And the standard for the Army Corps of Engineers manual across the lifting joints which are achievable. Post-COLA RCC bedding mix testing will be performed on the large test pad at the site prior to production of the RCC bridging mat.

Applicant's are aware there is a license condition for the Post-COLA testing. We feel that the licensing will complete under this prior to construction.

The 90 day test report for the strength and verification and the constructability testing in accordance with the criteria outlined in FSAR, which will be the new FSAR revision will have this test.

In conclusion, staff concludes that the information provided by the applicant demonstrates that the RCC bridging mat is capable of transferring the NI loads while providing the desired level of performance. Therefore, issue is resolved and being tacked as a committee items.

MEMBER BROWN: I got a question.

MR. PATEL: Yes.

MEMBER BROWN: During the earlier conversations I though the question was asked whether the testing, the prototype testing was not a license condition. Yet you've got comment on both of these pages that says, it implies it is a licensing condition.

MR. PATEL: It is a license condition. Yes. We asked people.

MEMBER BROWN: That's contrary to what we heard previously. At least what I heard. Maybe I didn't hear it --

MR. PATEL: I think applicant's can correct that.

MEMBER RAY: Wait a minute. Let me say what was said. The question was, was there going to be anything coming out of the prototype testing program that would then be the basis for the as-built program. That was the question I asked and that they answered in the negative.

MEMBER BROWN: Right. Because then I didn't understand the point of your question. Because I thought that the test pad. I was thinking of it in terms of the test pad.

And I was saying, well, okay that's not, they're just doing that because they want to make sure they're going to get it right. And they're saying no, they got to do that in order to make, that's a license condition for using that technique. That's the way I'm --

MEMBER RAY: Well those two things aren't inconsistent, Charlie. the point is that the prototype test pad doesn't, isn't the source of the parameters that will be measured in the as-built constructed, the foundation under the nuclear island.

Their part of the design, you're not deriving information. I was trying to find out if the prototype testing was used as a source of design information.

MEMBER BROWN: Okay.

MEMBER RAY: That would then be verified. And if so, then you had to be explicit about obtaining the data. What are the data your going to get from the prototype testing. And the --

MEMBER BROWN: Okay. I understand your point now.

MEMBER RAY: Okay.

MEMBER BROWN: One other question I had

was, is when you're building this giant mat. And I probably should have asked the applicant, sorry for that.

MR. PATEL: Okay.

MEMBER BROWN: Is the quality of that mat and its construction throughout the entire, what is it, 35 foot thickness? Is that just a process control, quality control?

Or are there specific samples taken at various layers or levels of the construction to see, am I meeting certain stress or strength or whatever? And do they cut pieces out and do the same thing they did in the other one? Or is it just process?

MR. PATEL: There are two things involved with that question. One is the quality assurance program for applicant's requirement, because this is a safety related component, the bridging mat.

Second thing, that the question asked what all the samples based on the code and the manual, they're required to achieve those requirement of the the inspections.

MEMBER BROWN: So there's actual material testing done as part of the actual construction of the construction unit?

MR. PATEL: Yes. Just like a safety

related concrete and --

MEMBER BROWN: Okay. That's, was curious. Thank you.

MEMBER SIEBER: Generally in big concrete pours that are safety related, they pour bricks, basically for every truckload at least.

MEMBER BROWN: So it's --

MEMBER SIEBER: Then take it to a laboratory --

MEMBER BROWN: It's like test coupons.

MEMBER SIEBER: And that's the sampling process

MEMBER POWERS: They count the coupons that are --

MEMBER BROWN: Well, I mean, coupons are coupons

(Simultaneous speaking)

MEMBER SIEBER: Ten gallon size coupons.

MR. PATEL: All right. Next slide please. In an effort, I think --

MR. ANDERSON: You should be on slide 19.

MEMBER RAY: I think he did get to the conclusion.

MR. PATEL: Yes. I did conclude that.

DR. DEVLIN: Is this your last slide?

MR. ANDERSON: So this is your last slide.

MR. PATEL: Okay. In EPRI 2000 staff participated in meeting with the applicant in Tucson, Arizona to witness the pre-COLA RCC mixed design test. During the pre-COLA mixed design testing program, the concrete test panels did not attain desired compressive and tensile strength.

The applicant attributed low strength of the core cylinder from the test panel required to use small mixing and compaction equipment. And that's because of the small equipment they used it and the test panel was very small, like ten feet by ten feet or so.

So it did not achieve compaction as required. So it did not achieve the true compression strength. Therefore, applicant committed to use mixing, placement, and compaction equipment; 1, consistent with the Army Corps of Engineers manual, equipment comparable to use with last successful commercial project as was also mentioned.

The applicant biaxial shear test yielded a shear strength at least 1.67 times the maximum design demand shear at the lift joint. Even though the test panel did not achieve the desired compressive strength.

As previously stated, the post-COLA RCC bedding mix testing will be performed on a large test pad, approximately 42 by 40 feet by 6 feet, at the last site, prior to production of the RCC bridging mat.

The applicant had a license condition post-COLA RCC testing. The applicant reports the ITAAC to ensure that the production of the RCC bridging mat placement and consistent with the design requirement resulting from the testing program.

Staff concludes that the applicant assessment of their obtaining the desired compressive and tensile strength from the RCC test program is acceptable.

Therefore, this issue is resolved and is being tracked as a committee item. This concludes my presentation. And if you have any questions, I can answer them. Thank you.

MR. BOWERS: Good morning. My name is Tony Bowers. I'm the emergency preparedness specialist in the Office of Nuclear Security Incident Response, New Reactor Licensing Branch. I'm the lead reviewer for emergency planning for the Levy combined license application, Section 13.3 Emergency Planning.

Staff conducted its review of the Levy

emergency plan in accordance with the standard review plan NUREG-0800 Section 13.3 in emergency planning. Currently there are no open items.

There are approximately 30 confirmatory items which will require NRC staff to validate various revisions being made by the applicant to the emergency plan and associated ITAAC. Staff has received, but not yet reviewed, revision 3 of the COL application, which should resolve these confirmatory items.

The applicant proposed locations for the technical support centers and the operational support centers at the Levy nuclear plant that are consistent with the TSC and OSC locations identified in the AP1000 DCD without any departures.

The staff's evaluation of TSC location size, habitability, and ventilation is contained in the staff's evaluation of the DCD NUREG-1793 and its supplements.

The proposed DOF is to be located at the Crystal River Training Center, West Venable Street in Crystal River, Florida. The EOF is an existing NRC approved facility for use by Crystal River 3. But if approved will be a shared facility.

The EOF is located outside the ten mile EPZ, but within 20 miles of the Levy Nuclear Plant.

Control rooms and TSCs the EOF provides approximately 21,000 square feet of working space will serve as an assembly point for EOF staff and representatives of federal, state, county and industry emergency response agencies.

The emergency plan states in part the EOF will have sufficient space and equipment to accommodate response to a simultaneous emergency at both sites, including the capability to acquire, display, and evaluate radiological, meteorological and plant system data.

Essential for recommending offsite protective measures for both Levy nuclear plant and Crystal River, without any decrease in effectiveness. The staff's evaluation focused on the potential impact to the functionality and capability of the existing facility with the addition of the two new units.

The applicant proposed an EP ITAAC to verify that the EOF equipment and data displays will identify and reflect the affected units during an emergency.

In addition the applicant provided a license condition to demonstrate its integrated capability and functionality of the EOF for simultaneous activation by the Levy and Crystal River emergency response organizations for a simulated emergency condition. Next slide.

This figure is a simple illustration which shows that the Levy ten mile exposure plume, plume-exposure pathway, EPZ overlaps at Crystal River 3. EPZ encompassing the Crystal River 3 power plant within its boundaries.

The applicant provided supplemental information in response to our request for additional information. Confirming that the exact sizes and configurations of the EPZ surrounding the Levy Nuclear Plant were discussed and coordinated with representatives from the State of Florida, Division of Emergency Management.

And Citrus, Levy and Marion County emergency management directors from the ten mile EPZ risk counties. The staff found the size of the Levy EPZ to be acceptable. Next slide.

The staff's conclusions for section 13.3 emergency planning are subject to the successful closure of the confirmatory items identified in the FCR.

FEMA has reviewed the emergency plans for the State of Florida and Levy, Citrus and Marion

Counties, and provided its interim finding report for reasonable assurance to the NRC.

FEMA has concluded that based on its review of the currently available off site plans and procedures, off site plans are adequate. And there is reasonable assurance the plans can be implemented with no corrections needed.

The NRC staff has reviewed the FEMA report and based its overall reasonable assurance finding on the FEMA findings and determinations regarding off site emergency planning.

The Levy nuclear plant COL application includes post licensing commitments, including UP ITAAC that are necessary and sufficient, provide reasonable assurance for on site plans.

Based on the staff's evaluation of the applicant's emergency plan for the proposed Levy units 1 and 2, the staff finds with the additional information and proposed textural revisions provided in response to the staff's RAIs.

The staff finds the applicant's on site emergency plan meets the planning standard in 10 CFR 50.47(b) and the requirements and the requirements and appendix C of 10 CFR part 50. That concludes staff's presentation on emergency planning.

(Simultaneous speaking)

CHAIR ABDEL-KHALIK: -- I believe the emergency plan. But is there any impact on the Crystal River emergency plan for having a large workforce during construction of Levy?

MR. BOWERS: Is there an impact on Crystal River?

CHAIR ABDEL-KHALIK: Right. Crystal River's emergency plan.

MEMBER RAY: Probably not.

MR. BOWERS: So let me focus on Levy.

MEMBER RAY: Just back off from that one a little bit.

MR. BARSS: I'm the team leader for the emergency planning --

MEMBER RAY: Can you start over?

MR. BARSS: Yes. My name is Dan Barss. I'm a team leader for the nuclear licensing branch responsible for the emergency planning reviews. And the answer is yes. There is impact to the Crystal River site.

But it's within the scope of their license requirement to look at that and make any modifications that would be necessary to their emergency plan. They're the ones currently holding the license and impacted by the construction activity. So it's really outside the scope of the Levy. It's more in --

CHAIR ABDEL-KHALIK: I know, but has the staff evaluated that impact assessment?

MR. BARSS: We have not, as part of this proceedings. Now there are regular inspections of the licensee's program. And it would be incorporated in that. I am not personally aware of any modifications or changes they've made. Or looked if they've done that.

MEMBER STETKAR: It's a fairly large transient population if they needed to deal with.

MR. BARSS: I want to direct your attention, there's another point. I want to make sure the full committee is aware of this. We mentioned this yesterday --

MEMBER RAY: Sir, just a few inches back.

MR. BARSS: We mentioned this to the subcommittee meeting yesterday. The emergency planning regulations are going under, or have the significant rule making, that was just implemented. Or are rolling with it December 23rd. It was signed the 23rd of November.

And as a part of that rule making and that change, there are revisions that applicants for COLs will need to make. There was built into that rule making a provision for deferred compliance for applicants such as this one, where we expect that their license may be, if the commission finds appropriate, issued before the December 31st of 2013.

They can defer compliance with those until a later date. And that's all included in the rule making. We wanted to make sure that the full committee was aware of that. That there are revisions that will be made somewhere along the line.

MEMBER RAY: Okay. Thank you. We're all over time. I apologize to the members for that. But I, it is difficult to have only a single subcommittee meeting for something as comprehensive as this.

Because follow up becomes awkward and tends to fill up time here. Dana, did you want to ask the applicant a question about the tsunami that you had? I don't know if they can respond or not --

MEMBER POWERS: Well, I mean --

MEMBER RAY: -- but we can ask --

MEMBER POWERS: What we said is that's in a different section. And we'll probably deal with it when the section comes.

MEMBER RAY: Well, this is it. Do you want to stand up, Bob, and speak to Dana here?

MR. KITCHEN: Sure. This is Bob Kitchen. I'm not sure I heard the complete question. But the studies that we did on tsunami included, we looked at all the most severe phenomena that have occurred in the region that were documented or were geologically traceable.

And determined actually, as we indicated earlier, this is a very low seismic area. There was one seismic source that we considered, which was the Venezuelan seismic source.

And the limiting occurrence for tsunami's actually a landslide event. An underwater landslide event. We looked at two sources for that, the Florida escarpment and the Mississippi Canyon fault, excuse me, Mississippi landslide event, which actually was the more limiting event.

Dr. James Kirby of the University of Delaware is not here today. And I don't think he's on the phone. Actually did the evaluation for us using modeling for tsunami.

And we determined that, using that model and that event, and it resulted in a 13 foot tsunami occurrence, which is way below the 51 foot elevation for the site.

MEMBER POWERS: How about the Bermuda

source?

MR. KITCHEN: I don't know if that was considered or not. There were, Member Powers, there were a number of, as I mentioned, all of the sources that we thought were potential sources were examined. I can't see exactly the Bermuda source. But we can certainly follow that up if you want.

MEMBER POWERS: I think just pointing to me on the application where you've addressed that.

MR. KITCHEN: I'm sorry?

MEMBER POWERS: Point to me in the application where you've addressed that, would be sufficient.

MEMBER RAY: He'd like to look at the section that discussed tsunami and what was considered and so forth.

MR. KITCHEN: Sure.

MEMBER RAY: So if you can just give him the reference, please. Okay. Who else would like --

MR. KITCHEN: It's in the FSAR 2.4.6.

MEMBER POWERS: Oh, thank you.

MR. KITCHEN: 2.4.6 is the discussion of tsunami hazards in the FSAR.

MEMBER RAY: Okay. Well, we can even expedite it if you can hand it to him. Dana, do you have more that you're going to --

MEMBER POWERS: I'd like to come back to the solubility issues on the dolomitic limestone.

MEMBER RAY: Yes.

MEMBER POWERS: When you speak of solubility, that's solubility in something. What is the something?

MEMBER RAY: I think both the staff and the applicant spoke to it. Can you --

DR. DEVLIN: Well, I'll have to turn that over to Gary Stirewell, the geologist.

MR. STIREWALT: Gary Stirewell. Could you please repeat the question? I did not hear it.

MEMBER POWERS: They spoke to the issue of solubility on dolomitic versus aragonite, or whatever calcium carbonate you have on the site. And solubility means solubility in something.

What is the something, water, seawater, freshwater, groundwater? Is it pure water? Is it saltwater? Is it water of a particular pH?

MR. STIREWALT: You mean what is the agent that does the dissolution?

MEMBER POWERS: Yes.

MR. STIREWALT: It will be groundwater.

MEMBER POWERS: Groundwater.

MR. STIREWALT: It will be the groundwater.

MEMBER POWERS: That's not enough for me. You're going to have to tell me what the groundwater is.

MR. STIREWALT: Well, I don't know the exact composition of that groundwater. You're certainly going to have --

MEMBER POWERS: Will the groundwater composition make a difference. Answer's yes. What is it?

MR. STIREWALT: It could make some difference, depending on obviously what the composition is. But again, I don't know the composition of the groundwater. We can check it and find out. But I do not off hand know what it is. The applicant may know.

MEMBER RAY: Let me invite the applicant to add, since this has been addressed by both.

VICE CHAIR ARMIJO: You should have all the mineral content in the groundwater. And that will control whether, you know, if it's saturated in calcium --

MEMBER RAY: I'm not going to try to answer the question. But it has been addressed at some length. Just this particular point, I don't know what.

MR. STIREWALT: From the geologic point of view I don't think it will make any sort of negligible difference. But again, I would need to check to determine exactly what the composition is to support that.

MEMBER RAY: Okay. Thank you. And, Bob, you got anything to add.

MR. KITCHEN: We don't have, I don't have the composition of the groundwater available immediately.

MEMBER RAY: All right. Okay. Well with that, Dana, is that enough? I mean, that's all we can do for now.

MEMBER POWERS: That's all you can do.

MEMBER RAY: All right. And John, and anybody else who is interested, we did get a report addressing a few things that were left over after the subcommittee meeting, including the issue of 2008.

I've asked Weidong to get that to John, as well as Bill's analysis of the report. These are all on the record. Regrettably we've used up all of our time and more here. And couldn't fit in everything. But we'll have to address that. Anybody else who would like to see that?

MEMBER BLEY: Yes, Harold, I'd like to see that.

MEMBER RAY: All right.

MEMBER BLEY: I didn't know that had come in.

MEMBER RAY: Okay. Fine. And with that I think we're done.

CHAIR ABDEL-KHALIK: Okay. We're 15 minutes behind schedule. But we're scheduled to take a 15 minute break. We will reconvene at 11:00.

(Whereupon, the meeting in the above entitled matter went off the record at 10:44 a.m. and back on the records at 11:00 a.m.)

CHAIR ABDEL-KHALIK: We do have a quorum so we are back in session. At this time we'll move to item number 3 on the agenda, Revised Branch Technical Position Regarding Concentration Averaging and Encapsulation of Low-level Radioactive Waste. And Dr. Ryan will lead us through that discussion.

MEMBER RYAN: Thank you, Mr. Chairman. I believe Mr. Greg Suber is going to have some opening remarks. And then we'll introduce the technical presenters and go from there.

MR. SUBER: All right. Thank you, Mike.

Good morning, my name is Gregory Suber. And I am the chief of the low level waste branch in the Division of Waste Management and Environmental Protection.

I would like to start by thanking the ACRS for the opportunity to present our proposed revisions to the Branch Technical Position on Concentration Averaging and Encapsulation to the full committee today.

We appreciate the committee's willingness to review and comment on a draft document. On October the 4th we briefed the ACRS subcommittee. And the comments we received from them were very helpful.

They challenged us to think more about our positions and the basis for those positions. And our reviews will make this a better document in the long run.

Over the past six months the low level waste staff has given a number of presentations to the ACRS. Many of those presentations dealt with the site specific analysis rule making that the staff is undertaking, as well as the Branch Technical Position on Concentration Averaging.

In these meetings there have been a considerable amount of discussion and concern about the concept of intruder protection. While intruder protection may be of great interest to the committee, we would like to reiterate the purpose of today's meeting.

And that is to discuss how to implement the existing regulatory framework in Part 61. And in particular the requirement that any individual inadvertently intruding into a waste disposal site be protected.

Perhaps the intruder protection requirements may change if Part 61 is comprehensively revised in the future. However, as long as there is an A, B, and C waste classification system, there is a need for guidance on how to perform the appropriate averaging.

If the regulations change in the future, we will revisit the need to proceed to revise the DCD accordingly. And we will be happy to discuss in detail revisions to Part 61 at another time.

But we do not have the staff currently at this meeting, participating in this presentation, who can facilitate a detailed discussion on revising Part 61.

The staff believes that the revisions in the 1995 BTP are necessary and desirable. And there seems to be a consensus on this. We expect the revised BTP will accomplish the following.

We'll incorporate recent commission direction on low level waste blending. It will increase the size of sealed sources that can be disposed of in Part 61 facilities, based on more realistic intruder analysis. And would thereby mitigate a national security concern.

In addition, it will make the constraints on averaging of other types of waste more rational. This document is widely used by low level waste generators, processors, and disposal facilities.

The positions not only relate to intruder protection, but also whether or not different types of low level waste have a disposal option. And worker radiation exposures that might be incurred in measuring concentrations of radionuclides are among them.

On October 20th we held a public workshop in Albuquerque, New Mexico to receive comments on the revised BTP. We received favorable reactions from stake holders, such as DOE, National Nuclear Security Administration, and EPRI.

In general, they stated that the revisions are on the right track and headed in the right direction. At the same time some stakeholders have concerns with the scenarios that are the basis for some of our positions, additional testing that might be needed, and other issues.

We will be discussing comments that we received at the ACRS subcommittee, as well as at the October 20th workshop in our presentation.

It is important to note that the changes proposed in this current revision will not take place until the BTP is updated. The existing BTP is incorporated into most low level waste disposal facility licenses. And will remain a benchmark for averaging until it is replaced.

Okay. That is the end of my opening remarks. And is it all right if I just go ahead and introduce --

MEMBER RYAN: No, I want to just make a comment first, if I may. And I guess, Jim, you'll be next, or Christianne?

MR. SUBER: Okay, it would be Maurice.

MEMBER RYAN: I'm sorry, Maurice, excuse me. I didn't understand. I kind of went in order instead of --

MR. SUBER: Okay.

MEMBER RYAN: I guess I appreciate your introductory comments. However, as you know the ACRS has written a letter on 61 already to the commission that is in there. It will be finalized, it's in their hands now.

And we're going to write a letter on what we hear to day and the materials we reviewed. So a second letter will go to the commission if the committee votes to approve the letter, we draft it. So there will be a second letter on this today, so.

And that's our opinion of where we are today. I appreciate the fact that you're briefing us on the dynamic process that you're involved in. And it may, you know, result in other changes or improvements to the BTP.

And we'll certainly react to those through the subcommittee and full committee process. But that's kind of where we are at the moment. So that's our path forward.

VICE CHAIR ARMIJO: I'd just like to say, in your opening remarks you mentioned that the revision includes more realistic intruder or scenarios. When the staff is ready, I'd just like them to point out what these are.

MR. SUBER: Okay. Yes, sir. We will do that in the presentation for it.

MEMBER RYAN: Greg, I might ask you to

just move that microphone away from your paper there. there you go. That's fine. Because it makes --

MR. SUBER: Oh, I'm sorry.

MEMBER RYAN: It makes a thunderous noise --

MR. SUBER: Oh, okay.

MEMBER SKILLMAN: I'm the culprit. That was me.

VICE CHAIR ARMIJO: Everybody's a culprit at one time or another.

MEMBER RYAN: Very good. All right. Without further ado then, let me introduce Maurice Heath from SME. Welcome.

MR. HEATH: Thank you and good morning. And again, like Greg said, thank you for allowing us to come and do this presentation for you today. Before we get started, I just want to introduce everybody.

Myself, Maurice Heath, the project manager. We have Dr. Christianne Ridge, who's our senior systems performance analyst, Mr. Jim Kennedy, the senior project manager, and Mr. John Cochran, from Sandia National Labs, whose been working with us as we revise the BTP.

MEMBER POWERS: Mr. Chairman, I have to

announce that I sit right across the hall from Mr. Cochran, so I will be recusing myself from this discussion.

MR. HEATH: Okay. These are the topics that we want to address today. I'm going to start off with a introduction, a little background why we're here. I'm going to discuss some of the comments we've received from the ACRS subcommittee. And also from the October 20th workshop.

We will go over alternative approaches that is in the BTP. It's a new section that's different from the 1995 to the current draft. We have just a homogeneity guidance encapsulation of sealed sources classify mixture of items. And then we'll summarize at the end.

Now, what is the BTP? It is a guidance document that is primarily for waste generators and processors. What it does is help classify waste for disposal under Part 61, provides for averaging and classifying radionuclide concentrations in waste over a volume or mass based package.

And also this document is widely used in the industry by generators, processors, disposal facilities and also our agreement state regulators.

Now in Part 61, Subpart C, it contains the four performance objectives that any land disposal facility has to meet when disposing of waste. Now how the BTP fits in is, the purpose of the BTP is for protection of individuals from inadvertent intrusion, which is 61.42.

And this slide is just a list of the regulations on how the BTP fits in the regulations. 61.55, which is the waste classification, it contains table 1 and 2 and defines class A, B, and C waste.

And 61.55 is the part of the regulation that allows for concentration averaging in determining waste. The last bullet, Part 20, Appendix G, which most people know as the waste manifest rule, really says that when you're shipping waste for disposal it requires you to classify the waste.

Now this is an example of the tables that are contained in 61.55. Now, I mean, the thing to point out on this table is that when you're talking about disposal limits in Part 61, they're expressed in curies per cubic meter.

And what the BTP provides is a implementation guidance for processors, for waste processors and generators.

Now, a little background. In 2007 low level waste strategic assessment was performed. And out of that revising the BTP was noted as a high priority. And another thing was to risk-inform and performance-base the positions inside of the contained in a BTP.

Now when the issue of blending of low level waste came about, that pretty much put a hold on updating of the BTP until the commission could weigh in. How would we deal with the blending of low level waste?

So when the commission made their decision in SRM-10-0043 that to risk-inform the blending position in the BTP, the staff also thought the opportunity to continue what we sought out to do in '07. To risk-inform performance-base position the entire BTP.

Now when you talk about risk-inform performance-base, the definition the staff is going from comes from the NRC strategic plan and NUREG-1614. Let me go to the second bullet, performance-base.

When we're looking at performance-base, we're looking at measurable, calculable, or objectively observed parameters. And let me go back to the first bullet when we talk about risk-inform.

It talks about the decision making ,approach which uses engineering judgment, safety limits and risk insights. Now, in the October 4th meeting with the subcommittee, there was considerable discussion on whether our revisions to the BTP are, in fact, risk-informed.

And the subcommittee concern appeared to be that the staff didn't take probability in consideration. And also the subcommittee took issue with our characterization of the changes in that way.

And in our revisions we evaluated the consequence of intrusion. And our metric was 500 millirem per year dose to the intruder. We also considered the likelihood of intrusion subjectively, not quantitatively, that is, without a PRA or probability risk assessment.

We have used the term here in other areas of waste disposal. Because whenever we choose a scenario we believe in making a likelihood decision.

MEMBER STETKAR: Maurice, can you, I wasn't at the subcommittee meeting. But I do have some risk background. Could you do us a favor and not use the term risk-informed, if you're not really using a risk-informed approach in the future?

If you're not considering quantitative likelihoods with quantitative estimates of consequences accounting for uncertainties, you are not performing a risk-informed analysis. So if you're not doing that, please don't use that term.

DR. RIDGE: If I could ask the question --

MEMBER STETKAR: Please don't use that term.

DR. RIDGE: If I could ask a question that would inform my thinking on the subject. When we say, for example, that at a certain site the groundwater isn't potable. And so we think it's very unlikely that someone would drink the groundwater there.

And this is where my thinking, maybe you can help inform my thinking. My understanding is when we say, at this site the groundwater's not potable. We're not going to consider a scenario in which someone drinks the groundwater here. Now it's not impossible that someone would drink the groundwater.

MEMBER RYAN: But that's a deterministic decision. It's a doubt probabilistic decision. That's a deterministic decision.

DR. RIDGE: It's not impossible that someone would drink the water but it is very improbable that someone would drink the water. And when we rule that scenario out, I think we're ruling it out because it's a very improbable scenario.

MEMBER RYAN: Fine and dandy. But it's

still a deterministic decision. It's in or it's out. And you say it's out for one reason. Or it's in for another reason. So it's deterministic. It's on or off.

MEMBER RAY: I think, John articulated it very precisely and very well, that, you know --

MEMBER STETKAR: I'm more reacting to the notion of frequency and quantitative estimates of frequency. Essentially, you know, if you look at the history or risk assessment.

You sort of think of the risk triplet. What can happen? How frequently it can happen? What are the consequences and the uncertainties about all of that? And if you're not addressing somehow all of those elements, you're really not doing a risk assessment.

Now in your plate, in your situation, you're addressing one of those and making essentially a pass/fail decision, without doing a quantitative assessment.

DR. RIDGE: Right. We're addressing, as you say, we're addressing the consequence fairly quantitatively. And we're addressing the probability subjectively.

MEMBER RYAN: Yes, and the example uses an interesting one. Because I could construct a scenario where the groundwater may not be potable --

MEMBER POWERS: But it's still dangerous to drink.

MEMBER RYAN: -- but it certainly can conduct radionuclides somewhere else. It could be of interest.

DR. RIDGE: Certainly.

MEMBER RYAN: So is a path ride, but --

DR. RIDGE: Right. And we would --

MEMBER RYAN: -- we won't go on a path ride.

DR. RIDGE: Right. And I'm certainly not saying we would ignore groundwater completely. I'm just saying that if we say essentially that we don't know exactly what the likelihood is that someone's going to drink this groundwater.

We think it's very low. And we're estimating. Our best estimate is that it's very low. And so it's essentially zero. And multiplying the consequence of that scenario by the probability, which we don't know to very many significant digits. And we're estimating that that's zero.

MEMBER STETKAR: The sense is, and I don't want to belabor this too much, because we're short on time. But I think we have to be careful as an integrated agency here, that the Nuclear Regulatory Commission and the staff use the term risk-informed consistently throughout the agency.

And that we don't get very, very sloppy. And just say, well, we're doing a risk-informed analysis. Because otherwise we slip down a very, very dangerous slope.

And it's just too easy to say, we risk-informed this process. Because we used the word probability or we used the word consequences someplace.

So that's really the message here, is that if you're not doing, you know, kind of that estimate of triplet with uncertainty. Just don't characterize it, at least glibly, as a risk-informed process. Explain what you've done. Maybe what you've done is fine. But just be really careful about that.

MEMBER RYAN: Maurice, I guess we should proceed.

MEMBER STETKAR: Yes, yes. I'm sorry let's --

MR. HEATH: All right. We'll move on to slide 10. And just, these are the lists of some of the major changes we've had in the BTP. But just removing a factor of 10 constraint for blending of low level waste, increase the outsource limit.

And like I said, we added a new section called Alternative Approaches. And we added a homogeneity tech. And these items we will touch on later in the presentation.

And this slide is just a list of our major changes. It lists what we revised it to, what 1995 says, and then the reason for change. And it's a busy slide, but we will touch on these items later on, the majority of them, later on in the presentation.

Now slide 12 is a, makes a distinction between the site-significant analysis we're making in BTP. Greg kind of alluded to some of it. Yes, both of them were for intruder protection, period of performance for the scientific rule making.

As most of you probably know with the 20,000 years in the BTP we have scenarios and the basis is for 500 years. And the big distinction is how the BTP is a guidance document. Whereas the site specific analysis rule making is a regulation that will require change.

VICE CHAIR ARMIJO: I don't quite understand that. Could you just try and elaborate on that? Why the 500 years here, compared to the 20,000 years under the site specific analysis?

DR. RIDGE: Do you want to take this?

MR. HEATH: No, go ahead.

DR. RIDGE: The --

VICE CHAIR ARMIJO: Why aren't they the same number? I guess that's what I'm asking.

DR. RIDGE: Well, it's because essentially the different applications. The purpose of the BTP is to, as Maurice said, it's to give implementation guidance to the classification system.

The class based on A, B, and C. We focus on 100 years for Class A waste, 500 years as the time of intrusion for Class C waste. The number of the long, of the radionuclides that cause the ingrowth issues that you've discussed --

VICE CHAIR ARMIJO: That's DU is at 20,000. Okay. You don't have to go any further. I've got it.

DR. RIDGE: Yes. They're not in the classification tables.

VICE CHAIR ARMIJO: Yes.

DR. RIDGE: And so since the BTP is specifically focused on implementing the tables, it is based on those radionuclides and what their profile, I was about to say risk profile, but I won't. What their profile of ingrowth and decay looks like over time.

VICE CHAIR ARMIJO: Okay.

MR. HEATH: Now from the comments from the October 4th subcommittee. Subsequently after that on October 20th we had a workshop in Albuquerque. And some of the comments we received, and I'll go through them on the slides.

And Gregory noted too, the intruder protection in his comments in the beginning. And that's one of the things that the subcommittee noted to us. We had discussion on the concept of intruder protection and protection of individuals far into the future. That was a comment that, from the subcommittee.

The second bullet. Scenario selection was, we had a live discussion on that both in the subcommittee and in the October 20th workshop. And she had some concerns on the scenarios. And we will get into that later in the presentation today.

The discussion was performance-based and that other word. As a discussion we started, we talked about likelihood and risk. And again, we'll get into that a little later as well.

And homogeneity tests, which Christianne will talk about later, was discussed. We had a lot of good comments from industry about homogeneity tests and the impacts it could have. And she will talk about that in her slides as well.

MEMBER RYAN: Maurice, If I may? I think there's one important issue for the committee to appreciate. And that is that --

MR. HEATH: Okay.

MEMBER RYAN: -- some of the homogeneity testing and other things that are done to classify waste at the site of generation can involve worker exposure and all that kind of thing.

VICE CHAIR ARMIJO: Yes.

MEMBER RYAN: So I think that's --

VICE CHAIR ARMIJO: That's important.

MEMBER RYAN: Those kind of improvements are certainly well thought through and, I think, done well. So I just want to kind of separate that from the once-disposed issues. You know, that's one set of questions that I think the committee has.

And then there's the, how do you prepare the waste for transport and disposal. That's kind of a different arena. And one where, unless you're really familiar with it, it's hard to separate all those.

But the homogeneity testing is really related to, how do I get it in a package, on a vehicle, and to a disposal site, mainly? Is that a fair summary?

MR. HEATH: Yes.

MEMBER RYAN: I just wanted the committee to have the benefit of the thought.

MR. HEATH: Okay. Last bullet was a comment we received actually from a phone caller in the subcommittee meeting, where they talked about we have topical reports that have been approved in the past.

And they would like to see that incorporated into the BTP as a point of reference. So it doesn't have to be done again by industry. And one thing to note is that all these comments that we received, we are working our revised draft that we will put out in April. And ask the public and everybody for comment.

And we will address the comments that we have and the comments that we receive today in that draft as well. Next, I'll turn it over to Mr. Jim Kennedy to talk about alternative approaches.

MR. KENNEDY: Okay. Thank you, Maurice. I'm going to talk about alternative approaches to the

BTP positions. And it may seem odd to start off with alternatives to the BTP positions, when we haven't even talked about the positions themselves today.

VICE CHAIR ARMIJO: Yes. Right.

MR. KENNEDY: Well, there is a reason for that. And the reason is because this BTP, the body of the BTP, addresses averaging of the waste classification, or waste concentrations rather, in the generic waste classification system that's contained in 10 CFR Section 61.55.

The generic classification system is for any site in the U.S. A humid and populated site in the east. A dry and less populated site in the west. And anything in between.

It's conservative. And at the subcommittee there was considerable discussion about site specific issues and how they might be taken into account. Because there is conservatism of course in the generic waste classification system, since it's designed for sites all over the country.

And so, and I suspect too, that there was a lot of discussion about site specific issues. Because you all had just recently reviewed the site specific analysis rule making that came to you in the summer and early fall. And that you wrote a letter on back in October, I believe. Or maybe September.

So we thought we'd start off with the alternative approach section today. It's a new section. We think it's an improvement and a big change from the previous BTP.

The 1995 version of the BTP had a section entitled Alternative Provisions. And what it said was, that if you wanted to deviate from any of the provisions in the BTP, you needed to invoke 10 CFR 61.58.

Now that's a provision in our regulations that says, if you want to deviate from waste classification or waste characteristics requirements in Part 61, you invoke that provision.

The BTP said, if you want to deviate from any of the positions in the guidance, you need to invoke that position. So in effect, there was a very high bar that discouraged people from trying different approaches and requesting regulators for different approaches.

In fact, in the State of Utah, they don't even have a 61.58 provision. It's not a matter of compatibility and it's not contained in the Utah Part 61 agreement state equivalent regulations.

So we've revised the BTP. And this

revised version appropriately states that the alternative provisions is restricted to deviations from the regulations. That's the first thing.

The second thing that we've done, is we've put in a new section entitled Alternative Approaches. And it, like with other NRC guidance basically says, this is, the positions in the BTP are one way of meeting the waste concentration averaging provisions in Part 61. And that licensees can demonstrate other ways and deviate from the positions in the BTP.

This is a new philosophy from the 1995 version. The revised version provides broadly applicable look-up guidance and sets a uniform level of safety. You know, we've done the generic analysis. We'll be talking about that later today.

But we specifically have a new section entitled Alternative Approaches. And beyond that we also give examples of what some of those alternatives might be. And what the considerations would be for regulators to approve those alternatives.

One example is for, the BTP sets maximum curie limits for gamma emitters that can be encapsulated in a non radioactive material. And the new section states that larger curie sources might be safe if buried greater than ten meters deep in a long lived source device.

So the alternative approaches section is designed to be, and it is, performance based. It's designed to solve an issue with the 1995 BTP. And more importantly, it's designed to enable licensees and regulators to take into account site specific considerations when they feel that that's necessary to do, and it's warranted.

MEMBER RYAN: And that's a good example that you give there. I appreciate that detail. Will there be other specific kinds of examples? I know you pulled out one for just the slide and to make the point today, but --

MR. KENNEDY: Well, yes. And, Mike, that's a comment that you made at the subcommittee meeting. Was to flesh out those examples as much as we can.

MEMBER RYAN: Yes.

MR. KENNEDY: And we are going to do that.

MEMBER RYAN: Okay. No, I just wanted to get the other members to appreciate the fact that you are thinking about that moving forward.

MR. KENNEDY: Right. And we don't want to just say, you can do other things. You know, you can propose other volumes. We want to give examples of what the considerations might be. Both for licensees to develop a request. And for regulators to approve it.

MEMBER RYAN: Right. I just wanted to make sure that was explicit for all the other member's benefit? Thank you.

MEMBER SKILLMAN: Does the Branch Technical Position specify what the encapsulation container, containers, or protection will be?

MR. KENNEDY: No, no. It discussed encapsulation material needs to be a material that's stabilized and will have structural stability for a certain period of time. But it could be, and it's expected to be, for example, in a 55 gallon drum.

MEMBER SKILLMAN: So glass, or titanium, or stainless steel? Or some kind of monkey metal that they choose that they believe is defendable?

MR. KENNEDY: Well, we rely on the encapsulation media itself, like concrete, for example. And whether it's in a stainless steel 55 gallon drum, it could be in a stainless steel 55 gallon drum, or a mild steel 55 gallon drum. If they're not taking credit for the drum itself. It doesn't matter what the container is.

MEMBER SKILLMAN: Okay.

MR. KENNEDY: And if it's not providing any protection.

MEMBER SKILLMAN: Thank you.

MR. KENNEDY: Okay. Well, here's some examples of the alternative approaches that we give. We talk about alternatives for encapsulations, encapsulation sealed sources.

We address activated metals, contaminated materials and cartridge filters. We singled those out because the BTP assumes that those reactor waste streams may still be intact after 500 years. And an intruder may still come upon them and receive an unsafe exposure.

In other words, they don't become soil-like after 500 years. So it's just one of the assumptions that was in the waste classification tables.

But we allow for the licensees to make an argument that under certain conditions cartridge filters, for example, may have become soil like. And therefore, can be subject to other averaging constraints.

VICE CHAIR ARMIJO: When you use a term soil-like, exactly what do you mean?

DR. RIDGE: I think we mean two things.

One is that it's miscible. The other is that it could be mistaken for soil. Essentially that if it's mixed, if it's brought to the surface and could plausibly be mixed with soil and mistaken for soil.

VICE CHAIR ARMIJO: This wouldn't look like some unusual material? So somebody wouldn't be able to recognize it and say, oh, this is dangerous stuff. Okay, that's, it has nothing to do with radioactivity, decay, or --

DR. RIDGE: No, no, no.

VICE CHAIR ARMIJO: Okay.

MR. KENNEDY: The fact is, the materials would still be discrete items. And because they're discrete items there would be different exposure scenarios.

We have a section on likelihood of intrusion. Some of the comments that we got say we need to beef that up. We agree with that. We don't have a lot of guidance in that section yet. But we'll be working on that.

We have a section on large components. And then we acknowledge that there may be other approaches or other sections, and other positions in the BTP that can be deviated from.

Now here's some of the comments. Not all of the comments, but some of the comments that we've gotten from both the subcommittee and the stakeholders at our October 20th meeting out in Albuquerque.

This one, this was from both meetings. One was that the BTP should acknowledge and endorse previous approvals of alternative approaches in the body of the document, not in the alternative approaches sections. But put it right up in the body of the document.

There was a gentleman from a utility at the subcommittee meeting who said, NRC you've approved this topical report on waste loading, whereby, you can use larger volumes for containers, as long as the waste loading is above a certain minimum of 14 percent.

And we agree with that. We intend to incorporate that into the body of the BTP. Another example that was given at the October 20th workshop was that about 10 years ago the Trojan reactor vessel was disposed of intact.

And what they did was, they put all of the reactor internals into the reactor vessel itself. They filled the vessel with grouting material. And they took the vessel and the internals up the Columbia River to the U.S. Ecology Hanford disposal site.

They saved 67 person-rem by not having to cut up the internals and dispose of them separately. And while we acknowledge that that's a technique that was approved in the past, in the alternative approaches section, one of the commentors asked that we put that up in the body of the report as well.

I'm not sure we can do that. We're going to look into that. But there are a lot of considerations and factors that go into whether an entire reactor vessel and all its internals and the encapsulation materials and so forth, are appropriate.

I'm not sure whether we can endorse that generically. Perhaps we can. We need to think more about that. Another comment we had was that the BTP should provide as many specific considerations as possible for the alternatives.

Mike, that's one that you have. We agree with that. We're going to work on that. Another comment was that it may not be this alternative approaches section, a viable mechanism for having alternatives approved.

And the thought was that this Branch Technical Position is incorporated into most disposal facility licenses. So in effect it really goes from guidance to something more like a regulation.

And we asked about the alternative approaches section at the stakeholder meeting. Whether, in fact, it would useful. I mean, I think the point was, if it's in the license it's going to be a hard sell for a regulator to deviate from what's in the BTP.

But the comments that we got at the stakeholder meeting, was that this was a really important and necessary improvement to the BTP. They thought it was viable.

In other words, they thought that they could submit alternative approaches, proposals to regulators. And they thought they had a reasonable chance of having those approved.

So just to summarize on alternative approaches. It's a new philosophy. the BTP provides look-up guidance. It's simple and easy to use. Provides a uniform level of safety.

If licensees want to deviate from the guidance in the BTP, we have a more straightforward approach for that. And we have stakeholder support for this new section in the Branch Technical Position.

MEMBER RYAN: And just one small comment on the last point you made about having deviation guidance. If something is incorporated into a license, like the BTP is referenced in the license. I think that gives an alternate provision in the BTP strength, rather than weakness.

MR. KENNEDY: Yes. That's exactly right.

MEMBER RYAN: And because it's in the license and that's one of the provisions now of the license and can be used.

MR. KENNEDY: Yes.

MEMBER RYAN: So I think that to me, and I got the feeling that you maybe were initially thinking that wasn't the case.

MR. KENNEDY: Well --

MEMBER RYAN: But my own personal experience is that --

MR. KENNEDY: -- that's a good representation.

MEMBER RYAN: -- they're probably going to get it.

MR. KENNEDY: Yes. What you're saying is that the alternative approaches is a requirement.

MEMBER RYAN: Well, if it's incorporated in a license, it is therefore a requirement.

MR. KENNEDY: Exactly.

MEMBER RYAN: And I can follow that requirement by whatever language it directs me to.

MR. KENNEDY: Yes.

MEMBER RYAN: Thanks.

MR. KENNEDY: Okay. And now I'm going to turn it over to Christianne.

DR. RIDGE: Thank you.

MEMBER BROWN: Can I ask one curious question? You said that the disposal of the whole vessel plus all the stuff. I presume all the high dose?

MR. KENNEDY: Yes. Control rod blades --

MEMBER BROWN: Control rods and stuff inside and it was filled up and --

MR. KENNEDY: -- and grouted.

MEMBER BROWN: You said you're not sure you can endorse that. I mean, it kind of sounded like a good idea. Instead of spreading high dose stuff around --

MR. KENNEDY: I'd endorse it on a generic basis. In other words, put it into the body of the BTP that such an approach is always acceptable under the BTP.

MEMBER BROWN: But you want to evaluate it on a case basis, if somebody --

MR. KENNEDY: No.

MEMBER BROWN: -- wants to do that.

MR. KENNEDY: That's my preliminary thinking is I think it would need to be evaluated on a case by case basis. I'm open to changes on that.

MEMBER BROWN: I'm not trying to advocate one way of the other. I just --

MEMBER RYAN: I'll offer you my thought on it. I think Jim is being cautious and probably not in a bad way. I think his thinking is that some jobs could be just like the first job. You do one and then there's maybe three more like it.

But the fourth one or the fifth one or the sixth one could have deviations that might raise worker exposure issues or other kinds of processing challenges that might be a little different, that may need some additional attention.

Maybe I'm being bold but these jobs can vary quite a bit. And some of them may look very similar. So I think it's fair to have some kind of a step in there to kind of just check that point.

I mean, are we doing one just like the last one? Or has this got enough differences that it should have a review on it's own. So --

MEMBER BROWN: But I agree with the one size fits all thought process that you just said. I was just thinking that there would be some criteria that you'd put in.

What was, you know, the blanket, generic, always, don't bother us. We'll never think about it type stuff. And I think there was some criteria that people would look at.

And, you know, if you're outside this criteria than you got to do it. But if you're inside the criteria, it just kind of simplifies and reduces cost. And does a few things like that. It just --

MEMBER RYAN: And the important part you just said, if I'm outside these criteria. It would be helpful if it not only told you what to do within a given --

MEMBER BROWN: Right.

MEMBER RYAN: -- definition. But it also would be helpful to have criteria that if you are outside of this bound for this kind of situation --

MEMBER BROWN: Right.

MEMBER RYAN: -- it's likely it will need additional review, or whatever it might be. So, you know, telling somebody when they're in is one aspect. And telling when they're out is another.

So that some alternatives to yes, this is okay. And this may not be. You know, that kind of discussion might be helpful.

VICE CHAIR ARMIJO: I just want to make real clear. If someone came in with an alternative approach. They were going to do exactly what was done with the Trojan reactor vessel disposal. They looked up what was done, all the details. And they proposed that to you again. Would that still be acceptable?

MR. KENNEDY: I think that would be hard to turn down if they did exactly what was done before.

VICE CHAIR ARMIJO: All right. So you're not saying that what was done in the past was unacceptable?

MR. KENNEDY: Oh, no. Not at all.

VICE CHAIR ARMIJO: It would still be --

MR. KENNEDY: It's just that it's a very complicated --

VICE CHAIR ARMIJO: And if somebody wanted to do something different, you'd have to look at the differences.

MR. KENNEDY: Right.

VICE CHAIR ARMIJO: Okay. I understand.

MEMBER RYAN: Sam, I'll pick on one point again from my own experience. In a very similar job to the Trojan reactor vessel there could be a big difference in potential worker exposure, you know, because of the materials involved. So I would think that particular aspect would then get additional review as an example.

VICE CHAIR ARMIJO: But the concept of doing something like that is okay. And you would include that as an alternative approach.

MR. KENNEDY: It's in there now, yes.

VICE CHAIR ARMIJO: Okay.

MR. KENNEDY: And folks wanted, as one of the comments, was to put that up in the body of the BTP. And not have it as an alternative. But to have it right in the BTP itself.

VICE CHAIR ARMIJO: Because it had been previously approved.

MR. KENNEDY: Yes.

VICE CHAIR ARMIJO: Okay.

MEMBER SKILLMAN: I think the sense of caution is appropriate. Because you could have --

VICE CHAIR ARMIJO: Yes, a lot of things.

MEMBER SKILLMAN: -- an instance out there where someone says, I want to get rid of this vessel plus all of these parts. And, gee whiz, there's an SNM in there. Or there's some fuel in there. And it's easy and sleazy to park it in there and put it in grout. When in reality the Branch Technical Position might say, if you're in transuranics -

VICE CHAIR ARMIJO: Shouldn't have any problems.

MEMBER SKILLMAN: -- or you didn't have any fuel mass greater than this, you can't do it. And I'd certainly agree with that. So I think the caution is well founded.

MS. RIDGE: All right. I'm going to talk a little bit this morning about the Homogeneity Guidance that's in the BTP. This is one section, so we're turning to the outline here.

I'm going to talk briefly about the Homogeneity Guidance and then if we could go back to the outline slide, Jim will be talking about the rest of the points, Encapsulation, Mixtures, and doing the summary.

The reason that we have the Homogeneity Guidance there for, that I want to talk about this morning. One is that the 1995 BTP had a part of the guidance called the "factor of 10" rule or constraint.

And it constrained the inputs to a mixture of miscible wastes. So essentially, waste that you wanted to mix together and then classify had to be within a factor of 10, the concentration of the final mixture.

Now this is not performance-based, because you're looking at the inputs to the process rather than the outputs to the process.

And so in the revision we're eliminating this "factor of 10" constraint. Now when we eliminate that "factor of 10" constraint, there is no longer any constraint on the homogeneity of what is in the container.

And the concern is that there might be very, very concentrated parts of that container that are being disposed as low-level waste. Or disposed as Class A waste when maybe they should be Class B or C waste.

And the concern came to the fore with an industry proposal to blend waste that is miscible, but has very different radionuclide concentrations. And the specific proposal, although there could be others, the specific proposal was to blend waste to make it Class A waste.

And the average would meet the Class A average, but the ingredients to that mixture could be essentially anything. Certainly they could be Class C mixed with a very low-level Class A to give you Class A waste.

This raised a stakeholder concern based on the perception that Class C waste is going to be buried in my Class A landfill. And so there was this concern even though the barrel on average would meet the Class A.

Now many of you, or all of you, are probably familiar with this, as the blending issue, there was a Commission paper on that issue. And in response to that, the Commission directed the staff to come up with some guidance on homogeneity.

Now in the scenario I just described, there are a lot of ways in which an intruder could intrude upon this waste where it really doesn't matter too much what the concentrations in a single barrel are.

If someone exhumes several packages of waste, for instance in the scenario that was envisioned in the development of Part 61, by building a dwelling and exhumes all of that waste, it's going to mixed to an extent when it's brought up, in addition a person on the site will be moving around the site and further average their exposure.

That hot pocket of waste may not be a concern because it's brought to the surface. And the task for the staff was to think about whether or not this elimination of the "factor of 10" would ever cause a safety concern.

And that's the reason for the Homogeneity Guidance. Now we can go to the next slide. I'll talk about the basis for the Guidance that we did arrive at.

The Commission directed us to consider these homogeneity issue in the context of an intrusion scenario. And so we're looking at the amount of waste than an intruder might come up with. The ways in which an intruder might contact the waste.

And as I said, in the scenarios that were considered in Part 61, a lot of waste is averaged, physically averaged when it's brought to the surface.

There are other ways in which an intruder might contact waste. For instance, a drilling scenario in the waste arena is commonly considered as an alternate way in which an intruder could contact waste. And the NRC considers drilling scenarios in it's Incidental Waste Program.

DOE considers it in the Incidental Waste Program, and a sum of their low-level waste application. So the drilling scenario isn't foreign to this type of consideration.

Now the interesting part of a drilling scenario is that someone coming in and drilling the waste might not average the waste over many packages.

They might come in and hit a hotspot. And we don't know exactly how likely that would be.

But it certainly is plausible that if we're generating a waste stream that has the potential for very concentrated pockets of waste, that an intruder may come in and encounter these.

When we came to the subcommittee, and when we had the October 20th meeting, we received many specific comments on the drilling scenario, that we used as the basis of the Guidance. And I will talk more about those comments and our reaction to those comments in my slides.

VICE CHAIR ARMIJO: I guess, Christianne, what really bothers me is why do you need the intruder scenario in order to come up with a practical, reasonable homogeneity requirement?

Why couldn't you just say forget the intruder, we're going to tell you it's got to be homogeneous to this extent?

We think it's good practice, just do it. And then you don't get into all these, that's what frustrates me is after all is said and done this is a deterministic situation clouded by these scenarios that you come up with.

But you could easily say hey look, we want this material when it's blended to be homogeneous to the following extent. And just write down the rules. And people know what you want and they do it.

And you can, if you wanted to, say oh I'll do an intruder assessment, you know, just say what if somebody did and came into this thing, what would they be exposed to? Okay, you can come up with some numbers but I wouldn't, I just -

MS. RIDGE: Well, I'm not sure what our -

VICE CHAIR ARMIJO: I don't understand why we have to go through these artificial scenarios to come up with some reasonable guidance.

MS. RIDGE: What would our basis be for requiring any homogeneity constraint at all if it didn't impact an intruder, if it, stop?

MEMBER RYAN: I think another thing that's -

MS. RIDGE: Well, but I, but please, I did finish the sentence by saying if it didn't impact an intruder, I didn't ask what is the reason for having this at all. Because we do think that there are some scenarios when it could impact an intruder.

VICE CHAIR ARMIJO: Christianne, I'd go back to your performance objectives on Slide Number 5.

MS. RIDGE: Sure.

VICE CHAIR ARMIJO: And you have four performance objectives and they're listed. And the inadvertent intruder is one of them.

MS. RIDGE: Right.

VICE CHAIR ARMIJO: But you have three others that I think are higher priority. Number one is protection of general population. Number two would be protection of individuals during operations. Number three would be stability of the disposal site after closure.

And by the way, it also provides some protection to intruders far out into the future, which you can't really determine what would happen there but it does provide that.

But the way this is done, it seems like the top priority is protection of these hypothetical, inadvertent intruders and the rules are -

MS. RIDGE: Yes, please do -

VICE CHAIR ARMIJO: -- hard to understand.

MS. RIDGE: -- let me speak to that. I think that impression is generated because of the context of the BTP. Certainly in an evaluation of a license application, all of those performance objectives are our priority. And an intruder is not the top priority, or the only priority, or anything else.

In the specific application of the Branch Technical Position, because the Branch Technical Position is providing guidance on how to interpret the waste classification tables, how to use the waste classification tables, that's why it is so dependent on a consideration of intrusion.

Because the waste classification tables were based on intruder protection. The calculations that were done to arrive at the numbers in those tables were based on intrusion scenarios.

MEMBER RYAN: Christianne, let me, if might add a dimension here of history that I think is in part going to address Dr. Armijo's comment.

When this all started intrusion was assumed because lay sites were not really well cared for in a perpetual sense. The requirements for a stability and closure, and closure funds, and all those kinds of financial instruments and infrastructure, to maintain control of sites, was put in place after the rules were written, and developed after the rules were written.

So you've got a situation now where sites have robust institutional control funds. And in essence, can continue to monitor and maintain a site for a very, very long period of time without running out of money.

So the idea of an intruder is somehow changing in my mind a little bit, if you consider that there are robust institutional controls required for sites.

And then that kind of gets back to one of my questions which is, what's the probability of actually having an intrusion, for whatever period you want to look at, at closure and beyond?

And that hasn't been really discussed yet today. But it's kind of at the root of what, I think his, Doug and Dr. Armijo's -

VICE CHAIR ARMIJO: Yes. Your rules may be just fine, but to keep going back to the basis by which the rules came up with and modifying those bases when it doesn't really, you could just as easily say hey, this is what we want.

These are the rules. We think it will meet all of the performance criteria. It's one through three, which is the ones that are near-term, and stability of the disposal facility, and by the way it will also offer some intruder protection under a variety of scenarios that we've looked at in the past, period.

And at least it's, I think it would be stable. And what I worry about the intruder scenarios, is they get more newer scenarios or more complex scenarios and it's open-ended. So I'll leave it at that.

MS. RIDGE: I'm just thinking about -

VICE CHAIR ARMIJO: That's all I want you to do -

MS. RIDGE: I'm thinking -

VICE CHAIR ARMIJO: -- is to just keep thinking, don't have to debate.

MEMBER SKILLMAN: I would like to ask a question, please?

MS. RIDGE: Yes?

MEMBER SKILLMAN: If the homogeneity concept can have an unintended consequence, as the staff considers, here's how we're going to homogenize to have a package that has less than this many curies, or less than this many, whatever it might be, and accepts the notion of blending other waste forms in there to achieve that homogeneity.

Does the Guidance then create an opportunity for a waste form different than the staff was originally intending? And now there's a new problem that we hadn't considered.

MS. RIDGE: Because mixtures of different waste that are blended may not have the same -

MEMBER SKILLMAN: Characteristics or -

MS. RIDGE: Physical characteristics.

MEMBER SKILLMAN: Could be they generate gas, or they create compounds, or the have a propensity to leak more aggressively against some container material.

I'm just wondering if the notion of homogeneity doesn't actually introduce a physical phenomenon, where 20 years from now we'll say gee whiz, why didn't we think of that.

MS. RIDGE: I think that's a very good question. And the way that's addressed in the BTP right now is that it indicates that blending of physically dissimilar wastes may need to be considered on a case by case basis.

So the specific blending proposal that the staff reacted to in its SECY paper was a proposal to blend ion-exchanged resins with different concentrations of radionuclides. And the staff, at that time, indicated that its recommendation was that that was acceptable.

The Commission agreed with that but there is, I think in consideration of your point, the notion that mixing of physically dissimilar wastes, such as resins and soils, or other combinations of waste that could physically be mixed, may need to be considered on a case by case basis for these reasons.

MEMBER RYAN: There's another dimension too to this, and that's is that many of these processes have process control programs, so I think that in part is in play here, that if you have a PCP that's been reviewed by a regulator and approved, then that sort of gets well, what exactly is your range of activities going to be to create these and that's -

MEMBER SKILLMAN: I would, can't help thinking of zeolite, or metal fines, or getting enough of a source term that there really is enough energy to create stoichiometric hydrogen and oxygen, or some other phenomenon, where we say we knew about that along. But in our effort to enable homogeneity, we shot ourselves in the foot.

MS. RIDGE: And if we have, it was in allowing blending.

MEMBER SKILLMAN: Yes.

MS. RIDGE: The BTP Guidance only constrains that, which the Commission has agreed with in its SRM on the blending Commission paper. So blending in itself isn't introduced here. It has been introduced and this Homogeneity Guidance would put some constraints on that.

MEMBER SKILLMAN: Thank you.

MS. RIDGE: And perhaps, you raise a good point, perhaps there needs to be more consideration here in where we're implementing constraints on the possibilities for mixing physically dissimilar waste.

MEMBER SKILLMAN: Thank you.

MEMBER RYAN: I would point out we're about half way through our allotted time, so we're going to ask that we let Christianne move through her presentation and we can follow up with more questions as we go.

MS. RIDGE: There are three main topics in the Guidance as it stands. Now Gregory and Maurice both thanked you for allowing us to come in and talk about something that is in motion right now.

It's a draft that has not, as of yet, gone out as a draft for public comment. It will be going out as a draft for public comment in April. And so what we're talking about now is that there was a preliminary draft which the subcommittee reacted to, stakeholders reacted to.

So I want to be clear that for the next few slides, I'm going to talk about what is in the

Draft Guidance now. I will then talk about some comments we have received and our reactions to those. And I will finish with some specific changes that we're considering.

The Draft Homogeneity Guidance right now contains three main topics. The first is the notion of a homogeneous waste type. Now this is something that is essentially unchanged since the 1995 BTP.

There are certain waste types that are essentially assumed to be homogeneous and I'll talk about that a little bit more.

And then I've talked a little bit about blending, but for waste types that are not one of these homogeneous waste types that are assumed to be homogeneous, the Draft Guidance does recommend a limit on the volume of waste that has a sum of fractions greater than ten.

So it's essentially saying, if there's a hotspot that has a sum of fractions greater than ten, ten times the appropriate class limit if you're looking at Class C waste, B, or C, ten times that limit, we want to constrain how big that hotspot is.

The Draft Guidance also does recommend an upper limit on the uncertainty in waste classification calculations. So we can go to the next slide.

Homogeneous waste types in brief are specific types of waste -

MEMBER BLEY: Are you going to say more about that uncertainty issue you just -

MS. RIDGE: Yes, yes. I'm going to say more about all of that.

MEMBER BLEY: Go ahead.

MS. RIDGE: Thank you. Homogeneous waste types are assumed to be, are wastes that are assumed to be homogeneous in the context of intrusion. They are specifically listed in the 1995 BTP. They're essentially unchanged in the draft and I'll let you read the list.

But these are wastes that, through experience people have found to be well mixed, radiologically.

Or they are assumed, in the case of containerized dry active waste, they may not be well mixed at the time of disposal but are assumed to become well mixed, because they deteriorate so readily with time, so they're assumed to become well mixed with time.

No test is proposed for these waste types. And there was one caveat that licensees are encouraged not to ignore existing information. For example, if surveys were done to fulfill transportation requirements to ship these packages and a hotspot was found, licensees were asked not to ignore that.

Now to get to the parts of the Guidance that were new. For wastes that were intentionally blended during processing, the Draft Guidance recommends that a container of waste should not contain any pocket larger than .03 cubic meters that has a sum of fractions greater than ten.

And we expect that in most cases, a processor would show that its process generated this waste and would not need to apply this Guidance to every waste package. We understand that it might be cumbersome to apply to every waste package. It certainly could be, through surveys.

But our assumption was that in order to have enough process control to know that you are actually blending waste and not typically putting waste together, that you would through your own industrial process control need to be able to demonstrate that you are not generating these pockets of waste that are essentially unmixed, when what you have is a blending process.

That's what in the Draft Guidance. And

again, we expect in most cases that would be applied to the process rather than the individual waste -

MEMBER SHACK: Do you have a container in mind here? Is this a 55 gallon drum?

VICE CHAIR ARMIJO: Yes, that was my question.

MS. RIDGE: Some of them are larger. The high-integrity containers, they are much larger than 55 gallon drums.

VICE CHAIR ARMIJO: Whether it's a 55 gallon drum or a bigger drum, it's still the one cubic foot?

MS. RIDGE: Yes. And the reason for that was that if you were to bore into the waste, for example for Class A waste at a hundred years, and you bring up a cubic foot of waste that is ten times the Class A limit, you've already consumed 250 millirem of the 500 millirem intruder dose.

And of course, you're bringing up more waste in that column. And again, that part of it is an estimate. We don't know how many containers you would be drilling through. But our thinking was we shouldn't let any cubic foot that you bring up take up more than half of that limit.

MEMBER RYAN: And my own view is there's a conservatism built in there, because if you've ever been on a drill rig and hit a 55 gallon drum, you know that's not soil. It's going to rattle pretty good.

So I think there's some practical aspects to how that would happen, that you would be advertent very quickly there into the drilling as opposed to inadvertent.

MEMBER BLEY: You hit a lot of stuff when you're drilling.

MEMBER SHACK: Well, a carbon steel 55 gallon drum isn't going to be there for a long time.

VICE CHAIR ARMIJO: The concrete inside of it will last longer.

MS. RIDGE: Well, right. But again, we did talk about encapsulation this morning but we're not talking about concrete right now. We're talking about -

VICE CHAIR ARMIJO: So this is just a drum filled with stuff.

MS. RIDGE: This is just a drum filled quite probably with resin, possibly other things, possibly dry active waste. But resin is something we're particularly looking at. Our conversation about encapsulation and concrete filled drums is separate from this.

MEMBER RYAN: There's a lot of metal in DAW.

VICE CHAIR ARMIJO: Okay.

MS. RIDGE? Okay. The last subtopic that's in the current Guidance before I get to the comments on the Guidance, is that the Guidance does recommend a limit on the uncertainty in this waste classification calculation.

More rigorous consideration of uncertainties for waste that has a sum of fractions close to one is consistent with the 1983 Branch Technical Position.

The 1983 Branch Technical Position however, does not provide any quantitative limit. It just says that if your sum of fractions is close to one, we are expecting a more rigorous consideration of uncertainties. And it leaves it at that.

Now again, when we're focusing on waste that we're trying to determine if it's well mixed. We're concerned it might not be. It might have these very concentrated sections, spatial variability in the radionuclide concentrations is a source of uncertainty when you're trying to determine what the concentration is and if the average concentration in a package meets the class limit.

Or if you're mixing wastes in a processing facility and you're trying to produce a number of containers that meet a certain class limit, and you're just taking samples from the processing equipment, certainly the spatial variability is going to impact how well you know what the mean is. And how well you know whether or not the waste has met the classification limit.

But there are, of course, many other sources of uncertainty. There's uncertainty in dose-to-curies ratios, and uncertainty in scaling factors from one radionuclide to another, that are all going to impact how well you know what the sum of fractions is.

The Draft Guidance indicates that the sum of fractions should be less than one minus its standard error. That was based on a one-tailed test if you have enough measurements that you can assume a normal distribution in the errors.

This being less than one minus the standard error gives you about an 85 percent confidence that your concentration is less than the class limit that you're saying that it's less than.

MEMBER BLEY: I haven't thought about this enough to have a really coherent comment. But we're using kind of classical statistics that have some embedded assumptions that aren't clear to me or are consistent with the kind of lumpy stuff we might be looking for.

And I don't know if you folks have delved into that very much. And I wonder if that's a very meaningful statistic that we're looking at here?

MS. RIDGE: I don't, let's just first be clear, when we're talking about the physical characteristics of the waste -

MEMBER BLEY: But they have to be related to the statistical characteristics of what you can find when you go to sample in the waste.

MS. RIDGE: Right. Wait I'm -

MEMBER BLEY: Go ahead. Say whatever you're saying.

MS. RIDGE: My first point was just that the wastes are miscible. So we're not saying we're going to go in and pull out one wrench, and we're going to average that with, I don't know, paper. If you think, when you're talking about lumpy waste.

Dry active waste typically, of course, has a very, very low sum of fractions. And as we started the slide, we're really focusing here on waste that has a sum of fractions close to one for your class limit. So we really do think we're looking at things -

MEMBER RYAN: Christianne, I think it would be helpful for Dr. Bley, I think it boils down to if it's resin, contaminated, I exchange resin and other things are -

MEMBER BLEY: Oh, okay.

MEMBER RYAN: -- relatively homogenous that sometimes -

MEMBER BLEY: That's what we're looking at. That's different than loading stuff in a box. Like you were talking about before where you, yes, okay.

MS. RIDGE: Right. Yes, and I should've clarified that to begin with. But this -

MEMBER BLEY: So I'm not sure, but we made that transition from the things that are two slides back where we were looking for a process that doesn't get you big pieces of things or discreet differences in any activity -

MS. RIDGE: Those weren't big pieces, those were -

MEMBER BLEY: -- the resins, that I can understand this would be reasonable for.

MS. RIDGE: And those processes, those

weren't meant to be big pieces. So maybe this can clarify it?

MEMBER SHACK: Those processes -

MS. RIDGE: Since I started talking -

MEMBER SHACK: -- still were like high-active resins and low-active resins, and you were mixing the two -

MS. RIDGE: Right, exactly.

MEMBER SHACK: Yes.

MS. RIDGE: Everything that I've said since I've started talking has been about miscible waste.

MEMBER BLEY: Okay.

MS. RIDGE: We talked about encapsulation earlier. This whole section of the Guidance is about miscible waste.

MEMBER BLEY: Okay.

MS. RIDGE: Okay, moving on to the comments. Okay, now the first comment that we heard from a number of places, one, of course, from the subcommittee. We also heard this comment in Albuquerque on October 20th, that we need to better quantify the probability of our intrusion scenarios.

And of course, risk is a function of consequence and probability and we understand that.

And we have this comment, in a slightly different way, come from stakeholders on the October 20th meeting.

And that comment was that if the perception of increased risk from blended waste is the basis for recommending homogeneity testing. And as I said, a lot of this did come out of the SRM for the blending Commission paper.

Then it's incumbent upon the NRC staff to present a technical understanding of the risk. And we certainly appreciate that. That if we're saying that the risk is increased, we should present why we believe that to be true. So I'm going to get to our reactions to that.

Now intrusion probability can be quantified for short time periods and we understand that. There are difficulties in forecasting human behavior for very long time periods, of course.

The National Academy of Sciences has weighed in on this in some of it's work on Yucca Mountain, and concluded that there's no basis for long-term intrusion of probability predictions.

Some short-term work was done for the N2S2, or what was then the Nevada Test Site Disposal, and some very thorough work was done in exactly this problem, quantifying the probability of inadvertent intrusion.

And there was a great deal of work done in that area and it was applied to the intrusion protection. And that expert panel that did that work recommended that those probabilities were reliable for around 25 years and that they should be reevaluated every 25 years.

Now the difficulty for us in our application is that we're looking at Class A waste, we're looking at intrusion at the end of institutional controls, which is at 100 years.

For Class C waste we're looking at intrusion at the end of when the intrusion barriers that are required for Class C waste, are expected to be reliable, and that's at 500 years.

And either one of those is well beyond the 25-year period that we think is a rough estimate of when these intrusion probabilities might be reliable. So that's our difficulty.

MEMBER BLEY: Well, before you leave that point, even if you get out there, if you assume that into a given area, the site where this stuff is embedded, that there will be some intrusions, that doesn't force you to assume that there will be an intrusion into every square foot of that site -

MS. RIDGE: No.

MEMBER BLEY: So there are some geometrical things that you could do, even under an assumption that somebody over time will enter this area, there ought to be something you can do beyond just saying, it's guaranteed they're going to go -

MS. RIDGE: And one of the difficulties -

MEMBER BLEY: -- where we don't want them to.

MS. RIDGE: Right. And one of the difficulties there is that we don't know how many bites of the apple there are.

We don't know if the intrusion, some of the work that was done by this panel for N2S2, focused on looking at whether we're expecting the intruder to be one lone person who comes out there in a year or whether it's a whole community.

And that greatly changes the probability that somebody is going to intrude if it's not one person coming onto this site, but there are multiple possibilities here. It could be that there's a whole community there.

And that was actually, although it was a lower probability of the community occurring, when the panel did its work on N2S2 there were so many more people, that actually, that was the dominant scenario that affected those probabilities.

MEMBER RYAN: I think you have to take into account some site-specific issues to really address this. It's very hard to do it in the abstract.

For example, if I have mostly Class A waste, then let's say I have a wide circular cylinder that's five feet in diameter buried in several hundred acres of a site, you very quickly could calculate the probability of hitting it at about 10-6. Is that a probability we worry about in PRA space, for example? I just think we -

MS. RIDGE: But we don't have one cylinder.

MEMBER RYAN: -- need, bear with me just for a minute.

MS. RIDGE: Of course.

MEMBER RYAN: I think you need to think about some kind of construct where we can address what is the likelihood. And maybe it's this very simple random probability of hitting a container with a particular content, given that containers dimension, divided by the area or the site.

And if that probability is very low, then

I think we need to address that. You know, we can't just kind of be in the abstract thinking about oh, I'm going to build a town on a waste site or we're going to have a new neighborhood here. At some point, it's got to be something tractable and that will translate from one site to the other.

MS. RIDGE: And I agree, we shouldn't just be hypothesizing worst case scenarios. But the expert panel -

MEMBER RYAN: Well, building a neighborhood on a waste site is just such a thing, I think.

MS. RIDGE: Well, I am certainly not an expert in human settlement and trends in human settlement.

The panel that did its work for N2S2 thought that the risk and again, here I am using this in the more technical sense of a consequence and the probability of a community developing on one of these sites, was actually greater than the risk from the more likely event that there would be a lone homesteader on that site because of the number of people involved.

And I don't know, as I said I'm not an expert in trends in human community development, but the panel that was there that was their conclusion.

MEMBER RYAN: The other thing I think that's important in this discussion to take into account somehow, is that sites have robust institutional control functions at this point. The ones in the United States do anyway.

And I think your 100-year number is not magic. That was done back in the 70s. There was no real view of institutional control functions. They were very robust. So somehow I think we need to update that aspect of it, that we assume 100 years is the point when this happens.

I'll give you an example. If you look at inventories in low-level waste sites and decay them down to 300 years or 500 years, don't say 300, you have a very limited number of radionuclides left to even worry about.

Several of the long-lived, I-129, carbon-14, and so on, uranium are going to be there. But a lot of the things that are in play at 100 years are gone at 300.

MS. RIDGE: One of the really interesting things to me when I did this analysis was that, you might expect going into this that the Draft Guidance would have one homogeneity test for Class A waste, another one for Class C waste.

But when I looked at Class A waste at 100 years and I looked at Class C waste at 500 years, I got pretty much the same answer.

MEMBER RYAN: I'm looking at just an inventory issue.

MS. RIDGE: But I think that that goes to your point. I don't think this is an -

MEMBER RYAN: Not at all.

MS. RIDGE: I think that this goes to your point that after 300 years, there's really not much to worry about. If we looked at Class C -

MEMBER RYAN: Well, it's not much to worry about. I simply -

MS. RIDGE: -- waste at 500 years.

MEMBER RYAN: I simply said the inventories are greatly reduced in the first few hundred years, I mean the first 100 years lots goes away, cobalts and so on.

MS. RIDGE: Certainly.

MEMBER RYAN: But at 300 years cesium is gone, strontium is gone, lots of other things are off the table. And I'm raising the point, not about let's argue about what's left and what we do with the scenario.

I'm simply saying that if I have a robust institutional control fund that's going to pay for monitoring and maintenance, that it's under one of the 50 Unites States' control to manage that, with whatever arrangement they want to make.

Whether it's a former operator, or a contracted monitoring and maintenance company, that should be an option to account for in the BTP.

MR. KENNEDY: Mike, let me -

MS. RIDGE: Well, the difficulty--I'm sorry.

MR. KENNEDY: Let me just, I agree with you up to a point and this is one of those Part 61 issues, because the requirement for institutional controls in Part 61 simply says you can not rely on active institutional controls beyond a hundred years.

MEMBER RYAN: And that's what I'm challenging.

MR. KENNEDY: Right. And I think a lot of people would say well, that's way too conservative. Like European countries with disposal sites, some of them use 300 years.

MEMBER RYAN: And some of them don't have any.

MR. KENNEDY: And I think a lot of us

would agree with that, me included. But we are dealing with the regulation as it is. And right now, Part 61 says a hundred years is as much as can be relied on.

Now a licensee could request an exemption, that would be a possibility. There's some good arguments for that, but that's something above and beyond what we can do in this Guidance.

MEMBER RYAN: And that's a fair point, I take that away. But it is something I'm going to, that the Committee might address -

MR. KENNEDY: That's fine.

MEMBER RYAN: -- in correspondence -

MR. KENNEDY: Right.

MS. RIDGE: In the context of the rule.

MR. KENNEDY: You know, but the official control goes from really a hundred percent control -

MS. RIDGE: Yes, but -

MR. KENNEDY: -- to zero.

MS. RIDGE: -- it's in the rules.

VICE CHAIR ARMIJO: That's obviously doesn't make any sense. But they, after institutional control is released -

MR. KENNEDY: That's the comment we've had from stakeholders.

VICE CHAIR ARMIJO: But that's not your problem. You didn't make these regulations and we only advise. But we don't agree with them either.

At least I don't.

MR. COCHRAN: And one more thing, Mike, to add and we talked about this in the Subcommittee meeting, for radionuclides that are fairly, evenly distributed in waste, your assessment that at 300 years they're largely gone is correct.

But if you've got concentrated items, and sort of lead into what Jim will talk about in a minute. If you've got concentrated items, even cesium with a 30-year half-life, the dose consequences working with a cesium source, even at 500 years are very significant.

MEMBER RYAN: But the probability of exhuming that little tiny button of something is pretty low.

MR. COCHRAN: It is low.

MEMBER RYAN: So you have to take the consequence and the probability of interacting with it together. That's what determines --

MS. RIDGE: And of course, it does --

MEMBER RYAN: -- the R word.

MS. RIDGE: -- depend on how many of those tiny little buttons there are.

MEMBER RYAN: Right. You know, one times 10-9 times nine is still pretty small or a hundred, whatever you want. I mean the probability of interacting with any or all of them is still very low.

MS. RIDGE: Jim, you might actually, I don't mean to put you on the spot, but you can help me out here. Again, the section of the Guidance I'm talking about is the homogeneity section.

And blending waste--it's just that I know this is something you know well. The proposals for blending waste could be actually related to a significant quantity of waste.

And so I think it's important that we keep separate several things here. One is the buttons, the sealed sources, things like that.

When we were looking at reasons for developing homogeneity guidance, one of the motivating factors was this proposal to blend waste. And blended waste wasn't necessarily going to be a very small amount of Class A waste. In fact, potentially it could be --

MR. KENNEDY: No, you are exactly right, Christianne. The ion-exchange resins, Class B/C ion-exchange resins are a pretty fair fraction of the

Class B/C waste stream, like about half, back in 2008.

There's a lot of resins that are produced. And under the best conditions, meaning if all of that waste were to be blended with available Class A resins, you could take about three-quarters of the Class B/C ion-exchange resins, which is a big fraction of the Class B/C waste stream as a whole, and take it down to Class A.

Blend it down to Class A concentrations. So there's some significant amounts of waste that are involved here, potentially, part of that is what licensees decide to do with their resins. They don't necessarily have to blend them. They could stabilize them and dispose of them as Class B/C.

MS. RIDGE: And if all of that waste is well blended then it would be unlikely to hit these hotspots. But in the absence of any guidance on blending the wastes, the staff doesn't have a mechanism for looking at how well blended those wastes are.

MEMBER RYAN: And of course, that's on the blending side and that's on the intruder exposure. The other side of it is, the fractional release from the inventory is what determines the environmental risk. And it doesn't really matter much if it's blended or not from that standpoint.

MS. RIDGE: For 61.41, I agree with you, for that off site --

MEMBER RYAN: So we've got competing goals in the regulations. That's the thing that I think we're frustrated --

MEMBER BLEY: Maybe that's what we want to talk about. Just one little comment on the intrusion probability issues. One thing that's very helpful often in risk assessment, when you're having trouble formulating scenarios and that sort of thing.

Is instead of saying how could this go wrong? Flip and reframing it, flipping it around so you say, what if I were trying to make this fail, how could I do it?

So the reframing here would be, given I don't know exactly what's there, how could I optimize my chance of getting something? And using a reframing like that to go after this probability. I don't know if that helps or not, but it might. When you think about it, it really doesn't other kinds of risk assessment work.

MS. RIDGE: So in this case, to make it fail would you just assume that the site was blanketed with people, I just want to understand your point --

MEMBER BLEY: No, it's if you were coming back in 500 years, your goal was to go --

MS. RIDGE: Ah, okay, I see, thank you.

MEMBER BLEY: -- find this stuff.

VICE CHAIR ARMIJO: Get a high dose.

MEMBER BLEY: Get a high dose, that was your goal, how would you do it.

MS. RIDGE: Okay.

MEMBER BLEY: And that might lead you to some scenarios that are helpful when --

MS. RIDGE: Okay.

MEMBER BLEY: -- trying to quantify, actually.

MS. RIDGE: Thank you. Okay well, I know, we're running short on time. I've outlined --

MEMBER RYAN: Actually, we have until 1 o'clock because we started late.

MS. RIDGE: Okay.

MEMBER RYAN: We're probably still short on time but go ahead.

MS. RIDGE: So the last slide outlines some of our challenges. And staff's reaction to this is that is perhaps to look more closely at what is needed to establish reasonable assurance.

Again, we see some very significant

challenges in quantifying an intrusion probability. But we do note that the general requirement at 61.40 requires that the performance objectives, the four performance objectives that Maurice discussed, that the staff needs reasonable assurance that those performance objectives will be met, not 100 percent absolute assurance, it needs reasonable assurance.

Now that appears to allow for some consideration of the likelihood of an intruder encountering a hotspot.

And the thinking there is that it doesn't have to be impossible, we don't have to show that it's impossible for an intruder to encounter a hotspot, merely that it is unlikely.

And that allows us to remove certain scenarios from consideration. And so that's one way that the staff has of going at this issue however, subjectively.

Now the staff is considering appropriate technical bases for developing a more technical basis for the argument that I've just outlined to you, that we're starting with this difficulty and this challenge of quantifying intrusion probability.

But that we do recognize that we're not looking for absolute assurance. And that we can remove certain scenarios from consideration and tailor the scenarios, because what we need is reasonable assurance.

And that that in itself, to my mind, incorporates a subjective evaluation of the likelihood of intrusion and ways in which an intruder could interact with this waste.

MEMBER RYAN: I think it also allows you to explore, maybe a follow-up to what Dr. Bley mentioned, and that is when does an inadvertent intruder become an advertent intruder.

Were they're actually excavating with knowledge. Because that can happen too. So I think that's something that could come in, in this kind of thinking, which I appreciate.

MS. RIDGE: We received a number of specific concerns about the drilling scenario we used in the basis in the Guidance. As I pointed out, this wasn't a scenario that was developed specifically for the BTP.

It's a scenario that NRC and DOE do use in other contexts that an intruder might drill into waste and exhume a small amount of waste and then spread drill cuttings on the surface.

And that last assumption was something

that we received a number of comments on. And the one comment we received is that more common drilling method, in at least some parts of the country, is mud rotary drilling.

In which cuttings are brought up into a pit, which is then covered. And so these cuttings aren't spread on the surface. And we understand that.

The staff will look at a range of current technologies. Well, let me get to that in my next slide. I'm sorry, I'm getting a little ahead of myself.

But we understand that comment, that there are certain drilling techniques that are more common than others. So if we can go to the next slide.

The drilling scenario that we considered was used essentially in the same manner as a design basis accident to test the site. This wasn't a site-specific scenario.

This was one scenario that we could envision to test what happens if an intruder brings up a small amount of waste. It's a stylized scenario. It's not site-specific. And the purpose was to test the site against a certain type of challenge.

The staff is considering whether we're going to continue to rely on a scenario in which a small amount of waste is exhumed and spread on the surface.

And as I said, we're considering a range of current drilling technologies and associated consequences.

Now, of course, if there are drilling techniques that are less likely but have much higher consequences, they do merit consideration for that reason, because of the higher consequence even if it's less likely, depending on how much less likely and how much greater the consequence. I think in the context of risk, we can appreciate that.

Now we received another set of comments on waste redistribution. Essentially, pointing out that the Draft Guidance is based on the assumption that the distribution of radioactivity in the waste remains unchanged. And that you can look at it when you've generated it and it will be the same in the disposal site.

And of course, there are a variety of factors that tend to redistribute waste, especially during transportation. There's motion and vibrations during transportation. There are also thermal and density gradients in the waste.

There's simple diffusion from

concentration gradients. And there are other processes that tend to redistribute radioactivity. And so this was one of the comments we received.

Our consideration is that we understand that redistribution may affect how useful it is to evaluate these packages at the time of generation. Now to some extent this makes the problem harder rather than easier, because if you're trying to protect someone from the configuration of the waste as it's disposed, that's what's of concern.

And so if you're redistributing the waste, maybe it's not as easy as surveying it at the time of generation, depending on how important these factors are.

MEMBER RYAN: There's one place to look, at least for the vibrations during transport part, I would look at the exit survey from a generated citation and the arrival survey to disposal site. And if they match there's no redistribution of any consequence.

MS. RIDGE: Right.

MEMBER RYAN: So that's one way you could begin to address, at least that part of it.

MS. RIDGE: Now one thing that was pointed out to us is that resins, in particular, do tend to stratify with density. And that the density is often correlated with the activity because different types of resins have different radionuclide, are used for different purposes.

They come from different parts of the plant. They have different radionuclide concentrations on them. And of course, if you've stratified into horizontal layers, that does, to some extent, reduce the need to understand the intra-package homogeneity.

Because if your most likely scenario that you're considering is that someone comes into the waste from the top, if the whole container meets the class limit and the waste is horizontally stratified, if you come in from the top, you've pulled up a waste that meets the class limit.

MEMBER RYAN: I think that's one that also, industry could have some significant input to it. Because for the same reason, the last thing you want is a stratified waste in a container, you just don't want that.

Because if the dose rate on the surface of the container as part of your compliance, who knows what you're going to have. I think the driver, particularly for resin, is to get it homogeneous before it leaves the facility it's covered. That may not be a current view of the world but I would suggest --

MS. RIDGE: One of the comments we received is that it won't stay that way. That even if you've homogenized it very well, it won't stay that way and I --

VICE CHAIR ARMIJO: Is that an opinion or is that a fact?

MEMBER RYAN: I would like to explore that as opinion --

MS. RIDGE: That was a comment we received and I believe that there were physical demonstrations done at the, I don't remember if that was at the Commission meeting or if that was at a separate meeting.

MR. COCHRAN: In the Chairman's office, actually, yes.

MEMBER RYAN: Oh, you had ion-exchanged resin in the Chairman's office?

MS. RIDGE: Yes.

MEMBER RYAN: That's not good. I think that's all well and good, a law bench demonstration is one thing, but I think the important thing is what happens in real waste containers leaving a facility and arriving at a disposal site, and do they have uniformity, do the surveys match? And if the surveys match, you're done. I think real data from real waste would be a whole lot more instructive.

MS. RIDGE: You bring up a very good point about the associated worker doses that waste stratification could cause.

Now the Branch Technical position is related to waste after it's disposed and meeting the classification limits. And so, we did not delve into that area because there are existing Part 20 regulations --

MEMBER RYAN: Yes, but I'm just picking on this stratification at the horizontal layers. I don't know how that happens in ion-exchanged resin as an example.

VICE CHAIR ARMIJO: Well, for uniform-diameter resins. Big diameter resins, they'll stratify it if you have small-diameter resins. There's a lot of little things like that.

The fundamental thing is, to me, is once it's in a container and it's buried, to say okay, now I'm going to worry about somebody drilling into it, that's where the problem is as far as I'm concerned.

Once you've taken care of all of these

other things, which I consider to really be important performance objectives on your Page 5, you also have some benefit, but you don't design for it to protect against an inadvertent intrusion, but it's not your primary focus.

And so you get involved in all of these complex considerations that really are driving all of your work, and really don't make any difference as far as protecting the general population, protection of individuals during operation, and stability of the site, which are the most important things.

It just seems to me that things are just driven by this inadvertent intrusion and gets you into some really strange kinds of arguments and issues that you don't really need to do it. Maybe your adequate protection idea can get you around this thing and still meet the regulations. But it's very frustrating to hear this, at least for me that --

MS. RIDGE: And you might find it somewhat reassuring that you are hearing a presentation on one specific part of this.

If you were hearing a presentation on the license application for a new low-level waste site, most of the time would probably be spent on 61.41, on protection of the general population from releases from effluents, if that's the presentation you were hearing was on a license application.

What we're talking about today is focused on only one of these areas. Not because it's the most important area, but because that is the task we're working on.

MEMBER RYAN: That's fair enough.

VICE CHAIR ARMIJO: Okay.

MS. RIDGE: Does that help, I hope?

MEMBER RYAN: I still should ask Sam's questions and concerns but fair point, so we probably ought to press on.

MS. RIDGE: Yes, okay. Specific potential revisions. I only have three slides here. On the next three slides, the text in black hasn't changed from something you've seen before. The only things that are changed are in red.

So we talked about homogeneous waste types and what they are. The only change we're thinking right now about making and again, more consideration could be done.

But the only one we're actively considering right now is that we're considering whether this recommendation to use all the existing information, for instance to use transportation surveys and not to ignore existing information, whether that's necessary to develop reasonable assurance.

We've received a comment that even if the staff says that no test is necessary, but we don't want to ignore existing information that, that may not be interpreted that way by state regulators.

And so we're considering whether that's necessary or essentially, if we have reasonable assurance because these waste types are very well mixed. The next slide.

MEMBER RYAN: Just, if you don't mind, I'll just offer a comment. And I understand the value of transportation surveys. Could we back up one slide, please? Thank you. There you go.

I guess the question I would ask is, the states that regulate facilities, now don't they have mechanisms to deal with non-conforming transportation surveys and that's part of the record? I mean, I can't imagine they don't. So what are you going to put in the rule that would, instead of transportation surveys --

MS. RIDGE: Well, all we we're saying --

MEMBER RYAN: -- separately from what states do now.

MS. RIDGE: All we were saying was that for these homogeneous waste types you don't need to do any test to determine that it's homogeneous. And all we were saying is, if there was some other reason that you happen to find the glaring hotspot in a waste, that you otherwise expected to be homogeneous, don't ignore that information.

MEMBER RYAN: Right and I think, I guess my own opinion, I haven't done it for a long time, but is that states do fairly routinely take radiation surveys on an arriving vehicle. And if there is any anomaly, that's immediately evaluated. So I think that's already being done is what I'm suggesting.

MS. RIDGE: Okay.

MEMBER RYAN: So you might recognize that in the BTP, how other tests or evaluations that are appropriate for whatever.

MS. RIDGE: I understand. I'm sorry, I don't think I understood your point at first but now I do.

MEMBER RYAN: Okay, great. Thank you.

MS. RIDGE: With respect to intentional blending during waste processing. I talked about the specific recommendation that waste should not have pockets with the sum of the fractions greater than ten.

We're considering changing that right now to a recommendation that licensee shows that these types of pockets are unlikely. And again, that relates to our reasonable assurance metric. And we think that that will still be protective, but would perhaps reduce the burden off the demonstration.

MEMBER RYAN: Do you have any thoughts how a licensee would demonstrate that?

MS. RIDGE: Well, the practical implication is essentially, instead of saying that you're going to survey the waste as it's being sluiced into containers or something like that, or you're going to survey every package, that it would go to more of a spot check-type basis.

MEMBER RYAN: I see.

MS. RIDGE: And that there would be a threshold if you start to find things that you would need to do further testing.

MEMBER RYAN: Okay.

MS. RIDGE: And that technical basis, we're still working on. But the idea being that it would move to more of a spot check-type basis.

MEMBER RYAN: One thing I think could be helpful, particularly for utilities who do an awful lot of testing of resin and other things like that, preparing it for shipment and still allow recognition of testing that's done by the licensee who owns the resin quarry, gives it to a processor or a transporter to take it away.

So somehow if you recognize any testing that's done to evaluate the conformance of a given batch of waste with an ultimate disposal requirement, whether it's done by the disposal site or the owner of the waste, or some combination of the two, that would be helpful, I would think. I'd defer to Dick Skillman to see if that's a reasonable sort of thing.

MR. SKILLMAN: Yes, this is where I think the notion of assuring that the product of the blending isn't something more grievous than the individual components presented before the blending.

For example, taking into consideration several of the things that you've mentioned, I've handled organic resin, same as a little model airplane, styrene resin. And some of the resin beads are about 1/16th inch in diameter, some are a thirty-second. They'll settle.

And I've also seen where zeolite, which is chabazite, which is silica has been added into the organic resin. And the difference in densities is significant. So that can not only be the settling, but the decomposition products of the organic resins, are methane, ethane, propane, and butane.

And if you get enough source term near the zeolite, you'll get stoichiometric hydrogen and oxygen along with the methane, ethane, propane, and butane.

And so there is the over-arching issue that I think you kind of recognized earlier, there needs to be guidance during the blending. What are we going to end up with? And how are we going to handle it?

It could be for the sake of minimization of volume, we've now created a problem that we really hadn't anticipated. Now we have something that's different. And we say, gee whiz, how did we get here?

MS. RIDGE: Right.

MR. SKILLMAN: And I've seen that happen.

MS. RIDGE: That's a good point.

MR. SKILLMAN: Thank you.

MS. RIDGE: We'll certainly consider that.

MR. SKILLMAN: Thank you. Mike, does that address your --

MEMBER RYAN: Yes. That's a good point. Of course, people have put in venting and other things to kind of address that. All of those things have been, I think at least in part, addressed all the time, but we don't want to learn another new lesson that way.

MR. SKILLMAN: Venting sounds dandy unless it's hydrogen. And now what do we do? Because now you got to handle that and that becomes a real challenge.

MS. RIDGE: Okay, I think we've covered that.

MEMBER SIEBER: I have a little bit of a question on the previous slide, the first red bullet.

MS. RIDGE: Okay.

MEMBER SIEBER: Which one would that be?

MS. RIDGE: Yes, that was the first red bullet.

MEMBER SIEBER: Slide 40?

MS. RIDGE: Yes, Slide 40.

MEMBER SIEBER: Okay. For some licensees who are generators and shippers, they will intentionally mix waste in order to be able to get rid of some.

For example, if you're shipping resins, you use a high-integrity container, and the high-integrity container is the perfect waste to put a real zinger of a dry active filter in there and then fill it up the rest of the way, cap it off, put it on the truck, and put a shield on it.

That particular bullet, where you talk about pockets being unlikely, you generate a pocket when you put a filter into, the hick with resin in it. And so you have to be dishonest to say that it's unlikely.

Does that automatically sort of disallow the practice that some licensees may use, where they get rid of some hot stuff by blending it with a lower-level material?

MS. RIDGE: I think part of what the staff is considering there is the relative number of those waste packages that a generator is making at the site, and they may be engaging in this practice, versus the number of waste packages that would come out of a processing facility that's specifically dedicated to mixing waste with different concentrations.

And I think we need to do more on that specific subject. The intent wasn't to dramatically change practices at generator facilities right now.

MEMBER SIEBER: Well, I could see for some folks that would give them an uneasy conscience by the time they're done.

MEMBER RYAN: One thing I think you should consider and address, or at least noting, is that we're not talking about just what the BTP will say. Ultimately, you have to meet the disposal site requirements where ever that is also.

So I think it would be helpful if the BTP had the phrase, "Consistent with disposal site requirements," in many of the places we've talked about.

Because you wouldn't want to recommend something or strategies that would be in conflict with disposal site or license requirements and they're all going to be there, and I think all the generators know that.

But I think the Guidance ought to be explicit on that point. And I think it helps get away from things where you might see something goofy showing up in a resin liner that may actually be prohibited by disposal site requirements.

MR. COCHRAN: I was going to point out too, you bring up a great point. And if you look at the BTP in big picture, homogeneous waste and the blending of waste is small.

What the BTP is really about is to prevent hotspots in the waste from compromising the protection of the inadvertent human intruder. So we're spending a lot of time on this particular topic, but at a high level the BTP wants to make there aren't hotspots in the waste that will compromise the protection of the intruder.

MEMBER SIEBER: Okay.

MR. COCHRAN: So you won't necessarily see that today because of some of the specific topics that we're focusing on. But that's really a high-level, what the BTP tries to do.

MEMBER SIEBER: Thank you, John. Tempest fugit.

MS. RIDGE: This is my last slide.

MEMBER SIEBER: Okay.

MS. RIDGE: Again, the text in black we've seen before, where we've recommended a ban on the uncertainty in the waste classification calculations. And right now, we're looking more at the acceptable levels of uncertainty in these classification calculations.

I said earlier that the metric we've come up with was just based on a confidence limit and that was fairly subjective. And we recognize that.

And so as an improvement in the Draft, we're trying to look more at the acceptable levels in the uncertainty, based on taking some concentration data and looking at the range of doses we could get to an intruder, if we randomly locate an intruder on a site with packages of various concentrations.

So we're trying, I'm sorry, packages with various levels of concentrations, and the key part being with different certainty of what those concentrations actually are.

We're going to try to get from that, more of an idea of what the acceptable uncertainty is in these numbers. The next is just a summary of what I've said. And in the interest of time, we'll move on.

MR. KENNEDY: And Mike, can you give me some guidance on what I should do at this time? Should I really just try to summarize the general points in these remaining slides, rather than go through each and every one?

MEMBER RYAN: I think we really are having a time constraint and we do need to finish right at 1 o'clock or a few minutes thereafter, no more. So I would advise you to give us the best message and, you know, what you want to do.

MR. KENNEDY: And I particularly want to focus on then Dr. Armijo's concern about the scenarios. And the one scenario, in particular, for sealed sources because I know you're interested in that.

And then also, I think the other thing is the changes in the mixtures of individual items. Changing from the factors of 1.5, 1.5 to 2, and so forth. So I will go through these quickly, in the 13 minutes that are left.

But the reasons for the Sealed Source Guidance, I'm going to be talking about encapsulation of sealed sources first. It has come about because of an increased awareness of safety and security issues with sources.

Back in the 80s there were some significant sealed source accidents around the world, Brazil, Egypt, Morocco. There were some significant consequences, lethal doses to people.

And there's also, of course, the consideration of security now, particularly since 9/11, because sealed sources like cesium-137 can be made into dirty bombs and cause extremely large-scale contamination of populated areas. So this is a topic of great interest.

The 1995 BTP was revised in part to address sealed source averaging and it was done in part because of the accidents that had occurred around the world.

Unfortunately, what it does is it severely constrains the disposal of sealed sources. And as a result, and for other reasons, the DOE National Nuclear Security Administration has a special program called the Off Site Source Recovery Project, for going out and collecting from commercial licensees, abandoned or unwanted sealed sources that potentially pose a national security threat.

So DOE/NNSA has thousands, I believe it's close to 20,000 sources that are in storage, should no place to dispose of them.

Now of course, disposal is preferred. It's the best way to manage waste. If you encapsulate sources and do appropriate averaging, they can be safely disposed of.

But in the context of the concentration other than BTP, sealed sources are indeed a hotspot, a very hotspot, and they were first addressed in the 1995 BTP. And because of the large number that are in storage and because of the severe constraints on their disposal, we relooked at them in this revision to the BTP.

I guess just the main point on this slide is that with respect to encapsulation of sources, one of the constructs is that you put a sealed source, for example, into a 55 gallon drum with concrete and you average over the drum.

What the BTP does do is that it constrains the amount of averaging that you can do. In other words, you can't take a sealed source, a thousand curies of cesium-137 and stick it into a railroad gondola car with contaminated soil and dispose of it at a Class A disposal site, that's simply not appropriate.

And so the BTP, both the 1995 version and the current version, puts some, what we think are reasonable constraints on it. I'm not going to go through all the specifics of what those constraints were and exactly what they are now.

I will point out on Slide 48 that the previous, the 1995 version which is still in effect, constrains the disposal of class cesium-137 sources to 30 curies.

I will also point out that the scenario that they used to come up with that 30-curie limit, is a scenario where an intruder goes into the disposal site, comes up with the sealed source, and is exposed to it for 2360 hours at a distance of one meter from the source.

And if you take into account the 500 millirem per year of dose limit, that's the basis for intruder protection in Part 61, you come up with a 30 curie limit. That's pretty low.

The revised Draft Guidance, we came up with new limits for disposal of sources. We based those on a no-intruder scenario that I'll talk to you in more detail about.

And we also highlight sealed sources in a big way in the Alternative Approaches section. And in there we talk about site-specific and other approaches, waste-specific approaches that could be used to increase the sealed source sizes for disposal even more, provided they're justified and approved by the regulator.

Now with respect to, or I should point out that the, in the save of the, for cesium-137, which is one of the main sealed source radionuclides, we've increased the limit from 30 curies to 140 curies, or rather a 130 curies.

And for Class B waste, we've increased it from a 700 curie limit to no limit now, based on the new scenario that we had. Maurice, let's see, slide 50?

Now in developing the new scenario, that's the basis for the new activity limits that are higher than the 1995 limits, we considered sealed radioactive source accidents for inadvertent intruder discovery of sources within a disposal site.

Now in the development of Part 61, we envision two things for the intruder. Either that the intruder would encounter homogeneous waste, that is waste that was or has become soil-like.

And that the intruder would then build a basement to a house which spreads contaminated soil on the surface, would grow a garden, and would receive radiation exposures from those activities.

Now alternatively, if the waste weren't soil-like, the intruder would encounter an intact waste, a recognizable waste, and back away very quickly after just a few hours of exposure.

But the 1995 Branch Technical Position, developed by NRC staff and some state regulators, was based in part, at least on sealed source accidents, and the idea that someone could intrude into the site, that they would not recognize the hazard associated with the sealed source.

In other words, that they wouldn't stop what they were doing in just a few hours. But that, in fact, they would take it away and be exposed to it for a very long time, 2360 hours at a distance of just one meter. And that's how they came up with the 30 curie limit for cesium-137.

Now we also reviewed the accidents that have occurred around the world. We came up with what we feel is an appropriate and more realistic scenario. It's not real, it's a stylized scenario to ensure that the intruder doesn't receive an inordinately high dose should intrusion occur.

Kind of in a nutshell, it occurs at 500 years. The containers and encapsulating media have decayed. The sealed radioactive source survives.

We postulate in the BTP that there's a pipeline project, large trenches dug through it, one of the workers picks it up and takes it home. And he receives an exposure of what, 700 hours of two meters, I think, something like that.

The key exposure was the fact that the individual finds the sealed source, doesn't recognize it's hazard, it's just a piece of old metal, finds in the soil but it's interesting. Puts it in the pocket and takes it home. And it's the four hours in the pocket that gives most of the dose.

Once it's in the home it's put on a shelf with other curios and it's two meters from where the individual sits.

MEMBER RYAN: I'm just curious --

MR. KENNEDY: That was a small part of the dose.

MEMBER RYAN: -- it's a 30-year half-life and you say it's 500 years down the line?

MR. KENNEDY: Correct, that is correct. And it's because it's so concentrated now, it's very small, lots of activity. And even after 300 years or 500 years, it causes a dose of 500 millirem a year.

MEMBER SKILLMAN: It's got 16 half-lives.

MR. KENNEDY: Sixteen half-lives, it's a huge rejection. And the key point here is that even for things with a moderate half-life like 30 years, if they're highly concentrated at the time of disposal, they can still be dangerous at 500 years.

VICE CHAIR ARMIJO: Isn't it a more practical way just to bury it deep.

MR. KENNEDY: Sure, sure.

VICE CHAIR ARMIJO: And say forget the intruder, forget everything, these things are concentrated, even though the short half-life, let's get them out of the environment in a way that no reasonable intrusion is possible.

We'll just put it in a deep hole below

your trenching for pipelines. And then you say well, somebody will come up with an oil drilling scenario, you know, that's why I have a problem with all these scenarios. You can always come up with something that creates a hazard.

But I just think, to me, that there ought to be more practical ways of addressing this, that just say hey, look, for sealed sources, high concentrations of cesium, we're just going to require that you bury them deep.

MR. COCHRAN: I think that's sort of what the BTP is requiring, right?

MEMBER RYAN: Let's let Jim finish, if you don't mind. I think we're hitting on the same thing of probability of what it means, let's ask Jim that -

MR. KENNEDY: So we used this pipeline trench scenario and it doesn't have to be that, that's just a scenario that we used. It could be the foundation for a large building, it could be something that we can't even foresee in the future.

And we admit that. This scenario isn't based on what's happened today to disposal sites, but it's a stylized scenario to help ensure that the very high doses that can result from sources are not coming into play if an intruder gets to them.

Now here's the revised table here. I mentioned these increased dose limits using this revised scenario for cesium at Class C, it's 130 curies. For cobalt-60, it's no longer a 700 curie limit at Class B, there's no limit. Next slide, Maurice?

This is a graphical presentation of that. We see the increases, in blue it's the 1995 BTP. There's actually a small blue line for class there, it's a very low number. And the green is the revised Draft BTP.

So those were some of the general comments we had. The scenario chosen is arbitrary and consistent with DEIS scenarios. I think the authors of the 1995 BTP felt that the accidents and other safety considerations warranted coming up with guidance, even though it differed from the DEIS scenarios.

The DEIS did not address sealed sources in great detail, nor did it address averaging, actually in the addressing of hotspots and so forth.

Another comment was that accidents with sources are not applicable to disposal of sources or to the accidents happen out in the real-world, abandoned buildings and so forth and, you know, that's a good comment.

You're much more likely to have an accident, of course, in the world and outside of the U.S. than you are at a disposal site. And so we've tried to temper our scenario to make it reasonably foreseeable and conservative, taking into account that it's at a disposal site.

MEMBER RYAN: Jim, I'm going to have to, you're at five minutes, we got a few minutes from DOE, so I need to accommodate that.

MR. KENNEDY: Okay.

MEMBER RYAN: So whatever you want to wrap up.

MR. KENNEDY: All right. We also made some significant changes to the mixtures of items. Mixtures of items means you've got, say reactor components in a container, some of them hot, some of them less hot, you can average over the whole container. But we put constraints on hotspots, on how hot the hottest item can be.

And I think the biggest change is that on Slide 61, the previous BTP for gamma emitters had a factor of 1.5 constraint that said, for any individual items, the concentration of gamma emitters had to be within a factor of 1.5 of the average concentration of all the items in the mixture.

That provides for uniformity around the average. It doesn't necessarily provide any connection to risk because you can be uniform and at the low end of the class limit. So it does that.

What we've done with the revised BTP is two things. First off, we changed it to a factor of two. We thought, given all the uncertainty and then precision that goes into intruder protection and assumptions, that 1.5 implied much more precision than, in fact, there is. So two seemed like a better number.

And we also tied that factor of two constraint for an individual item to the class limit. And we also have a scenario in the Appendix that justifies that.

I know you're running short on time Mike, let me just summarize then on the BTP. It provides guidance to help ensure intruder protection in accordance with the existing Part 61.

The revised BTP addresses new developments since 1995. The blending issue that's come up and that the Commission has given its Direction on. Sealed source security. And the use of risk incites and performance-based regulation.

We've had this workshop on October 20th. We've had good comments or comments from people, stakeholders that are very positive. They think the changes are useful. They also think we need to do more work on some of the issues and some of the positions.

I will also point out that the BTP remains in place in the meantime, and is the benchmark. And whatever positive changes we're in the current version won't be actually into effect until the Draft is finalized.

Now as Maurice said, we're going to be publishing a draft for public comment in April. And that's our next step is to work on, all the comments that we've received to date, including the one in your letter that will be forthcoming and come out with an improved draft.

MEMBER RYAN: Okay, great. So I think the important message for the Committee is that we'll have time for further interaction with you as this develops and as public comment comes in and so forth. So it's not hanging over our heads today, but it's something that's well in development and more time to come.

With all, I'd like to call Linda Suttora from DOE who would like to make a statement. Just right at the microphone, please?

MS. SUTTORA: Okay. Oh, somebody was tall or at least not short. Okay, so I work in the U.S. Department of Energy and I'm in the Environmental Management Program. And we have been using the '95 BTP and we have our own processes for blending, we call it blending or concentration averaging.

And I just wanted to give a short summary of how DOE does their blending and concentration averaging and why it's important that we maintain some sort of harmonized approach.

Because we actually, Department of Energy, both generates low-level waste and disposes it at DOE's facilities, but also dispose it at the commercial facilities. So it's important for us to all have a harmonized approach.

Thank you for giving us the opportunity to share our information. We also appreciate the NRC staff for releasing this preliminary draft, so people can start ruminating on it and germinating new ideas.

The DOE supports many of the suggested changes. Specifically those which provide clearer guidance, greater flexibility with no increase in risk and in summary, it has greater consistency in the regulation of low-level waste disposal.

However, DOE believes it's worthwhile to give further thought to those aspects of the recommended approach that would increase controls while corresponding decrease in risk.

The methods used by DOE provide a relevant benchmark for furthering a risk-informed balanced approach. And as you've probably noticed, DOE considers risk the key component of decision making. And we consider both the long-term risk for future populations.

But we also heavily consider the existing risk to workers which we find, for at least the short-term, we have to heavily consider that we have workers that are exposed to radionuclides on a regular basis. And we really don't want to increase their risk if we don't have to, their exposures, sorry.

DOE manages it's radioactive waste in accordance with our own regulatory scheme, DOE Order 435.1 which in many ways was based on Part 61, so we have a lot of similarities.

And we also, as I say, have our own requirements for insuring that low-level waste is disposed in a manner that's fully protective of the human health, safety, and environment.

In terms of bringing it, I'm afraid to say the word risk-informed after the comments today, but in terms of bringing a risk-informed approach to low-level waste disposal, DOE believes that a thorough and well supported site-specific understanding of a disposal facility, operational practices, and waste forms, and waste containers are relevant variables when assessing the suitability of a waste package for disposal at a specific facility.

We have waste acceptance criteria. We do a site suitability study, we analyze both natural and man-made barriers. As Mike had, what I consider an earth shattering revelation, which we haven't really considered very heavily.

And that is the potential for intruder scenarios when we have much greater institutional controls than were planned or expected when 61 was developed.

And 435, since we based it on 61, we just assumed intruders and we really need to go back to the drawing board at this point, 435 is also under revision as is Part 61 at this time.

And I'm going to bring that back and talk with the highest levels of management in DOE and say, you know what, this is something we haven't, we've just made these assumptions of intruders and we really need to just take that step back and say, DOE facilities, we don't anticipate our own own disposal facilities to ever be released to the public.

We're lucky in that way. The commercial facilities don't make that same assumption of federal ownership, although, they probably will end up being that way but they don't make that assumption. And DOE facilities, we make that assumption. So why are we assuming intruders, 100 percent chance of intruders?

So DOE also submitted comments on the site-specific analyses for demonstrating compliance with the Subpart C performance objectives a few months ago, and so we that's available in ADAMS, we submitted it informally.

MEMBER RYAN: We have copies by the way of your, the Assistant Secretary Marcinowski's signed out paper with the comments. So all members will receive --

MS. SUTTORA: Okay, terrific, thank you. Yes, so we've submitted those comments so you should have those. And we also commented on the period performance paper from a few months ago and so that's available also if you don't have it, I can get it for you.

VICE CHAIR ARMIJO: We reference that in

our material.

MS. SUTTORA: Okay. So DOE considers consolidation consistent with the philosophy of a less, I can't say that today, prescriptive risk-informed approach.

DOE's consolidation approach provides flexibility for managing DOE waste and demonstrating how applicable DOE performance objectives and waste acceptance criteria are met. Thereby, encouraging improved outcomes when protecting health and safety.

DOE calculates the concentration of radionuclides present when consolidating, by averaging the total mass of the waste volume, including the waste packaging as appropriate, in accordance with site-specific intruder scenarios.

In some cases, grout used to stabilize the waste package is considered in the concentration averaging. Now we've got a few differences from the way the NRC does it.

DOE does not necessarily require consolidated waste to be homogeneous. Safety requirements, technological limits, ALARA considerations, and process limitations are relevant variables that often make homogeneity of radioactive waste impractical.

When solid radioactive wastes are consolidated, no attempt is generally made to achieve homogeneity. We often will take the solids and we'll stick a grout in there just to stabilize them, so you'll have less subsidence issues earlier on.

But we don't actually make a big, we'll throw wrenches, and PPE, and all kinds of stuff in a drum and average it over the size of the drum.

When solid radioactive wastes are consolidated--I did that--the degree of waste homogenization required is driven by the site-specific conditions of the disposal facility.

And we heavily take into account what's required by the EPA, Department of Transportation, and the host state. So we are looking ahead at the disposal facility. We're looking ahead at the transportation requirements.

And we find that if you take all those other requirements into consideration, homogeneity is not important. It's not a critical thing to start establishing way early in the process.

And also as part of its process, DOE has waste handlers to determine the safest, cost-effective, and practical method for managing the radioactive waste.

So if the waste streams are anticipated to be consolidated, we actually require characterization before and after the consolidation takes place. And then prior to shipping, we require the classifications of characterization when packaging, classification prior to disposal, prior to transportation.

And we always require that they verify that it meets the waste acceptance of the disposal facility. Of course, if we find that it's better to be homogeneous, we will require the packager to do that but we don't require it all the time.

So as I said, the beauty of the DOE disposal facilities is that we're generally located on large federally-owned reservations. And that the Federal Government is committed to retaining ownership and control of the land.

However, for some reason we still hear these wild intruder scenarios, inadvertent intruder scenarios. But the difference that we do, is we do context-based.

So if it's a very, and I think I mentioned this during the period of performance paper, is if it's a very rocky environment and the well driller is used to drilling through rock, they'll use a different drill bit.

And so if they hit a, so we don't discount the chance that if they hit a drum or hit a chunk of cement, that they'll treat that any differently. Because the assumption is they might hit something hard and it won't be surprising if they do.

But in places like South Carolina where the soil is very much like sand, if they hit a drum or something hard rock, the assumption is they will move to another location, they won't drill through it.

And so we allow these site-specific, contextual scenarios when we do our intruder scenarios. We don't have one-size-fits-all. And that's an important point when we do these. Inadvertent intrusion --

MEMBER RYAN: We really are getting over time so I'm going to have to ask you maybe wrap up --

MS. SUTTORA: Okay.

MEMBER RYAN: -- the next couple of minutes, if you don't mind.

MS. SUTTORA: I'm just going to do my --

MEMBER RYAN: Please?

MS. SUTTORA: -- what we think are issues. Okay, so we do have the following concerns. As a general observation, it's appropriate for NRC to consider providing a basis for their intruder analysis, we talked about that today.

Also, the Draft BTP does not appear to be clear as to the basis, or need, to establish controls premised on inadvertent intruder scenarios exposed to uncontrolled radiation sources left unsecured, or in abandon buildings in other countries. It's not clear how such a scenario is relevant.

And also, we suggest refining the alternative approaches discussion. And we suggest that NRC consider clarifying the precedent or basis for NRC's selection of a ten meter depth of disposal for the alternative approach's discussion, and with further explanation or basis for the default ten meter depth. And that's all I have.

MEMBER RYAN: Okay, great. Now correct me if I'm wrong, but all of the comments and points you made are in this --

MS. SUTTORA: Yes.

MEMBER RYAN: -- summary document?

MS. SUTTORA: There are.

MEMBER RYAN: So we have the entire text. And I apologize for the late schedule. And with that Mr. Chairman, I'll turn it back to you. Thank you very much --

CHAIR ABDEL-KHALIK: Thank you.

MEMBER RYAN: -- for coming and making comments.

CHAIR ABDEL-KHALIK: Thank you very much. We're 30 minutes behind schedule. So we'll split the difference. We'll break for lunch and we will return at 2:00 p.m.

(Whereupon, the meeting in the foregoing matter went off the record at 1:13 p.m. and went back on the record at 2:00 p.m.)

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

CHAIR ABDEL-KHALIK: We are back in session. At this time we'll move to item number 4 on the agenda, Proposed Requirements for Maintenance of ITAAC and the Associated Regulatory Guide. And Dr. Bley will lead us through that discussion.

MEMBER BLEY: Thank you, Mr. Chairman. Two years ago we reviewed an earlier draft of Reg Guide 1.215, notes and comments, most of those were incorporated in one fashion or another in what followed.

But in the intervening time, it was noted that there was kind of a gap in the regulation. That's what we're going to hear about today, how the rule change will take care of that and how that's been factored into the guidance in Reg Guide 1.215. And Jim Gaslevic, did I say that right?

MR. GASLEVIC: Gaslevic, yes.

MEMBER BLEY: Gaslevic, sorry.

MR. GASLEVIC: Very close.

MEMBER BLEY: Will begin the presentation for staff.

MR. GASLEVIC: Well, actually Mark --

MEMBER BLEY: Oh, Mark will, I'm sorry. I got it backwards.

MR. KOWAL: Good afternoon. My name is Mark Kowal. I'm the Branch Chief of the ITAAC Branch in NRO. And today we're going to talk to you about the ITAAC maintenance rule making and the associated revision to Reg Guide 1.215, which captures the rule making guidance.

And this is an effort that really, we've been working on over the last two or three years probably, regarding ITAAC maintenance. It's been the subject of numerous public meetings including Commission meetings.

Both these documents have been developed and out for public comment. And I guess they're being processed and developed in parallel. And we plan to issue them concurrently, the spring time of next year is the current schedule.

So with that, Earl Libby is going to discuss the ITAAC maintenance rule making and Jim will discuss the associated Reg Guide and NEI 08-01 changes.

MR. LIBBY: Good afternoon, Earl Libby, New Reactor Office and well, we have a new branch today, so it's the Advanced Reactor Policy Branch.

(Simultaneous speaking)

MEMBER CORRADINI: Everything changed after December 1st.

MR. LIBBY: Yes it did.

MEMBER CORRADINI: And you don't know where you are?

MR. LIBBY: I know where I am.

MEMBER CORRADINI: Doesn't know what he's called.

MR. LIBBY: It's the Associated Branch is different, that's all.

MEMBER CORRADINI: Take a vote.

MR. LIBBY: I'd like to address the changes from the proposed rule making for 10 CFR 52.99, to the final rule of 10 CFR 52.99.

Specifically, the rule change was put forward to add reporting requirements to licensees. And that was specifically our, if there is new information that materially alters the basis for determinating that a prescribed inspection, test, or acceptance criteria, or analysis was performed as required and the finding that the prescribed acceptance criteria was met.

So if the ITAAC completion letter has been submitted to the NRC, something materially changes the basis for that ITAAC completion. Then the regulations now require a second notification. They post-close the notification.

The other addition that was added is that the NRC is now requiring, with this final rule, that the licensee submit an all ITAAC completed notification, okay. That has gone into Section 10 CFR 52.998. One, two, three, and four are different sections there.

While we're really working on 10 CFR 52.99, we brought some of the language up to agree more closely with the Atomic Energy Act language. Next slide.

CHAIR ABDEL-KHALIK: I assume you will expand on the word materially.

VICE CHAIR ARMIJO: Yes, right.

MR. LIBBY: No. I'm going to turn that over to Jim Gaslevic, when he gets to the Guidance to expound eloquently on materially effects.

MEMBER SKILLMAN: Before you change, please, certainly the second slash under the second bullet, notify the NRC of completion of all ITAAC activities.

MR. LIBBY: Right.

MEMBER SKILLMAN: Is the context of that, when it is 100 percent all complete, said and done, then there is a notification. Or does that mean when I complete ITAAC perhaps for Chapter 6 components, I notify the NRC.

And when I complete ITAAC somewhere else in Tier 1 stuff, I notify the NRC. Is the context that there is only one notification when everything is completed? Or does this mean incremental notification as the ITAAC are completed?

MR. LIBBY: Good question. The first scenario that you put out. There is one notification that 100 percent of the ITAAC are complete.

MEMBER SKILLMAN: Yes, sir. Thank you.

MR. GASLEVIC: Earl, if I could add? Say you mentioned materially altering. And I offer this definition that appears in the rules' detailed discussion.

The term materially altering refers to situations in which there is information not contained in the original closure notification, that has a natural tendency or capability to influence an Agency decision maker.

CHAIR ABDEL-KHALIK: Very fuzzy, maybe we'll get to it.

MR. LIBBY: We'll probably spend some time on that later.

CHAIR ABDEL-KHALIK: Proceed.

MR. LIBBY: Okay, the basis for the rule making as was pointed out earlier by Dr. Bley, without the rule change itself, licensees may not have been required to notify the NRC of issues or activities that would have affected or may have affected previously closed ITAAC.

That's an ITAAC that had the ITAAC completion, ITAAC closure notification already submitted. The rule change now requires that they do notify us when something materially affects them.

The adverse impact of that, not being in the rule, is that it could potentially affect the NRC staff ITAAC closure activities.

Including the inspection participation in the ITAAC hearing, the validity of the Commission's 10 CFR 52.103(g) finding, and could impact the information that's available to the general public, or interested parties that may want to request a hearing at that point in time.

As was pointed out earlier, we had significant public interactions up to this point. A proposed rule went through quite a through iterations, including public moves during the 2009/2010 time frame.

And we had well, the proposed rule went out earlier in this year. The comment period ended in July of this year. And we have one commenter with 11 comments on the rule itself. That was NEI. Okay.

MEMBER BLEY: I'm just curious about that. That's very limited comments, but you've been through all these meetings. So things change because of the meetings, such that it never got to the point of getting other comments.

MR. LIBBY: Right.

MEMBER BLEY: Or were they kind of general industry?

MR. GASLEVIC: Well, the comments were basically at its real nature and not really considered significant. But that's kind of a testament to the success of the workshops, and the interactions, and gaining understanding between staff and industry up front before guides come out, before proposed rules are issued.

MEMBER BLEY: Okay.

MR. LIBBY: A SRM on the proposed rule instructed that the details of the rule itself be included in guidance such as the documentation required, the definition for materially altered, things like that, additional notifications in a time frame for the completion of those notifications.

So the final rule itself merely lays out the requirements, essentially a performance-based rule.

There was one correction in the final rule from the proposed rule. And that was on 52.99(e)(2) in the second sentence. And that was a change from(C)(1) through(C)(4) of this section, which changed to (C)(1) to (C)(3) of this section.

So the entire rule now states, "The NRC shall make publicly available a licensee notification under Paragraph (C)(1) through (C)(3) of this section no later than the date of publication of the Notice of Intended Operations required by 10 CFR 52.1030(a)."

And that's a correction, you can leave it there, that's fine. Leave it on that page. And that was a correction because there was a time frame associated with the 103(a) filings. And then working your way through, down to the all ITAAC complete notification which was the (C)(4).

This is a listing of all the notifications required under 52.99, (C)(1), ITAAC closure notification, there's a language change only to "are meant." (C)(2) is the new one, that's a ITAAC post-closure notifications, materially altered.

(C)(3) is uncompleted ITAAC notifications, also referred to as the 225-day notification. And 52.99 (C)(4), all ITAAC complete notification is a new notification, again, that all, 100 percent of the ITAAC are complete. Questions on the rule itself before we get into the Reg Guide?

MEMBER BLEY: Of course, I think I understand the rule. That last one comes very close to fuel load, is that right?

MR. LIBBY: Yes. It should be between 180 days or, between the 270-day filing and 180-day notification from the NRC back out to the public for the ability to request a hearing. And it should be after that time frame.

MEMBER BLEY: Okay, thank you.

CHAIR ABDEL-KHALIK: And the timing for the notification under items one through three would be what?

MR. LIBBY: They would be up to 325 days prior to fuel loading, from issuance of a license all the way up to the 103(a) filing, up to about 225 days prior to fuel load.

MR. GASLEVIC: Earl, could I ask Mike Spencer to maybe clarify a little bit on the timing of the potential all ITAAC complete notification.

MR. SPENCER: Just to clarify the, because I wasn't sure if I understood the answer of it. It would be right next to scheduled fuel load. It'd be very close to that.

MR. LIBBY: Correct.

MR. SPENCER: Okay.

MR. KOWAL: But you're asking about the time --

CHAIR ABDEL-KHALIK: For one through three --

MR. KOWAL: -- for one through three. And are you asking, I mean the (C)(1) notifications would come in whenever the ITAAC are completed?

MEMBER BLEY: They could come in very early.

MR. KOWAL: They could come at any time, from the time the COL is issued --

CHAIR ABDEL-KHALIK: No, I'm interested in the previous slide that says no later than the date of publication of the Notice of Intended Operation required by 10 CFR 52.103(a).

MR. LIBBY: Correct.

CHAIR ABDEL-KHALIK: What would be the latest date of that notification?

MR. LIBBY: That notification, okay, that time frame right there, the 52.103(a) is when the NRC goes back out with a public notice and that is 180 days prior to fuel load.

CHAIR ABDEL-KHALIK: Okay.

MR. LIBBY: Okay.

CHAIR ABDEL-KHALIK: All right. Thanks.

MEMBER STETKAR: This 52.99(C)(3) --

MR. LIBBY: Yes.

MEMBER STETKAR: -- has to be filed --

MR. LIBBY: Two hundred twenty-five days --

MEMBER STETKAR: -- no later than 225 days before fuel load, is that --

MR. LIBBY: Correct.

MEMBER STETKAR: Okay.

MEMBER BROWN: Before you go, the all ITAAC complete, when you're told all ITAAC are complete, you said nobody does anything until you're notified. Is that when you do your inspections or do you do any inspections? When do you actually inspect --

MR. LIBBY: The inspections start immediately.

MEMBER BROWN: -- the actual ITAACs? Do

they tell you all, I'm trying to understand what you said earlier. Were you notified those ITAACs are completed as they are completed? I mean it could be two years before fuel load or whatever.

MR. GASLEVIC: The inspections start as soon as construction begins. The Region II staff has, and coordinates with the licensee to inspect targeted ITAAC. Those inspection results are then databased for us to reference later.

MEMBER BROWN: You say targeted?

MR. GASLEVIC: Targeted ITAAC, initially, and if warranted, it's available that the inspections can open up to wider areas, to other ITAACs.

MEMBER BROWN: Okay, so it's a sample-based, that's what you targeted.

MR. GASLEVIC: Yes it would.

MEMBER RYAN: I was just going to ask what the criterias that were targeted.

MR. GASLEVIC: There was a prioritization process of the ITAAC that staffers entered into ACRS -

MEMBER CORRADINI: About five years ago.

MR. GASLEVIC: So there was a set of ITAAC then that were identified as being probably preferable for scheduling an expecting inspection up front, and so those will be targeted from the onset of construction. But if needed, we have the availability to expand that inspection.

MEMBER BROWN: Okay, the inspections, are they done by staff or is that just by Region inspectors? Are there any of these targeted for headquarters inspection?

MR. KOWAL: The majority of them are target ITAAC, Region II leads the inspections. But the tech staff and headquarters may need to get involved in situations where there's technical inspection of reports and those types of things. But Region II leads the inspections.

MEMBER BROWN: Yes, I can understand running a cable, making sure the connections are all made to the right terminal boards. I wouldn't just think that headquarters staff to do it.

But certain types of ITAAC that are associated with, like the new instrumentation and control systems. I would think would require a more engineer oriented review than an "trained inspector," where there's a specific set of, check this number, it's supposed to be five versus four or whatever the thing is.

When's that decision made? Is that done, I'm still trying to figure this out from all the meetings we've had as to when that decision is made.

MR. BEARDSLEY: This is Jim BEARDSLEY. I'm Chief of the Construction Inspection Program Branch. For the last year and continuing into next year, we're breaking down each one of the ITAAC families, looking at the targeted ITAAC.

And then deciding what resources are most appropriate to do those inspections. We're doing that in coordination with the headquarters technical staff.

So in those cases where technical staff researchers would be much more appropriate because of the technical nature of it, or in the case you brought up, the new digital INC system, something like that, we would then schedule with those technical branches that inspection activity.

So they'll be either physically onsite with the inspection team. Or the inspection team leader will task them with a certain part of that inspection activity. But all of that is being done, as Jim said, well before any ITAAC closure letters are received.

MEMBER BROWN: Right, okay. So the closure letters are effectively final thing saying all the inspections have been made. You all have been involved where you want to be involved. And now we're all done and they can proceed with whatever --

MEMBER BLEY: We've had some other presentations on this. And gentlemen, correct me if I say this wrong, these are the closure notifications that are required by rule.

In addition, when you read NEI 08-01 and the Reg Guide, there will be a series of reports reporting closure of various ITAACs or there might, from what I understood. And as soon as that happens, inspections could begin. Is that right?

MR. GASLEVIC: That could be the case. And in the Reg Guide we explain and we offer that partial closure letters occur on very complex and very long ITAAC. Because receiving all of those very complex, big ITAAC late in construction towards fuel load would really impact the resources of staff. So that is offered.

MR. BEARDSLEY: Yes, our intention is to conduct inspection, if not all, almost all of the inspection well before the ITAAC are closed.

We have the licensee schedule, we're planning on scheduling those inspections during construction so we're there as those construction activities are completed.

Or as the reports that build up the ITAAC closure packages are completed. So we can look at those when the notifications are received, we should have all the data we need to go evaluate whether or not the licensee has truly closed those ITAAC.

MR. KOWAL: Once an ITAAC closure notification under (C)(1) is submitted to us, all the inspections will have been done by that point.

So we will review and verify that the ITAAC are indeed closed. There may be cases, hopefully not many, where we may need to go out and maybe do a little more inspection if we have questions on one of the ITAACs.

CHAIR ABDEL-KHALIK: Would you expect that a lot of inspections would have to be repeated as a result of this rule change, or would this be a rare occasion?

MR. GASLEVIC: No repeat inspections unless there was rework that needed to be done on a previously closed ITAAC. And really this rule will provide notification on how the licensee resolved that situation.

But the guidance that's associated with the rule also recommends that there be prompt notification to us. And I'll get to those situations in just a couple of slides.

MR. KOWAL: But I think in our discussions with industry and as we were developing the rule, I think we've asked ourselves on numerous occasions well, how many of these do we expect?

How many of the (C)(2) notifications do we expect to see? And I think that everybody in general agrees, it was not many, a handful maybe, of the (C)(2) where we would need a post-closure notification on an ITAAC.

MEMBER BROWN: So (C)(2) is when it's been closed but some new work has been done or it's had to be done. Do you all get notified of each one of those so that it goes on a --

MR. KOWAL: Yes.

MEMBER BROWN: -- list somewhere?

MR. KOWAL: Yes. And Jim will get into this, part of the reason for the notification is to allow us to determine whether we need to do more inspection while they do the rework, so we don't miss it.

MEMBER BROWN: Is that a positive response from you all, that yes or no, we have to look at it or not? Or they just send this notification and it's like going into a, I didn't want to say a black hole, but that's a little humor here.

MR. KOWAL: It's not a hold point for them --

MEMBER BROWN: So you all have to, so if they don't hear from you they keep on going? In other words, the Region does what they do and --

MR. KOWAL: Right.

MEMBER BROWN: -- you all keep on going. Okay.

MEMBER SIEBER: You have to risk the fact that --

MR. KOWAL: Like a risk, right.

VICE CHAIR ARMIJO: If there is a, after the 52.103 finding, could there be a post-closure notification that something wasn't quite right in their ITAAC?

MR. GASLEVIC: After the 52.103(g), ITAAC have no further legal --

VICE CHAIR ARMIJO: Okay, so they, all these notifications have to be found and addressed before this finding. And if something is found that was wrong after the finding was issued, what happens then?

MR. GASLEVIC: Well, you're in operational space and maybe --

MR. KOWAL: Yes, there is a reporting

requirements that are in the Guidance. Like the situation you're referring to would be toward the back end, after the all ITAAC complete letter has been submitted, until the Commission makes the 103(g) finding.

I think there's a 24-hour reporting time in NEI 08-01 that we've endorsed in the Reg Guide because it's going to be, we need to know very quickly.

Now if the Commission, I don't know how long that time is between the all ITAAC complete notification until the Commission actually makes it's 103(g) finding. If there's a situation where, after the fact we find that one of the ITAAC maybe wasn't satisfied for some reason, through inspection, that would, I guess we would get into the enforcement space. And that's the way that would be addressed.

MR. TAPPERT: Yes, this is John Tappert, Deputy Division Director of the Construction Inspection in NRO. So after the 103(g) finding, the ITAAC are no longer operational, right?

MR. KOWAL: Yes.

MR. TAPPERT: But they become a normal operating plant, so all the 50.72 and 50.73 reporting requirements for being outside design basis, whatever those special ones are, those would be then the operable requirements pending notifications.

MEMBER RYAN: Okay.

MEMBER BLEY: That really is the key finding that changes the status of a plant.

MEMBER SKILLMAN: Of the license, yes.

MEMBER BROWN: You mean the 103 notification? Yes, okay, all right.

MEMBER BLEY: Yes.

MR. GASLEVIC: So the guidance associated with this amended rule is included in the revision to Reg Guide 1.215, also known as Draft Guide 1250.

The Reg Guide is used as a vehicle to endorse NEI 08-01 in this guideline, an ITAAC closure. This promotes a standardized approach to ITAAC closure and ITAAC maintenance.

As Dennis mentioned before, ACRS heard our presentations on 08-01 and 1.215 in July of 2009. The ACRS final letter reads that the Reg Guide provides an acceptable approach for closing ITAAC.

The initial issuance of the Reg Guide occurred in October of 2009. And since then, doing our work in the workshops, some revisions, mainly including ITAAC maintenance items, have been included in the industry guideline 08-01, and revision four was submitted to the NRC in July 2010.

And this next slide was developed to explain how ITAAC maintenance works and our approach. First, the ITAAC maintenance period. So it will talk about the ITTAC closure notification that is required for every ITAAC in the COL.

Once that closure notification is submitted to us, that ITAAC is now under a ITAAC maintenance period up through, to and including the 52.103(g).

And Earl mentioned before that the language here is that the acceptance criteria are met. So the ITAAC maintenance approach then provides for that acceptance criteria are met, even though the small minor activities are going on, such as preventive maintenance, maybe a like for like replacements, these items.

But for a significant event that breaches a certain threshold, we would expect notification then. And this is the post-closure notification (C)(2).

The graph also shows that at the time of the 52.103(g) finding, on the far right hand side, there could be, under this allowance, under this small margin, there could be minor maintenance activities going on at the newly constructed plant that would still allow the Commission to make an affirmative 52.103(g) finding.

MEMBER CORRRANDINI: So did you give something that's an orange example that I missed?

MR. KASLEVIC: Right, right. So the orange is caution.

MEMBER CORRRANDINI: I'm waiting for that.

MR. KASLEVIC: So the green is good, orange is caution.

MEMBER CORRRANDINI: Yes, that I got.

(Laughter)

MEMBER CORRRANDINI: But I'm try to, give me some, you know engineers, we need an example. So can you give me a couple tangible examples of orange?

MR. KASLEVIC: Sure. Let's say that there was a valve that needed to be replaced and the post-work testing to verify that the ITAAC is still valid, that test cannot be done.

Let's say that there needs to be a certain analysis instead of a test or analysis instead of an inspection now that needs to be done. That's a significantly different approach to the post-work testing that was originally prescribed in the ITAAC. Therefore, we would expect that notification on that different approach to post-work verification.

MEMBER CORRRANDINI: So something that was a test became an analysis or something that was an analysis became an inspection? Or something like that?

MR. KASLEVIC: Yes.

MEMBER CORRRANDINI: So that one is kind of obvious. Give me one that's in the fuzzy area that the licensee might find that they decided X.

In other words, what I'm trying to get at is are you looking for a lot of false positives in this because I'm worried that this orange thing is going to create a lot of false positives. They're going to be afraid and they're going to start shipping you stuff that is just of no consequence.

MR. KASLEVIC: Well, actually, in Revision 4, of 08-01 there are 34 added examples of ITAAC maintenance. And probably when these thresholds would be breached by a certain event or when it's doesn't raise to that significant level.

MEMBER CORRRANDINI: Okay. Brian?

MR. ANDERSON: Yes. There's five generic thresholds.

MEMBER CORRRANDINI: Okay, that's fine.

MR. ANDERSON: And the way we handled this was through examples and we batted those examples into Appendix H of NEI O8-01. And they're very good examples that across a span of different complexity of ITAAC, including Emergency Planning and Security ITAAC, that we've all agreed to that this would require a C2 post-closure notice, this meets a threshold, this doesn't meet a threshold. So that's what we've done.

MEMBER SKILLMAN: Before you change that slide, please, what is the PWV?

MR. KASLEVIC: That's the Postwork Verification testing or any other Postwork Verification I was talking about.

MEMBER SKILLMAN: Thank you.

MR. KASLEVIC: And so for every maintenance event or small or minor replacement event the licensee performs, the Postwork Verification, just to verify that the acceptance criteria remains valid.

MEMBER SKILLMAN: Thank you.

MR. KOWAL: Yes, certainly, I mean, we want to be as objective in this as possible and remove as much uncertainty. Or we don't want to get into those situations where we're at the end, you know, when we're trying to close all these, verify these ITAAC close where there's all these questions on whether something is or isn't required. And we felt examples would be truthful.

MR. TAPPERT: Thank you. This is John Tappert. But just to address your point philosophically, the idea was that we did not, we set the bar intentionally fairly high because we don't want a lot of false positives.

The gap we saw in the regulation was, before now, they were required to let us know when the ITAAC were met. And then the agency had to make a finding that all the ITAAC are met and it could be a period of months or years later. And there was never any obligation on the part of the licensee to inform us if anything changed.

And so what we're trying to do with that large bar and with this notification threshold, is say, if something significant happened and it's a big deal, then we need to have that notified.

And that's what this rule making in straight guidance is trying to illustrate. It's not to try to get down into the weeds of them trying to handle maintenance issues or anything of that nature.

But if something, if they changed up the type of valve, now they're relying on a different EQ Test to demonstrate that it's environmentally qualified. That's the sort of thing we need to have us reported to.

MEMBER BROWN: Okay, so everything below that line the licensee can just do? But doesn't the region -

MR. KOWAL: They can do, but part of the -

MEMBER BROWN: I mean, the region inspectors of that office has to know what's going on, don't they?

MR. KOWAL: Well, there's going to be, I think, a lot of maintenance type activities going on during construction, things might get damaged, you know, that type of stuff.

But a big part of the ITAAC maintenance, and as we discussed in the 08-01 is the programs that will have links to activities, maintenance activities or design activities, that might impact a closed ITAAC.

MEMBER SHACK: There's nothing like a 50.59 where there's a record of it that could be inspected?

MR. KOWAL: Yes, I think that what they, the licensees would need to document these activities, whether they impacted a closed ITAAC or not. And we could certainly inspect these things. I think we have a inspection procedure, 4600, Jim, that --

MR. BEARDSLEY: We do have an inspection procedure that looks at the ITAAC maintenance process. But in general, we would not intend to do ITAAC inspections on ITAAC we have received closure notifications on.

Once we've received a closure notification, unless the licensee notified us that there was a change in that ITAAC, we would not intend to do inspection on that. So we will be reviewing that process for maintenance, but not the ITAAC themselves.

MEMBER STETKAR: But I thought what Bill was asking, if I'm the applicant, licensee, the COL holder now, and I look at a situation and I have to make a determination of whether I'm going to notify you that I've had material, something has been material altered. I can't say it. I'm in an orange condition, okay?

(Laughter)

MEMBER STETKAR: Do I have to document that decision process? Bill used a 50.59 type process that I had made some sort of judgment based on some criteria.

MEMBER SHACK: Yes, how do I distinguish

between some --

MEMBER STETKAR: Yes, I don't meet the criteria for orange. But later, you know, that determination is subject to audit by the staff.

MR. KOWAL: Right, and there are programs which 08-01, identifies, as well as the Rev Guide, where ITAAC maintenance provisions should be incorporated into existing programs such as QA program and instruction programs and these things. The attributes in there will include screening processes and also updating recommendations to the ITAAC closure package.

MEMBER CORRADINI: So to put it bluntly, the licensee does know that they've go to keep an ongoing list in case you want to go peek at it to decide if it's green or orange?

MR. KOWAL: Yes.

MEMBER BLEY: I don't think you're saying this as strongly as the documents you gave to us say it. So you can rely on these existing plant systems provided that they're redesigned to accomplish this task. And it's stated pretty clearly.

You know, and if somebody can a say little more about that, that might help the rest of the committee. And I can't remember --

MR. KOWAL: And I can in about a slide or so.

(Simultaneous speaking)

MEMBER SKILLMAN: Let me ask you a question.

MR. KOWAL: Go ahead. I'm sorry, Dick.

MEMBER SKILLMAN: Isn't there a requirement for a construction QA program?

MR. KOWAL: Yes.

MEMBER SKILLMAN: And if you have a construction QA program, once you cross into that orange territory, I suspect what you have is an action under the Corrective Action. And that will find its own whether it's a 50.59-like or 50.59 process, they will bring that to surface so that it's obvious, it's recorded, it's logged. It becomes part of the station construction log and it's inspectible. And that is under 10 CFR 4.50 of Appendix B. So is the real deal. That's what I think is in place.

MR. KOWAL: And there were other notifications currently required that were considered, but the point of the post-closure notification was to notify us on all things important, all things significant regarding ITAAC. So 50.59 Part 21, 52.6 type reports could result in a report to us, but not necessarily whenever you're considering all ITAAC. Because you have safety significant ITAAC, you've non significant ITAAC.

MEMBER SKILLMAN: Getting to Dr. Shack's question, the question was if there's a item, is it logged? Is it obvious? I think the answer to that question is yes.

MR. KOWAL: Yes, with the ITAAC provisions, ITAAC maintenance provisions that would be built into the licensees existing programs.

MEMBER SKILLMAN: Programs. Thank you.

MEMBER RAY: Well, wait a minute here. I think you're presuming an alignment between Appendix B and ITAAC which doesn't exist. Now there's a footprint for Appendix B, it's not nearly as large as the application of ITAAC plan.

MR. KOWAL: That's correct.

MEMBER RAY: All right, so let's not make that mistake.

MR. KOWAL: All right.

MEMBER BROWN: If you're going to address it fine, but one of the experiences is particular with the new. And I got to refer to my stuff, or that I believe knows something about digital instrumentation control. You can run through an initial installation, I've looked at the ITAAC on several of these but you can complete those, they'll come out just fine.

Then you'll be in a mode of semi, you've past the closure point, you've got indications of things going on and you'll be operating certain things as you go through different points of your program as you built up to being able to operate fully.

And all of a sudden something won't respond the way, "uh oh," that didn't do what we thought it was going to do because you didn't really cover that specific circumstance in the early test book, you couldn't for plant reasons. And now you have to make a software change.

The vendor comes in with another version of software. I would take that as a determination materially altered, but I'm not quite sure based on my understanding of how people that are changing software think. Oh, we just changed this tweak and moved this over this to make this to such and such, no big deal. Software changes are easy and that mentality is very strong. So I'm a little bit concerned about how very minor software changes carry very large impacts downstream because they're unexpected.

And you don't have to take my word for it, but I've just been scalded about 400,000 times. And this is new. It's not a hardware thing. It's not like somebody is doing maintenance, they spill coffee in the drawer, God, we got to put in a new circuit card or a new drawer or something like that. That's easy. Like for like, that works out very easily definable.

But the software changes and the stuff that has to be looked at when you change a few lines of code, whether it's in the operating system for the magic platform that everybody's blessed or whether it's in the actual application is a far different cry. And I don't understand how that's going to get touched based on what you're all saying right now.

MR. KOWAL: In a couple slides I'll walk through --

MEMBER BROWN: Let me make one other point, is that I'm not sure the region inspectors have necessarily the total understanding. And this is not a negative thing, it's just they're not necessarily software people, programmers, or design guys that can understand the impact of software changes. In other words, you need to have some folks that are a little bit more experienced.

MR. KOWAL: And that very well may be channeled to technical staff, you know maybe here at headquarters.

MR. BROWN: I'm trying to figure out it even gets into that channel right now.

MEMBER BLEY: Why don't you give him a couple --

MEMBER BROWN: All right. Thank you, Dennis.

MR. FREDETTE: I'm Tom Fredette from the staff. I've briefed the committee before on designing substance criteria for piping and other factors.

Mr. Brown, I understand your point. In a situation like that where you have indications, whether they be in the control room or somewhere in the plant, indications that are going haywire on you that are related to software malfunctions, okay, in that case, there would be a condition report that would be written.

If it's safety related software it would be a condition report that would probably require some type of root-cause evaluation or root-cause analysis to determine the underlying cause of the malfunction. And then there would be a corrective action that would be applied, okay, per criteria in 16.

MEMBER BROWN: Is that in place during this ITAAC closure notification period up to the --

MR. FREDETTE: It is in place throughout, from the time that, well, the licensee and/or applicant are always bound by Appendix Bravo. So your QA program, basically, governs all your activities including construction phase and operating phrase.

But the point that I wanted to make is that, you know, your Corrective Action Program would basically take care of any malfunctions related to structure systems and components in the plant throughout construction and into operation.

So for a situation like software malfunction that you're talking about, there would be probably a condition report written that required a root-cause evaluation to determine the underlying --

MEMBER BROWN: It may not be a malfunction. It may be doing what's it's being told to do and it's just not the right thing you want done. It's not a malfunction. It's doing what's it's told to --

MEMBER BLEY: It's a system malfunction. I'm sorry, he meant a system malfunction due to software if you would, Charlie.

MR. FREDETTE: Yes, whatever the malfunction is there will be a condition report within --

MEMBER SKILLMAN: He is saying software malfunction. It's doing exactly what it was told to do --

MEMBER BROWN: Software rarely ever malfunctions.

MEMBER SKILLMAN: -- it's just the wrong thing.

MR. BROWN: It does what it's told to do.

MEMBER BLEY: Software doesn't malfunction, but plants do under the control of software.

MR. FREDETTE: Just one other point that I want to make is that, I understand also your point that the regional inspectors may not have the necessary expertise to delve into this.

However, as I've briefed the committee in the past, as an inspector in the field, I have the resources of the entire agency at my disposal. So if I need to call upon experts here at headquarters, at the labs, contractors that basically support NRC, I have access to them to help me get to the root cause of the problem and what we're going to do about it.

MR. BROWN: You've said this before, I just don't, obviously, don't understand all the nuances of civilian plant processes well enough to, so

I'll have to defer to those who know about it, like Harold and John and a few others.

CHAIR ABDEL-KHALIK: I guess --

MR. BROWN: Okay, we can go with, I'm sorry, Said. Go ahead.

MR. KOWAL: But Mr. Brown, we'll address in just a slide or two about how that notification threshold is actually broken down into certain criteria. And the situation like what you described would flush out in there.

CHAIR ABDEL-KHALIK: I guess that the reason for a lot of these questions is that the determination as to whether or not you're above or below that notification threshold falls on the shoulders of the licensee.

MR. KOWAL: Yes. Thank you.

CHAIR ABDEL-KHALIK: And then the question is, is it in the licensees best interest to err on the side of caution and notify you even though, you know, it's a questionable thing as to whether or not it's above or below or is it the other way around?

MR. KOWAL: Well, there's definitely an advantage to being cautious about this. With the inspectors in the field, and as Thomas said, inspectors on the ground there, they're in daily interaction with the licensee and the correction staff. So they understand what's going on. They probably have this information well before we do, obviously.

So if something is rising to that level of significance and the licensee is not showing or is down playing something that might be, as we would see significant, there could be an ITAAC finding against that.

CHAIR ABDEL-KHALIK: But, you know, again, some of the criteria for the thresholds they involve judgment, whereas others are fairly specific. And then there is no ambiguity there. So when something involves judgment, then the question is it's judgment, right? They can either judge it to be below the line or above the line. But we'll get to that, I guess, when you about Slide 10.

MR. KOWAL: Any other comments? Questions? Okay. So the concept for ITAAC maintenance is to support the status that the acceptance criteria are met.

And this is the case if the following conditions hold: that the ITAAC was verified to be met at one time, and that there is confidence that the ITAAC continued to be met, and the threshold for notification was not exceeded.

The C2 post-closure notification then required for events that exceed threshold not only provides public access to accurate information, but also reports that acceptance criteria continued to be met through staff.

So the ITAAC maintenance thresholds. We identified the five criterion for reporting on post-closure events on an ITAAC. The first --

MR. BROWN: When you say reporting, you're reporting where? To headquarters?

(Simultaneous speaking)

MR. KOWAL: Yes. To the NRC, yes.

MR. BROWN: Okay.

MR. KOWAL: First, is material error omission, that there was an error in the original ITAAC closure notification that was discovered after it was submitted. The second, post-work verification that Michael was, his example, we touched upon that earlier.

Will the post-work verification uses significantly approach than the original performance of the ITAAC.

The engineering changes. Will an engineering change be made that materially alters the determination that the acceptance criteria are met? Additional items to be verified.

MR. BROWN: Hold it. That materially alters? Who makes that judgment? The licensee again?

MR. KOWAL: Yes.

MR. BROWN: For an engineering change?

MR. KOWAL: And this is the threshold that I was thinking for your example with Digital, Inc., a software upgraded?

MR. BROWN: Any software change would qualify as materially alters.

MEMBER BLEY: You didn't bring any slides that include examples from the NEI document, did you?

MR. KOWAL: I did.

MEMBER BLEY: You did?

MR. KOWAL: Yes, I did. And those are backup slides.

MEMBER BLEY: Maybe later you can show up some of those examples. I think that would help with a lot of certain questions.

MEMBER CORRRANDINI: We have them in the packet, right? Threshold two, example. Threshold one, example. We've got them.

MEMBER BLEY: There are a couple back there.

MR. KOWAL: The last four slides of the package are those examples from 08-01.

MEMBER BLEY: And maybe that'll help when we can read those at this when we get back.

MR. BROWN: That talks about pipe snubbers.

MEMBER BLEY: They don't all talk about pipe snubbers.

MR. BROWN: The only one in there, pipe snubbers.

MR. KOWAL: The last --

CHAIR ABDEL-KHALIK: I guess my concern is the very last bullet. Not out of concern about, you know, whether the activities will materially change, but whether or not they actually see the connection?

MR. KOWAL: So when the concept of ITAAC maintenance was originally being introduced, there were two types that were first worked on. The first was, which is equal to the first threshold I have here, material error omission. So if there was an error in the original ITAAC closure letter, I would want to hear about it if you identified it.

The only second item that was introduced was a rather broad statement saying that if there was a significant event on closed ITAAC, the licensee should report it to the NRC.

We took that second item there and expanded it into these last four: post-work verification, engineering changes, additional items to be verified, and the last, which is probably similar to that original concept is meant to be a wider and broader threshold that would catch anything that would pass by the previous ones. So if it materially alters a determination basis, we want to hear about it. We want to be notified about it, I should say.

CHAIR ABDEL-KHALIK: Do they not know that it even impacts the ITAAC determination basis?

MEMBER CORRRANDINI: But I guess my only thinking is, is if they don't know, you approved it, they enter into operation and something comes up via a thing and it's a true violation, it enters a different legal framework --

Right? Isn't that what it --

MEMBER BLEY: Said, I guess this is my own opinion. There is a lot of places in the Regulation were things are written this way, but once it's a rule if you're later determined to have violated it and you're the one who signed the letter that went in and said, "there are no material changes." That's a real bad spot to be in. And people are very, very careful about that. You can end up more than having the NRC looking at you after that.

MR. KOWAL: I mean, the licensees they're responsible for performing and completing the ITAAC and ensuring that the ITAAC, the acceptance criteria are met. The NRC will verify that through reviews of the ICNs, you know 99C1, two, or three letters.

And we have, our inspection program, you know, where we're inspecting ITAAC. We're inspecting their ITAAC maintenance, or ITAAC management programs that they have, we're inspecting their programs, their quality assurance, you know, all that as well.

And we're going to have inspectors at the site. And numerous residents, they're going to be involved in the day-to-day meetings. A lot of this, though it's just going to be informal communication where we're going to know about things that are going on at the site. Do you have anything to add to that?

MR. BEARDSLEY: Yes, I think that what Mark is getting to is that the resident staff at every plant today, has access to the licensees corrective action program and monitors the activity in the program on a day-to-day basis. We will continue to do that during construction.

And we'll have access to the problems that are identified and the licensees corrective actions. If we believe that those materially effect an ITAAC, and the licensee hasn't informed of that, we can look into that and ask that question, and then potentially, get an ITAAC finding out of it. So I mean, we're going to be monitoring the construction activity continuously all throughout the process.

MR. KOWAL: I think, too, ITAAC haven't been used before in construction of the current plants. There is a lot of attention being placed on ITAAC, how they're being performed?

I know our residents, you know, they're going to be digging, they're already digging. You know, if you ask the resident at Vogtle, I mean, he's paying very close to attention the 3LWA ITAAC that are going on. So you know, is there a chance that we'll miss something? You know, sure there is.

MR. BROWN: I am just worrying about applying the materially altered thought process to the Digital, Inc. systems because there is just zero familiarization. There are total understanding of how closely integrated those systems are.

You've got a number of things in there, and the vendors, the guys that designed this stuff are convinced, absolutely convinced, they've said so in every meeting, that their software is just fine, that their software will protect.

They've got software algorithms to make sure that the other software is okay. They're convinced software protecting software -- they're just happy as pigs in mud wallows, they just run around, you know, just wading through it and having a great time.

And I just do not believe that. They are very convincing. The guys are smart. And a threshold for having the licensee determine when, any change to those systems from communication protocols, to the way gateways are handled for one-way for communications, to the way the watchdog timer operates, if it finds out the timing sequence is not right in terms of some processing change, all of those things, the guy said, oh, we didn't change anything, we just altered it a little bit, it's just all working just fine now. Well, what does that mean? But now it's different.

And are there retests that should've been done? Were there particular scenarios that should've been tested? Somebody has to be able to do that. And to me, allowing that to fall into the materially altered thought process is a potential problem.

MR. KOWAL: Well, one thing as we

mentioned, we hold regular public workshops with any ICN industry. And we had one this morning, actually. We're working to actually develop additional example ICNs.

If you look in the Appendices, there's ICN examples for numerous things. We develop 34, 35 examples for what would cross a threshold for the ITAAC maintenance things here.

I don't recall specifically if there's one on software and this type of design change as far as software goes. But I think it's something we can talk about at our next workshop. We are making additional changes.

I think, Rush Bell from NEI is planning to submit Rev 5 to NEI 08-01 in February time frame. I mean, this is something we could pursue if that forum and think about some of the details that are software related.

MEMBER SHACK: Well, one of the examples of 08-01 is the software change in the system that passes the threshold.

MEMBER SKILLMAN: I'd like to suggest that this maybe a moment for all of us, if you've worked in the plants the procedures are pretty clear when you have some sort of a finding. And you go into cap, you enter the cap, among the questions that is asked is not, does this impact ITAAC? That's not part of the current language.

It asks, does this effect the licensing basis or the design basis? And that normally gets kind of handed off to the STA or to licensing. So maybe that we'll really get to the heart of this by asking, "how has ITAAC been impacted by this change?" That's different.

MR. KOWAL: And that is one of the attributes, Jim, it's NEI 08-01, it's in Rev 4 now and that's the link that Jim is going to get to on --

MEMBER SKILLMAN: But it needs to be --

MR. KOWAL: That link, with all the programs to the ITAAC, and that question should be asked, you're right, is part of the NEI 08-01 guidance in Rev 4 now. And that's on one of the next slides.

MR. TAPPERT: That's the next slide. Perhaps we haven't been clear, but that's exactly the paradigm that we're trying -- I'm sorry, John Tappert, here.

MEMBER SKILLMAN: Okay. Thank you.

MR. TAPPERT: That's exactly the paradigm we're trying to have. So for the corrective action program, for the maintenance program, for the design and configuration control program, events specifically ask those questions when they're going into things. And on correctness, is this affecting a closed ITAAC. And by looking at those thresholds, have I violated any of those thresholds?

MEMBER SKILLMAN: And that question is in the front end of the condition report process.

MR. TAPPERT: Exactly. And so the licensee will do that as part of their processes. And then we have an inspection procedure for the NRC staff to kind of do an over-check to make sure that thing was working properly.

MEMBER SKILLMAN: I think the main thing for me is ITAAC'S not part of the current language for construction or for operation.

MR. TAPPERT: Right. So when we introduce this to the introduce this to the industry, folks are going to be thinking, what's that?

MR. KOWAL: And as John just mentioned, these are going to be built into the existing programs. So the attributes that I have listed out here, licensee screening of activities and events for impact on ITAAC, licensee determination on whether a post-closure ITAAC notification is required, and licensee supplement of the closure package, the ITAAC closure package as appropriate to demonstrate that the acceptance criteria continued to be met. And we spoke of that before about updating the closure packages.

So with these provisions built into these existing programs, ITAAC maintenance provisions should include plans and programs to ensure that activities affecting, successfully completed ITAAC do not invalidate the acceptance criteria.

MR. LIBBY: To go back to the question you had earlier about current operating fleet screening criteria or corrective action programs, as well as 50.59 evaluations. As you stated with some of your first questions, as you went through that process, is this part of the licensing basis?

MEMBER SKILLMAN: Right. ITAAC is part of the licensing basis.

MR. LIBBY: Yes. What I've suggested already is --

MEMBER SKILLMAN: What I'm suggesting those is that ITAAC is not part of the common language at this point, and it's going to become that.

MR. LIBBY: Correct.

MEMBER SKILLMAN: And once it is, then the question that Dr. Khalik asked gets an answer because the people that are screening are going to have to say, "what have I done to ITAAC with this change?"

CHAIR ABDEL-KHALIK: I'm actually more concerned about things that people don't see directly, don't see the connection directly. And I've been sitting here trying to think of an example.

Let's say there's an ITAAC on verifying the position, the location of the hot leg and cold leg ARD's. And they well, okay, we're going to change that and they're reported to you. And it's okay. But that may impact rod control. How would they know about that?

MR. BELL: My name is Russell Bell. I'm with NEI, the Director of New Plant Licensing. And I met with these folks this morning on ITAAC issues. I don't have an answer to that question, okay.

But I did want to, I guess, reassure the committee, you know, ITAAC is very much up front and center of the minds of the licensees. They are training on it. They understand that that's their final exam to operate and they need to pass it 100 percent.

When you imagine these guys closing ITAAC and moving on, the systems and components and structures that are the subject of closed ITAAC are going to become jealously guarded by the licensing programs we've mentioned, and then they're on the screen right now.

And in our guidance it says, the QA programs, maintenance, corrective action, design engineering, configuration programs, will all need to carefully reflect and respect the requirements for ITAAC, including ITAAC maintenance.

So that's going to assure that folks whose job it is to manage the ITAAC process for the licensee are again, jealously guard those close ITAAC, bring the bearer, all the resources of the design engineering folks to be sure that issues that might impact the ITAAC are recognized. And assure that the ITAAC conclusions remain valid.

As Mark said, we haven't been through this before, but we're trying to anticipate as much as can. And make sure that these programs reflect the ITAAC process. The importance of respecting and maintaining the validity of the ITAAC, so that we can get to the 103(g).

MEMBER BLEY: Before we leave that one, I'll just throw a couple words on this, but I'd really like to hear more from the staff on it. As Said, it's kind of the way thinks happen in a operating plant room. They have a corrective action program, same thing comes up.

How do we know if interactions are covered? Well, the plants who have had unfortunate incidents happen through that pathway, at least the ones I've seen have come back and put review committees of technical expertise to look at them to make sure that the first level people who looked picked up all the interactions that are possible.

I don't know there's another way. There might be another way to do it. I can't imagine those won't reach that point pretty soon.

And I don't know if any -- I want to say something about that or people who are involved with inspections for NRC want to but that's kind of the way it's done. And it's not easy. You need that integrated knowledge of the whole facility to be able to address this question. It's not unique to this new process.

MR. LIBBY: Let me try to address this from a licensing side instead of from the inspection side. From the licensing side, what you've presented in the particular scenario that you've presented was a change in the rapid cooling system effecting something else in the rapid cooling system.

From the licensing side, you have a plant change or modification, okay? That goes through its screening process which would then determine whether or not you need a License Amendment Request to go ahead and proceed with the change, okay?

If you do need a License Amendment Request to proceed with the change, it is reviewed both internally within an licensee side.

And the Development of License Amendment Request, which then looks at the impact upon all the ITAAC, and then it comes internal to the NRC, which would then do their acceptance review of that License Amendment Request and an additional review of the impact upon the ITAAC at that point.

So you've got both the internal, we are directly effecting this system for this ITAAC in the initial screening. And then when you get a licensing basis change, then you've got the screening that's a broader scope. What other ITAAC are in this area?

CHAIR ABDEL-KHALIK: I was just trying to think of an obscure connection that might be missed, it wasn't that specific example that I was giving. And I agree with Dennis, that eventually, they'll have to have, you know, some kind of committee that would look at these changes and decide whether or not there are any impacts.

MEMBER BLEY: Once in a while they'll miss and they'll get better.

MR. KOWAL: I mean, they are going train their staff, everybody tends to do the right thing. The flip side of this is, you know, we talked about the perfect case scenario as one of these.

You know, why do we ITAAC maintenance? Why doesn't the licensee just wait until the end of the construction period and submit all these thousand letters to us to review and then wait. We don't want that either. We don't want that to happen.

MR. BROWN: Okay, just to use the NEI 08-01 example, they define and take Appendix A, "calls for a change in the protection system." It is a, what was it called?

CHAIR ABDEL-KHALIK: Material change.

MR. BROWN: Materially altered thing, and they go through and describe it back down in the threshold to examples. All they note is that the closure letter has already been submitted. And that the set of application software was changed because of a change in the piping, you know, a fluid system.

So there was a change in the fluid system. They called it a minor design change. So I'll give them the credit for a minor design change.

I asked for installation, they did the V&V that was originally required and it was passed. And therefore, now they have to submit a supplemental closure letter. But there's nothing that says, well, that it is a result of that change.

Would some other design issue have to be addressed? In other words, all they had to do was pass the initial V&V that was done for the original design. Now something was changed in this fluid system.

Are there any other factors involved that have to be considered other than the original ITAAC that were used to pass, you know, to say it's okay? It doesn't talk about, somebody has to make that judgment in NEI 08-01.

So I mean, that's the type of thing that concerns me and when somebody says, did it materially alter? You make a change in the plant fluid system, you may now have some other set of circumstances that have to be considered.

MEMBER SHACK: Yes. But that was just the committee they were discussing.

MEMBER STETKAR: Just because it's software it's no different than changing a position of an RTD.

MEMBER BLEY: They are in essentially the same place as an operating plant to make these kinds of decisions.

MEMBER SHACK: I mean, every time you make a change, that's a possibility --

MEMBER STETKAR: Somebody has to evaluate it. Sometimes they're going to miss it.

MR. BROWN: It just seems to me this is an ITAAC closure thing. ITAAC disappears after the plants, you all said that ITAAC, once it's through 103, ITAAC disappears. I'm talking about the other period. Let me finish, okay?

And so who is making this judgment that they submitted a new closure letter, but it doesn't say or doesn't say NRC or the headquarters has to make some, there is enough justification for why the original ITAAC was suitable to bring that back and that there were no other considerations.

You're saying not to worry, our existing QA process in this period will take care of all that. I don't believe it.

There is just going to be too much stuff going on. I'd be very surprised if they didn't get through a test program without numerous software changes. So they become kind of, oh, yes, we made a few software changes. The old familiarity breathes content type thought process.

MEMBER RAY: Charlie, let me be sure I understand. These are changes that don't violate the ITAAC or the --

MR. BROWN: I don't know. I don't know.

MEMBER RAY: I'm just asking.

MR. BROWN: I don't know.

MEMBER RAY: All right.

MR. BROWN: I'm just saying that you cant --

MEMBER RAY: Let me put that another way, supposing they didn't violate the ITAAC, is that a problem for you?

MR. BROWN: Who makes that judgment?

MEMBER RAY: Oh, okay. All right.

MR. BROWN: Because who makes the judgment, the licensee?

MEMBER RAY: If you can't answer that question then, you know, I'm not sure what the ITAAC --

MR. BROWN: Well, Harold, I mean, I sat down and we would make changes and I didn't allow Newport News to make that judgment even though the equipment was under their auspices. That decision was made at headquarters for those types of changes. Other changes were allowed to be done just under the same auspices as you guys are talking about.

MEMBER RAY: But that's not the way the ITAAC --

MR. BROWN: That's just a level technical understanding of what was being done. So somebody's got to judge. Is that ITAAC going to be satisfactory? I don't believe the licensee should be making that judgment solely.

MR. KOWAL: Well, the licensee, he is performing a screening process with these upgraded programs. But the inspection staff, the NRC inspection staff still has tools available to them to make ITAAC findings on significant events if they felt that that was significant.

(Simultaneous speaking)

MEMBER BLEY: I am having a little trouble with where you are sitting, Charlie, because the licensee isn't going to make this changes. The licensee is going to make these changes with their vendors who have all of the deep expertise in this area. That's probably the right people to be making these decisions.

I'm not sure if somebody who just reviews things is the right one either. All our inspections, all our reviews, just hope, give us confidence that process for design really was done well.

MR. BROWN: Okay, fine. Go ahead. Do what you want, okay?

MEMBER BLEY: Well, what's that mean? What do you want?

MR. BROWN: Go on, okay. Go on with the briefing. I mean if --

MEMBER BLEY: Or are you suggesting --

(Simultaneous speaking)

MR. BROWN: -- okay? I'm one of the few people in here that's for 22 years, I installed probably five dozen systems. And I never worked through any of them that didn't have a significant number of changes once you started running, and they were detailed software changes.

We did not allow just a vendor and our prime contractor to make that decision and say it was okay. There was some higher level oversight at headquarters, just like here, that we understood what they were doing before we said, yes.

The testing you're going to do is okay. We feel that will, again, satisfy the intent of the acceptance criteria. We did not leave it up just to a prime contractor in those circumstances.

MEMBER BLEY: You were the owner?

MR. BROWN: Well, we were the owner, the --

(Simultaneous speaking)

MEMBER BLEY: You were the owner and the regulator.

MEMBER STETKAR: You didn't have another regulator.

MR. BROWN: You all, I can't help what we were.

MEMBER STETKAR: You were the owner and operator.

MEMBER BLEY: What you say is all true. There will be problems. There will be interactions. So what are you recommending?

MR. BROWN: My recommendation would be to have for those that materially alter, you know, software or those types of things in the protection systems, the ability to have the existing ITAAC confirm that it's satisfactory. He made it a determination level other than what the licensee and his vendor.

MEMBER SHACK: The letter will be sent.

MR. BROWN: No. It just says we did it

and we used the other ITAAC.

MEMBER STETKAR: Charlie, when you were the Navy did you have an external, all-knowing, all seeing organization review you? Did you want that?

MR. BROWN: That's irrelevant.

MEMBER STETKAR: Did you need that? No, it isn't.

MR. BROWN: John. That is irrelevant.

MEMBER BLEY: I hardly think we're not going any further. Back to you guys. Go ahead.

MR. OESTERLE: Eric Oesterle from the staff. I just wanted to point out that when there is a change made by the licensee, there is a process that they have to go to, to determine what the impacts are on the plant including any ITAAC.

And if they determine that there is an impact on ITAAC, that gets you into the change process that requires a license amendment and if there's a change to that ITAAC, that license amendment then will be submitted to the NRC for review and approval.

So in cases where those types of changes result in a change to the ITAAC, we will be looking at those changes and approving those changes as well.

MR. BROWN: I understand that. But they make that determination whether it's going to change the ITAAC?

MR. OESTERLE: That's true.

MR. BROWN: That's the point.

MR. OESTERLE: We also inspect the licensees program for screening those changes --

MR. BROWN: I understand that.

MR. OESTERLE: -- in determining whether the ITAAC --

MR. BROWN: I understand that.

MR. OESTERLE: -- are effected or not.

MR. BROWN: I understand that. You're saying you have to have a program for going through and they're supposed to make the right determination. I just say there is a threshold in protection systems that ought to be a little bit higher.

We ought to go on, Dennis, with the review.

MR. KOWAL: Today, the 50.59 process used for operating plants today, the licensee does the screening. They make the determination whether they need to obtain prior NRC approval to do something.

MEMBER STETKAR: And the staff can audit those determinations.

MR. KOWAL: That's right. And with the C2 notification --

MR. BROWN: These systems are more complex than anything they've ever installed any place. You can see all the pipes. You can see all the valves. We get great detail when review, you don't see all this stuff, it's all hidden. It's invisible. It's all little bits and bytes running around and they're highly integrated.

CHAIR ABDEL-KHALIK: Gentlemen, please, can you yield?

MR. KOWAL: Okay, so new additions to 08-01 in Revision 4. We have discussed the ITAAC maintenance examples, 34 examples added to this revision.

Examples of the post-closure notifications, and by the way, these are required or these will be submitted rather 30 days after licensees resolution of the event. The all ITAAC complete template. Also guidance on inspections, tests, or analysis performed at other than final installed locations.

And this gets back to the as built ITAAC and the credit that licensees can take when it's advantageous or if it's standard industry practice or if it's more practical to perform a test or an inspection at a other than final in place location of a component or system.

Again, the attributes added for the ITAAC maintenance programs also show up in 08-01 Revision 4 of course.

MEMBER SKILLMAN: I do have a question. I understand including the QA program, the maintenance program cap, and configuration management, design configuration, why isn't IST part of this list? Because at the end of the day, what carries the licensee after the turnover is the IST program, IST and ISI.

MR. BEARDSLEY: This is Jim Beardsley with the Construction Program. Those programs are being developed by the licensee over the course of the course of the construction process.

Now we do programmatic inspections of the program themselves, but those programs are not necessarily in place at this time. So those programs really take effect following 103(g).

MEMBER SKILLMAN: They become the hand-off.

MR. BEARDSLEY: Correct. They do. So assuming all ITAAC are complete and the plant is built to the design, those programs are now in effect once we hand off and we're under tech specs and ITAAC no longer exists. That's the dividing line.

MEMBER SKILLMAN: I understand. Thank you for your answer. Let me express what's really on my mind. It would seem to be that there ought to be a blending or, if you will, an incremental passing of piece to piece from ITAAC into ultimately IST.

Because it is the IST program, a year later, two years later or two-year frequency or refuel frequency or once each five years, repeats the ITAAC to confirm that the critical function is maintained. And so that's the tone of my question. Why isn't there a, if you will, connection from ITAAC into ultimately IST?

MR. BEARDSLEY: I think there is a connection, but for the context of ITAAC maintenance, those programs aren't in existence. So it wouldn't make, to say, oh, we should go look at those, with respect to the ITAAC maintenance, there is not necessarily a program there to compare it to. The program is assuming these processes are going to maintain the ITAAC to 103(g).

MR. KASLEVIC: And again, that is where this industry guideline and also our Reg Guide focus is on licensee construction to the 103(g).

MEMBER SKILLMAN: Okay. Thank you.

MR. KASLEVIC: So the ITAAC maintenance thresholds that we discussed previously also appear in 08-01 Revision 4. And also the prompt notification emails for ITAAC maintenance.

So once the licensee has determined that there is an event that breaches one of the reporting thresholds, there is a prompt notification made to the, what likely will be the Op Center via email. And this will tell us what nature of the problem is. And this will be done within seven days of determining that there is a potentially significant event.

So that's throughout the course of construction. Once the all ITAAC complete notification has been submitted, a prompt notification would be due to us within 24 hours. And this is due to the urgency of 52.103(g) process and the need for information on a accelerated basis at that time.

And again, there's a template that's included in 08-01 for this early notification. I'm sorry, did anybody have any comments?

MR. KOWAL: And again, those times are to allow us the opportunity to inspect any post-work that might be going on.

CHAIR ABDEL-KHALIK: That sort of goes back to my concern about, you know, the determination by the licensee if you're slightly above the line or slightly below the line. When you're in this situation, I'm not sure if they want to err on the side of caution.

MR. KASLEVIC: Additions to Reg Guide 1.215 then. I spoke before about the partial submittals that's available for complex ITAAC or ITAAC that'll take a very long time to complete. The earlier that we get partial notifications on this, on the progress of how an ITAAC is being completed, it's advantageous to us and this reduces the resource loading at the very end of construction.

Now each ITAAC, including these complex ITAAC that the licensee elects to make partial submittals on will still require a stand alone, final closure notification.

But these partial notifications inform us and educate us on the progress of the ITAAC. So that that verification of closure can be made faster than if we got this, you know, a book submitted to us late in construction.

The Reg Guide also adds the enclosure from SECY paper 10-0100, which is discussion on when license amendments would be necessary in relation to each of those maintenance thresholds.

A couple components on the rule in the draft guide 12-50, which is the draft revision to 1.215 and then as Earl mentioned before, the public comment period ended in July of this year.

And comments received only from NEI on both Rule and the draft guide, 11 on the Rule, 25 comments on the draft guide. All were considered not significant, most were editorial in nature. And none of the comments resulted in changes to the purposed rule.

Next up is Reg Guide NEI 08-01, shows the success path by documenting current work as ITAAC topic evolve and are refined. Staff will provide the final the rule in Rev Guide to the commission in January. And issuance of the final Rule and final Reg Guide And final Rev Guide is scheduled for May of next year.

And Mr. Bley, you were talking about the, examples for the thresholds?

MEMBER BLEY: Yes.

MR. KASLEVIC: And these were taken out of 08-01, so 08-01 currently has the thresholds listed in there. And directly following each threshold is an example and these are taken from there.

MEMBER BLEY: We have time for you to go

through those.

MR. KASLEVIC: So the first example, the acceptance criteria states the 300 gpm flow passes through a motor-operated valve. It is replaced, but water cannot be flowed through the valve as part of the post-work verification to verify that the acceptance criteria continues to be met.

Instead the valve is stroked and an engineering analysis verifies that the flow, under all applicable conditions, is performed to validate the acceptance criteria. This condition requires that a post-closure notification be submitted because an engineering analysis was created to verify instead of the original testing that was performed.

Next, engineering changes. A design change is required to add pipe snubbers. As new piping to address the water-hammer damage to support that occurred during pre-op testing.

The condition requires a post-closure notification be submitted because an engineering design is required to address the issue of water-hammer. And the design is material to the determination that the acceptance criteria is met. That is as new piping can withstand combine normal and seismic loads.

Additional items to be verified. As new piping, again, suppose the base metal repairs are made. The code report is revised to add more welds to the base metal repair information.

And this condition requires a post-closure notification because the scope of the determination basis was increased with the addition of more welds that are reviewed as part of the updated ASME code report.

And last, complete and valid ITAAC representation. An addition or correction is made to a seismic report that is cited in the ITAAC closure notification, the original ITAAC closure notification. This condition requires a post-closure notification to update the determination basis to reflect the corrective or supplemental seismic report.

And this points more towards maybe a non-physical change and maybe a referenced change that resides in the original ITAAC closure notification, change that a seismic report warrants a post-closure notification.

CHAIR ABDEL-KHALIK: Okay. Thank you. Anything else from the Committee? We received one request for public comment. That comment was submitted in writing, will be entered in the record.

It however, didn't deal with the maintenance of ITAAC, but it dealt with ITAAC for equipment maintenance. So it isn't directly relevant to today, but it's relevant to other work we're involved in and design certification and COLs.

So at this time, I'd like to thank you for the presentations. And, Mr. Chairman, back to you, a half-hour early.

CHAIR ABDEL-KHALIK: Oh, wonderful. Thank you. We made up all the lost time from this morning. Are there any additional questions to the staff? I guess not. So thank you very much. We appreciate it.

At this time, we are scheduled to take a short break and then we'll begin the next item on the agenda, which is preparation of ACRS Reports. And we will start by reading Harold's letter, so if the staff person, let me just get off the record first. Thank you.

(Whereupon, the meeting in the above entitled-matter was concluded at 3:25 p.m.)

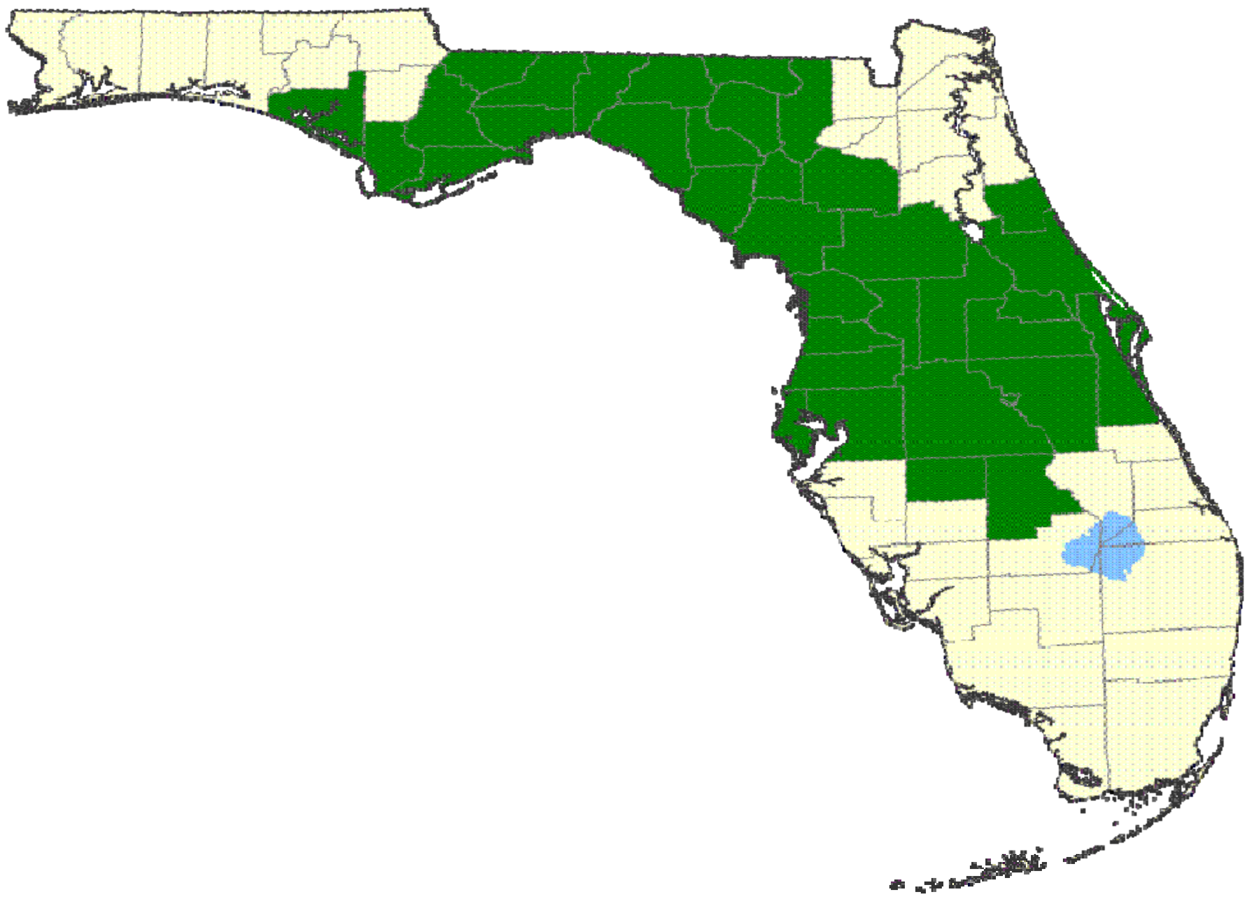
Levy County Units 1 and 2 Combined License Application

John Elnitsky
Vice President
New Generation Programs & Projects

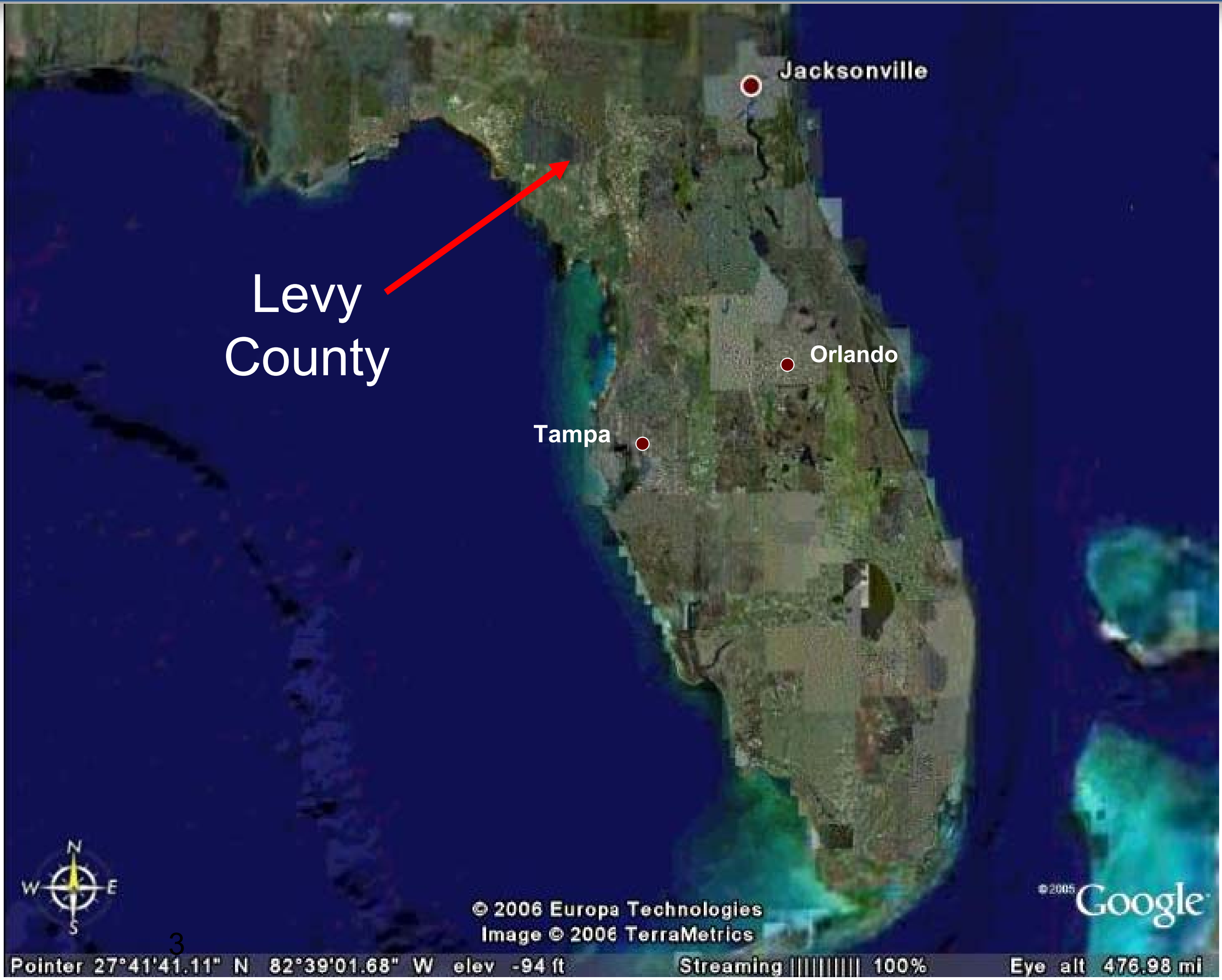
NGG Think Fleet.

Progress Energy

Progress Service Territory



Site Location

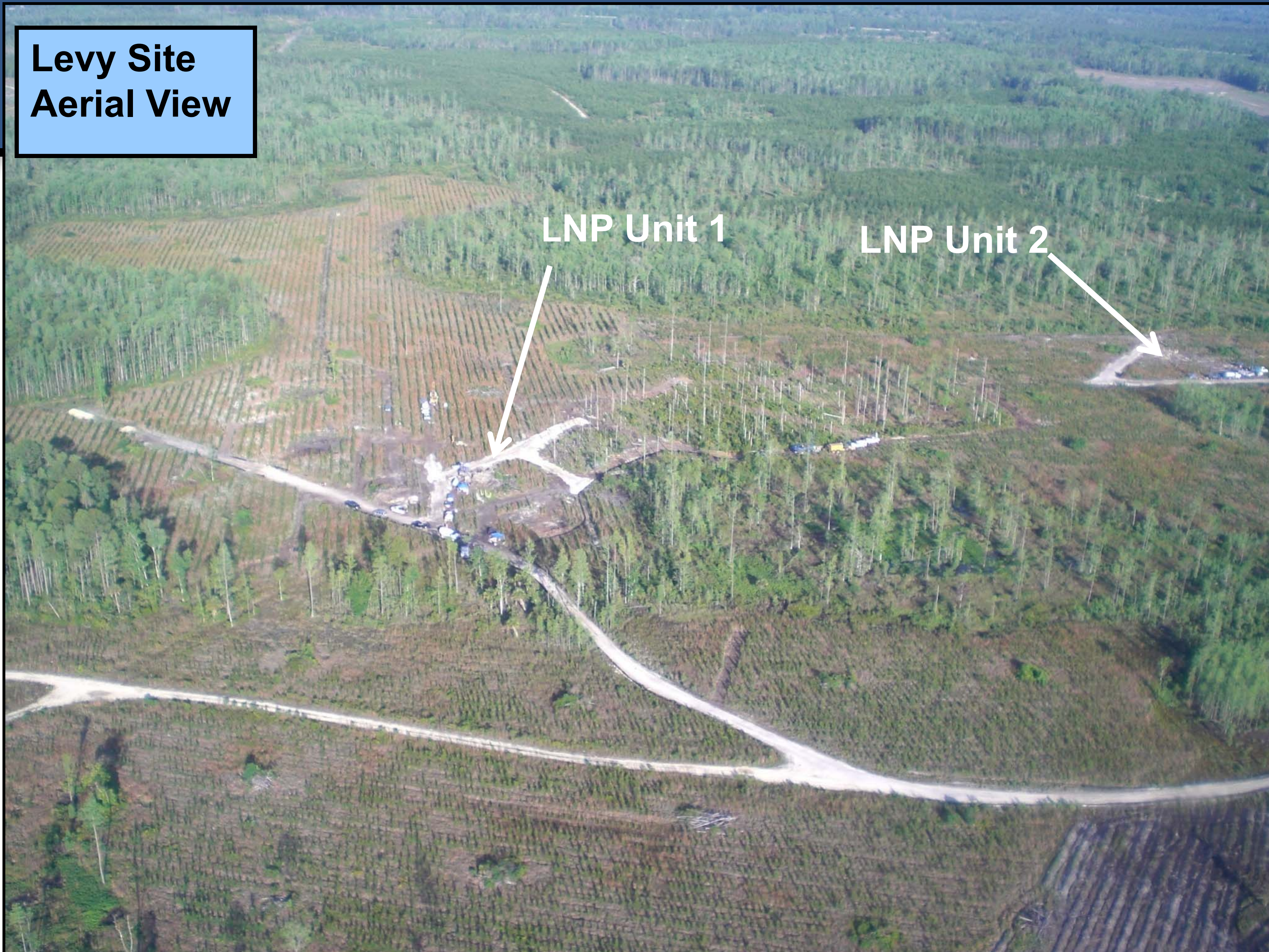


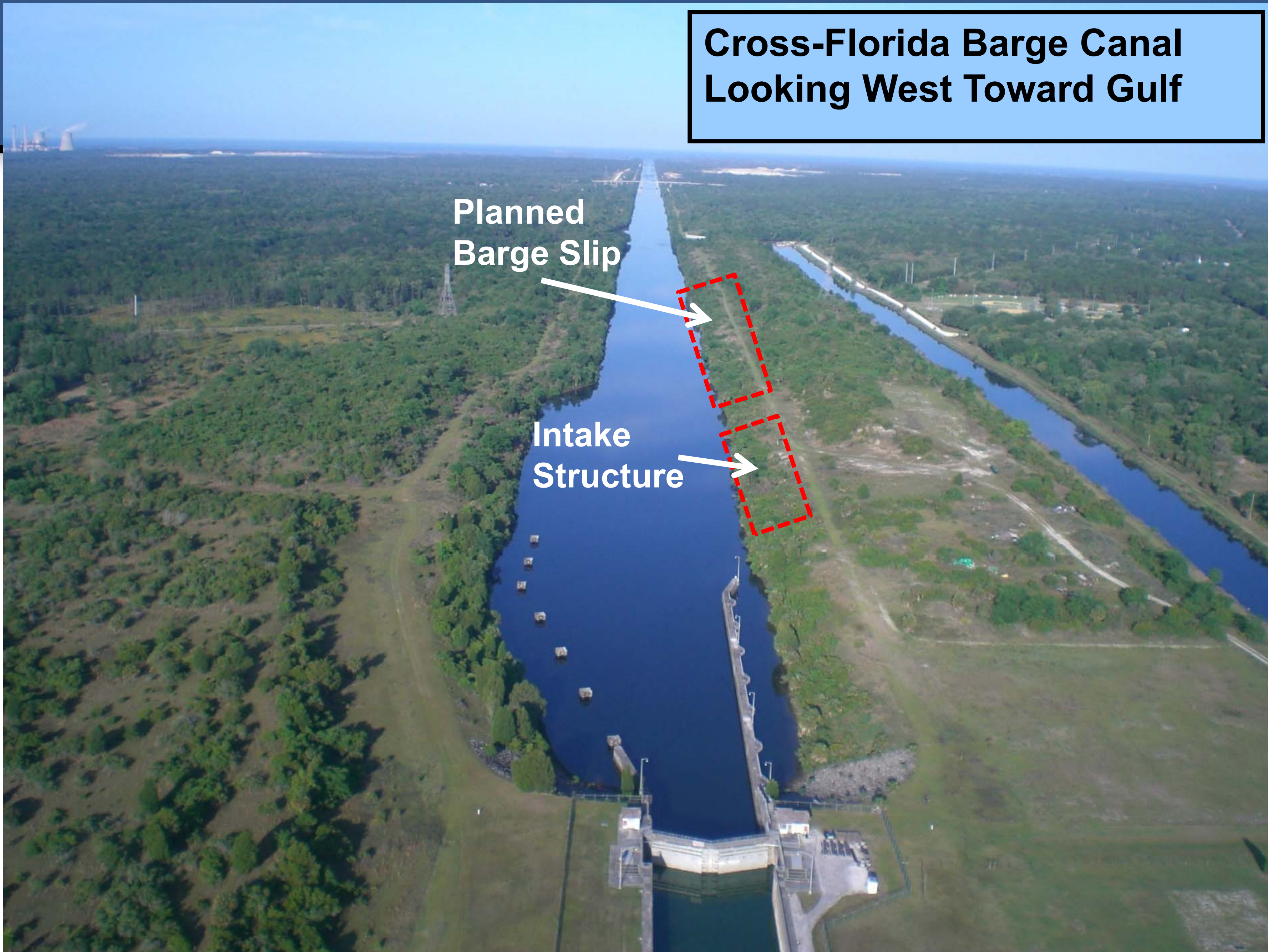
Levy County Units 1 and 2 Combined License Application Overview

Bob Kitchen – Manager
NGPP Licensing

Site Location

Levy Site
Levy County
Marion County
Proposed Levy County Power Plant Site
Inglis, FL
Lake Rousseau
Dunnellon, FL
Barge Canal
Crystal River Power Plant Site
Citrus County
Gulf of Mexico
approx. 5 miles
Crystal River, FL
Levy County
•Training Building
•Visitor Center
500 kV Switchyard Units 1 & 2
Cooling Towers Unit 2
Unit 2
Cooling Towers Unit 1
Unit 1
Access Road
Barge Slip
Units 1 & 2 Make Up Pumphouse
Progress Energy

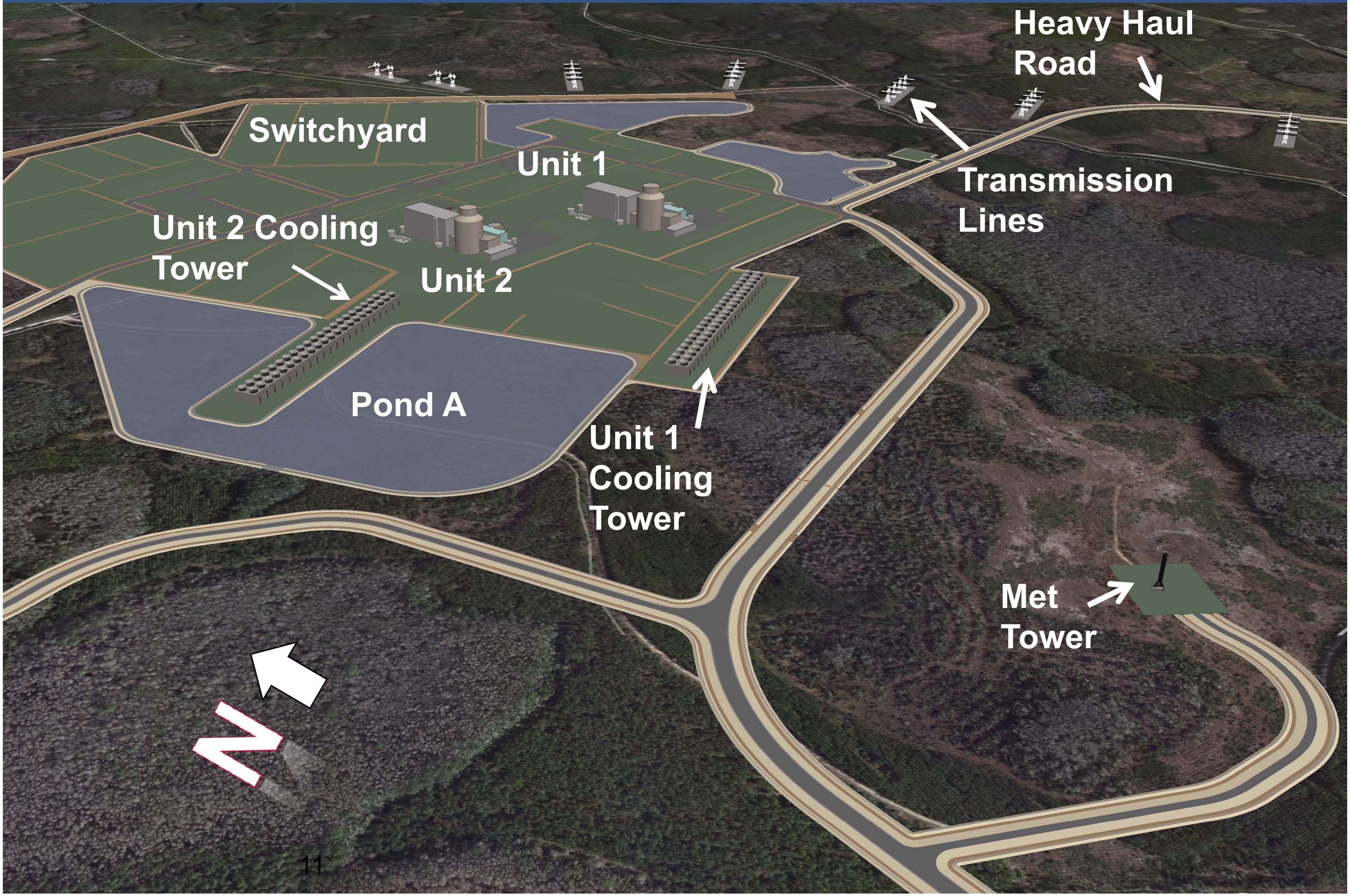

Levy Site
Aerial View
LNP Unit 1
LNP Unit 2


Cross-Florida Barge Canal
Looking West Toward Gulf
Planned
Barge Slip
Intake
Structure

Levy Nuclear Plant Transportation & Water

Crystal River Site Discharge Canal

Section 1.2 Site Layout



Salt Contamination – Impact to Switchyard

- Practice is to coat insulators & bushings within a switchyard with a Silicone Rubber coating
- Periodic inspections are conducted
- Coatings are re-applied as needed
- Insulators can be washed while energized.

Coating being applied to insulators at Crystal River Energy Complex

NGG Think Fleet.

Progress Energy

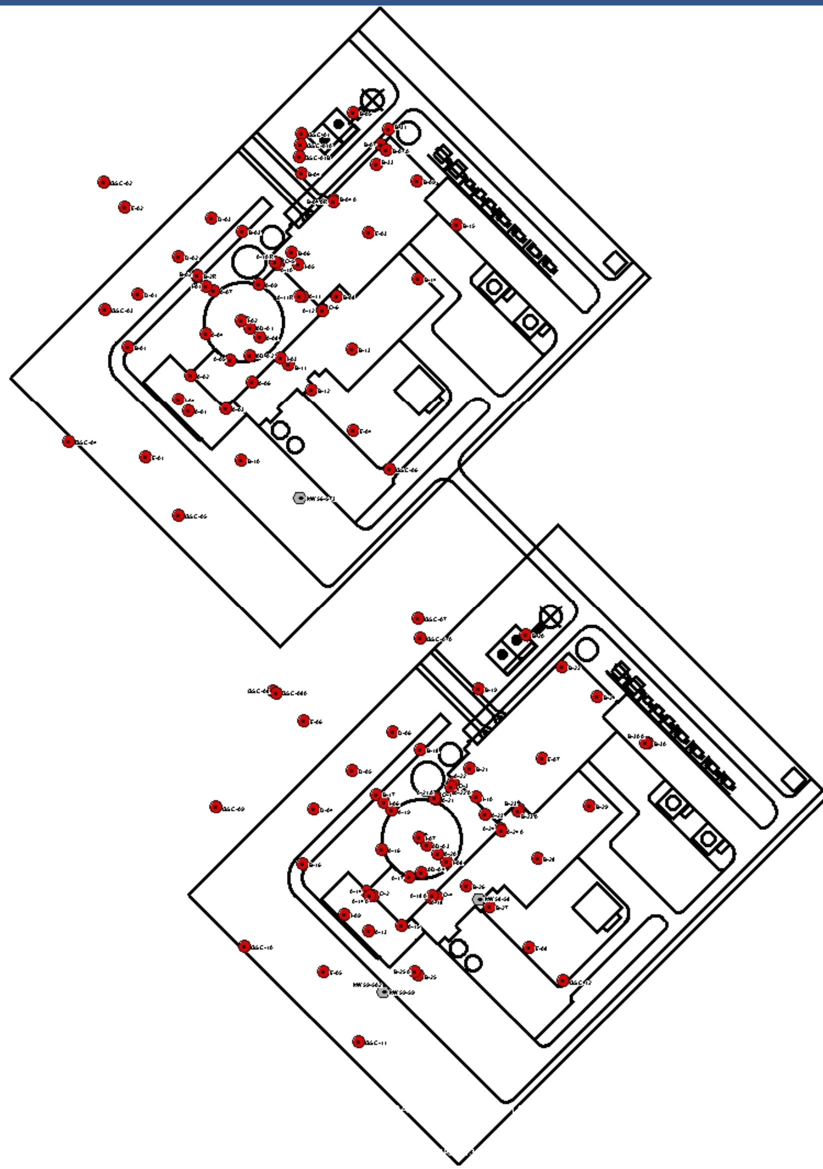
Levy Nuclear Plant Site Characteristics and Foundation Concept

Vann Stephenson

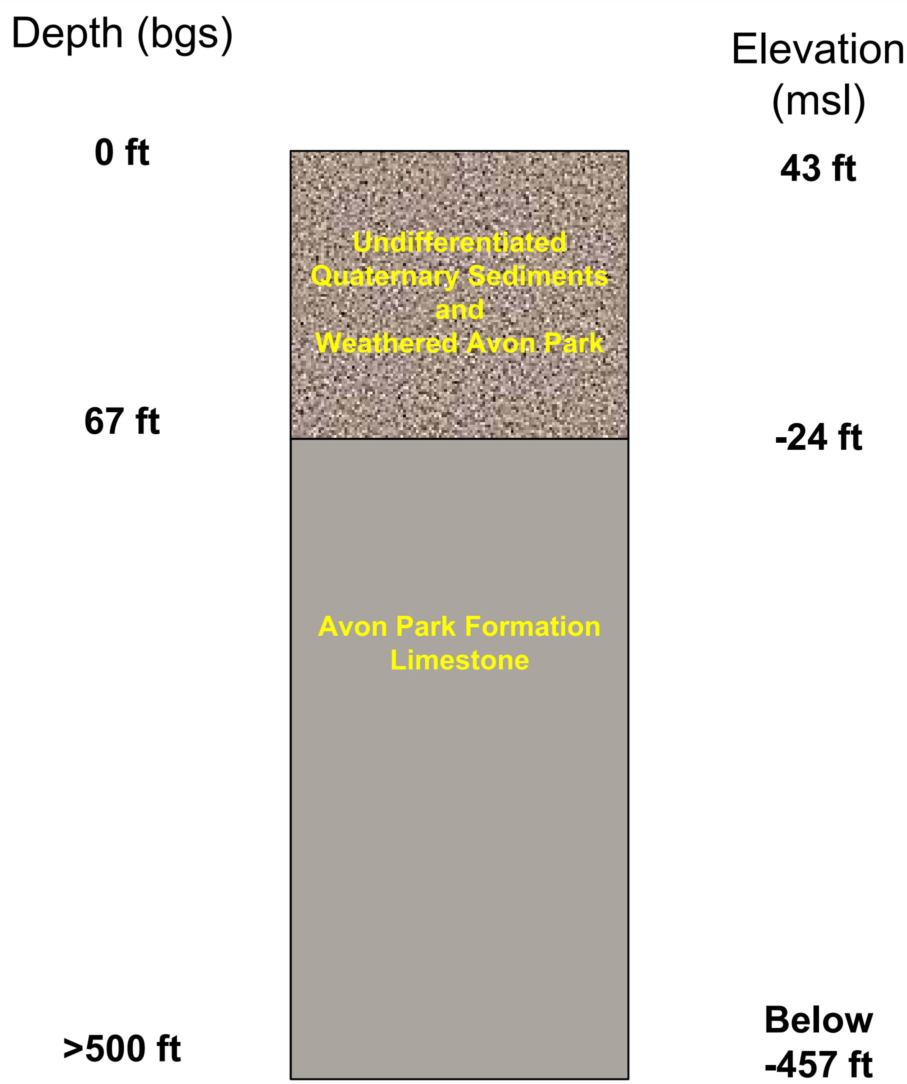
NGG Think Fleet.

Progress Energy

Site Characterization – RG 1.132 Compliant



Typical Composite Profile



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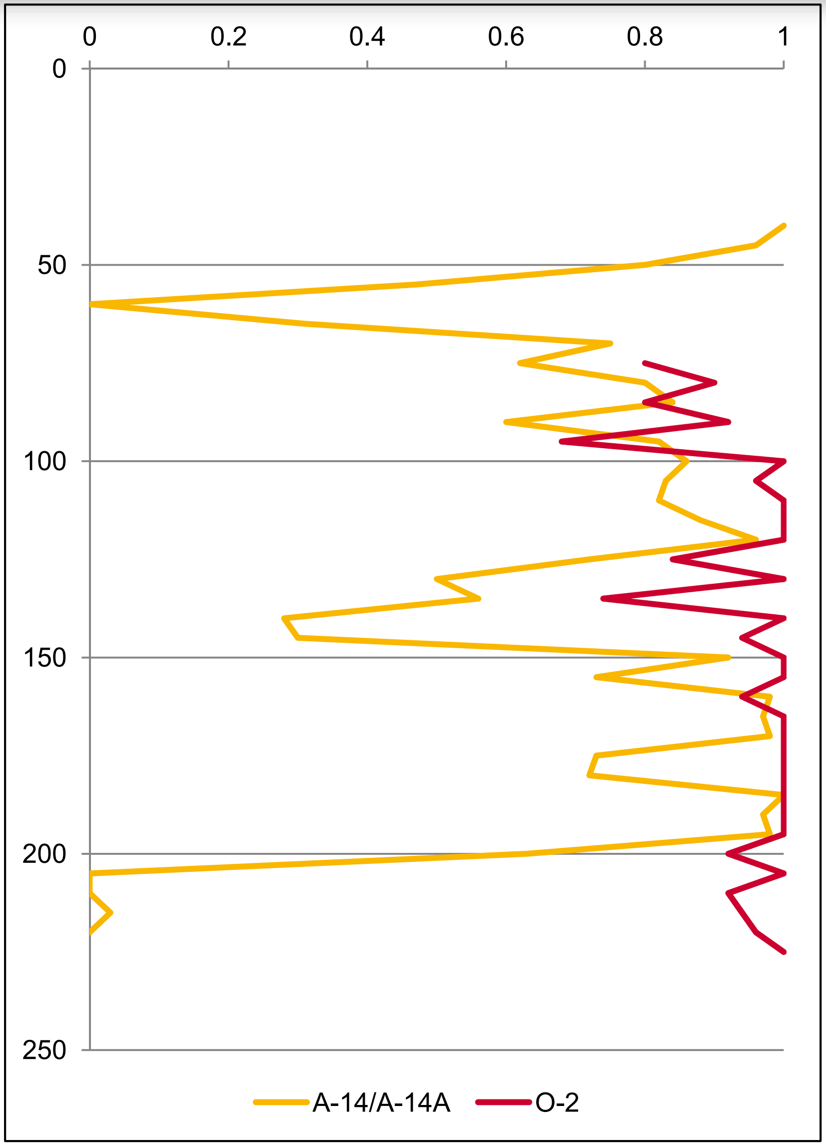
Low Recovery Zone Characterization

- Evaluation of low recovery zones for design
  - Detailed analysis of logs
    - Rod drops, drill fluid losses, core recovery, RQDs
    - Acoustic televiewer and caliper surveys
  - Grout Takes from initial borings
  - Grout Takes from Grout Test Program
  - Offset Boring Program

O-1 Core Recovery: 100% Recovery (Run 26)

- In A-21, this depth saw 40% recovery

O-2 and A-14A
Recovery – Offset Program vs Initial Program



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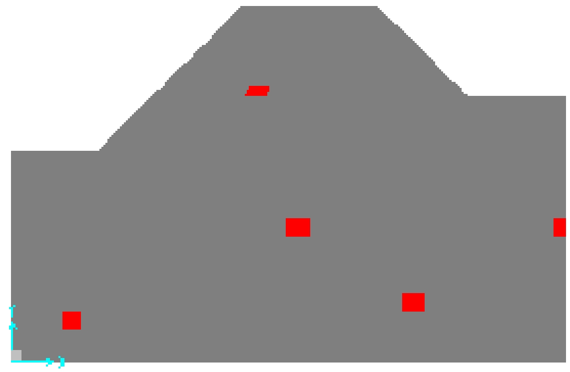
Levy Foundation Design & Analysis

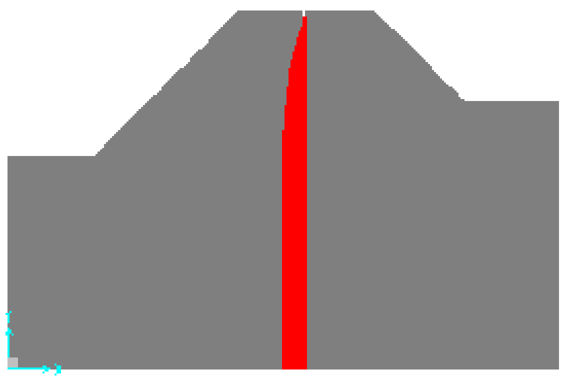
Four configurations of karst evaluated for each Case

1 - No Cavities

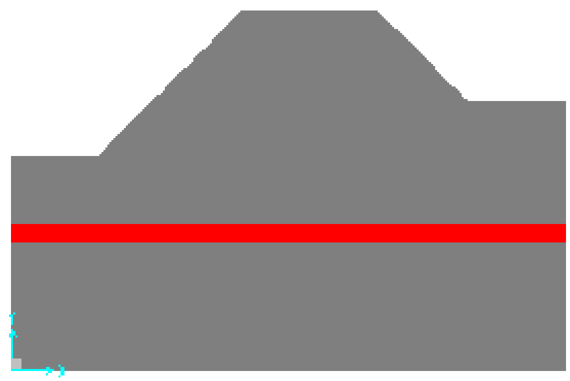


2 – Multiple Cavities

Plan View



3 – E-W Continuous Cavity



4 – N-S Continuous Cavity

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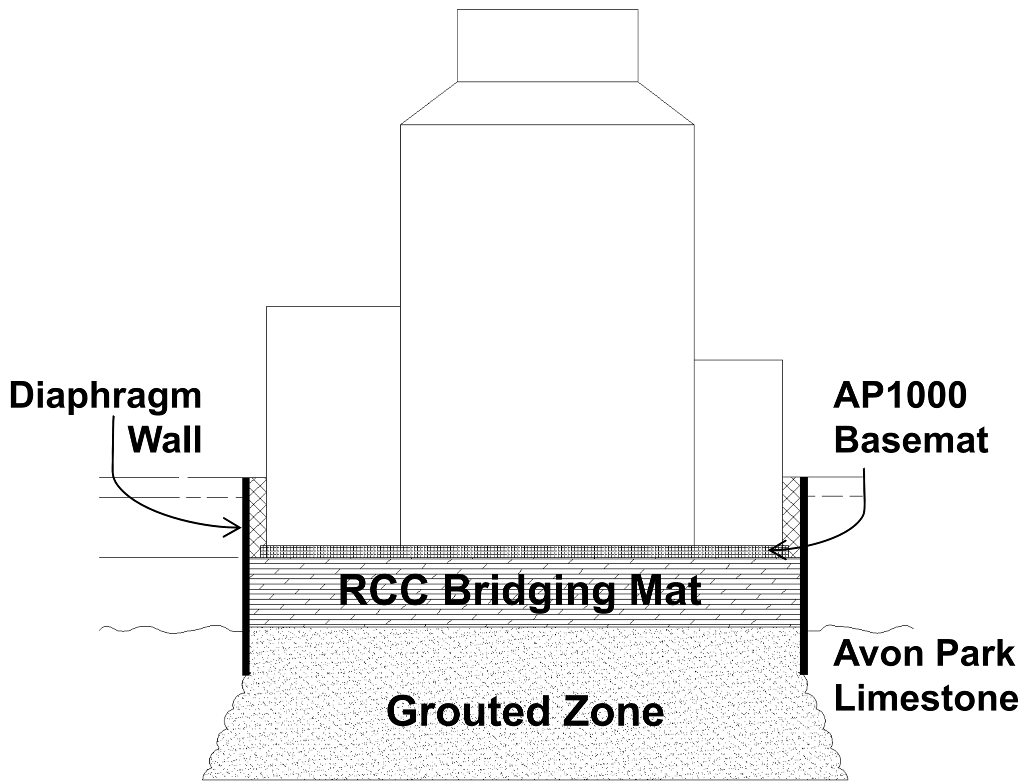
Nuclear Island Foundation Design Concept

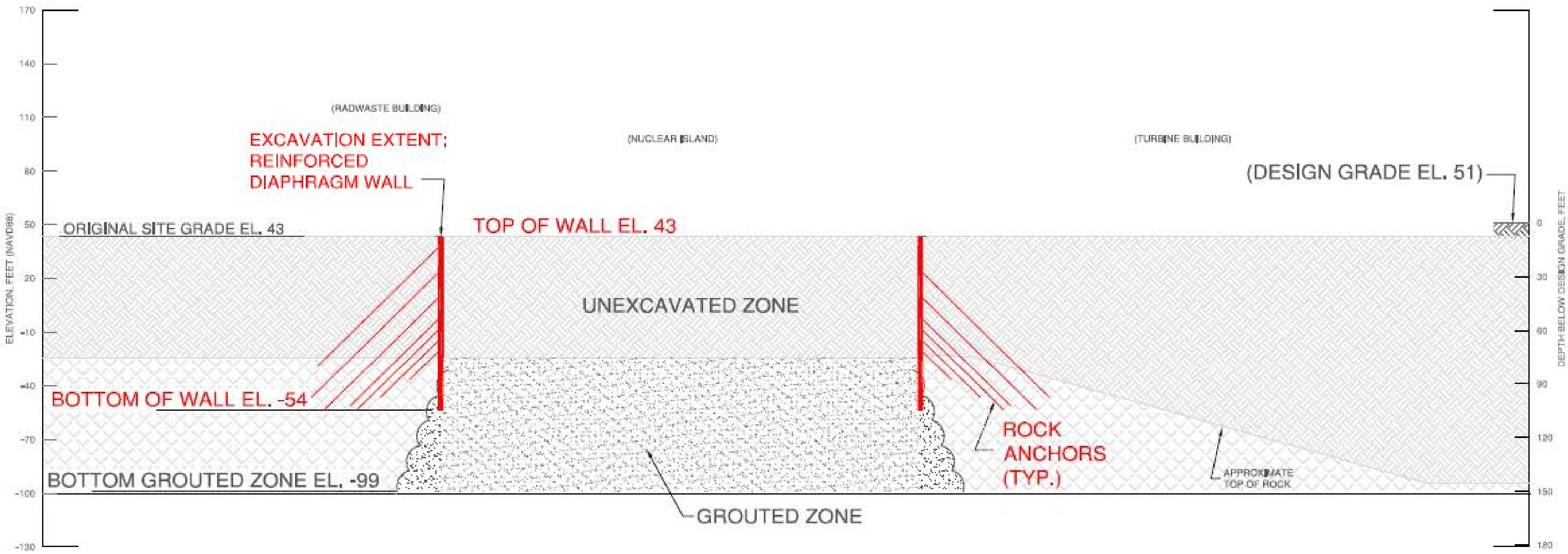
- Diaphragm Wall
- 75-foot thick Grouted Zone
- 35-foot thick RCC Bridging Mat
- AP1000 Basemat



NGG Think Fleet.

Progress Energy

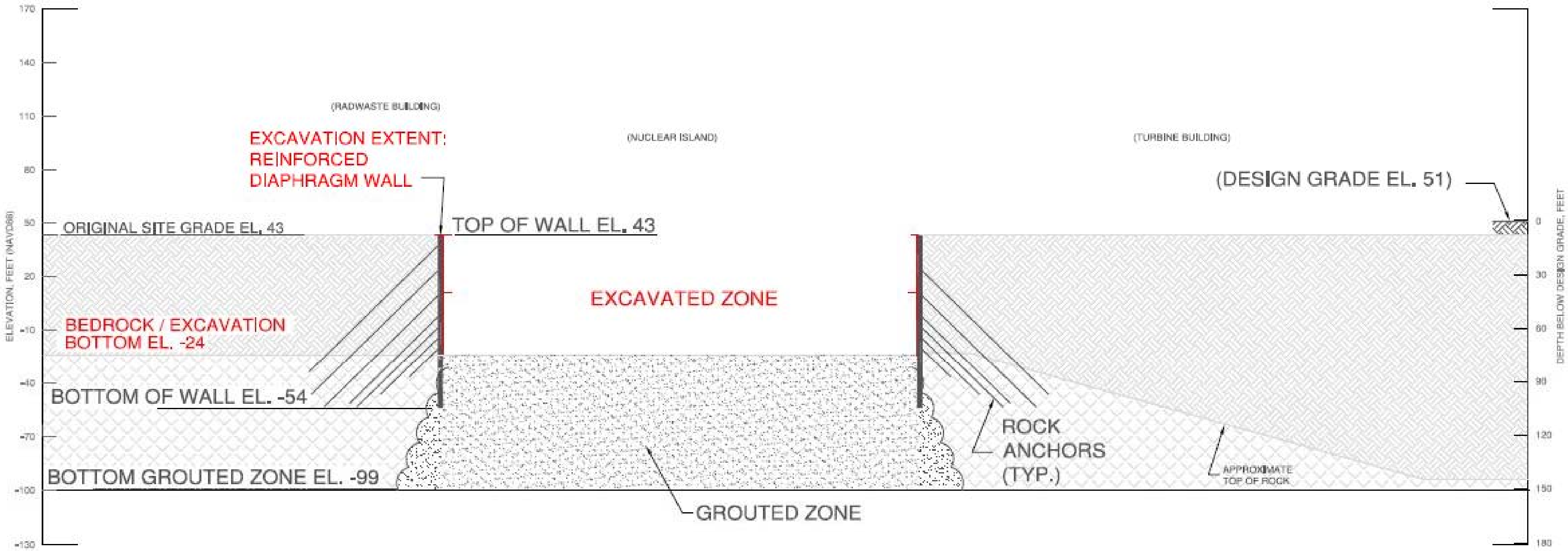
Install Diaphragm Wall and Subsurface Grouting



NGG Think Fleet.

Progress Energy

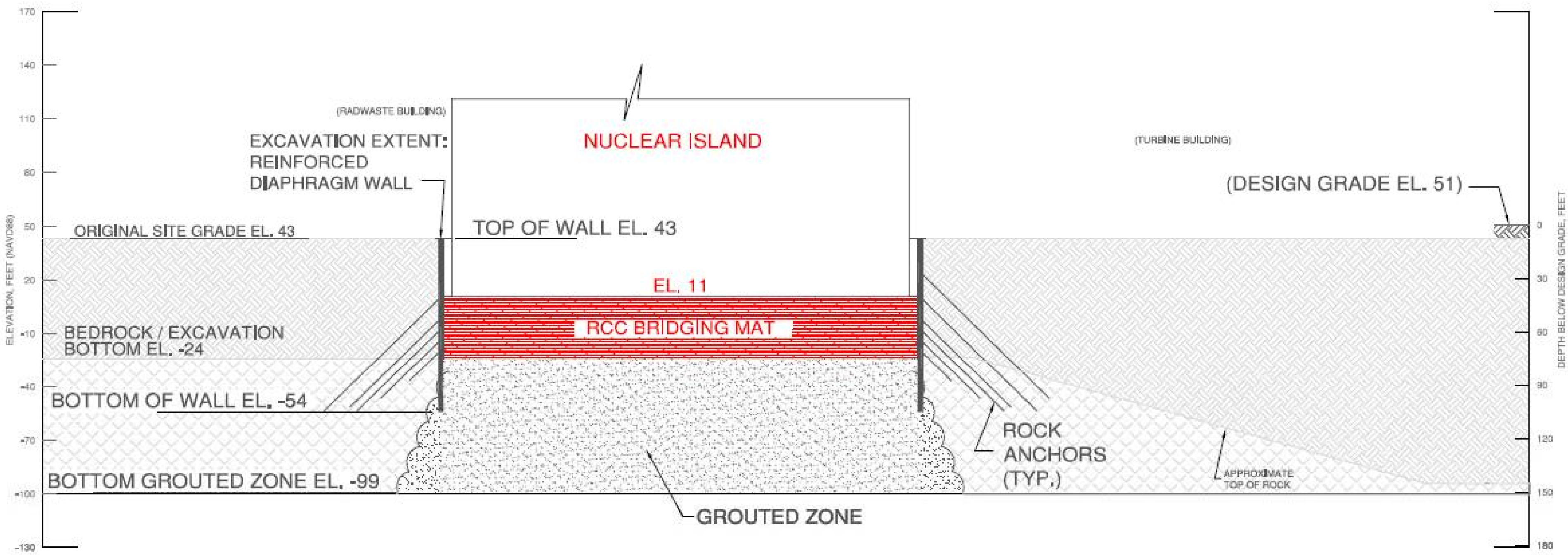
Excavate to Avon Park – Map Walls & Rock



NGG Think Fleet.

Progress Energy

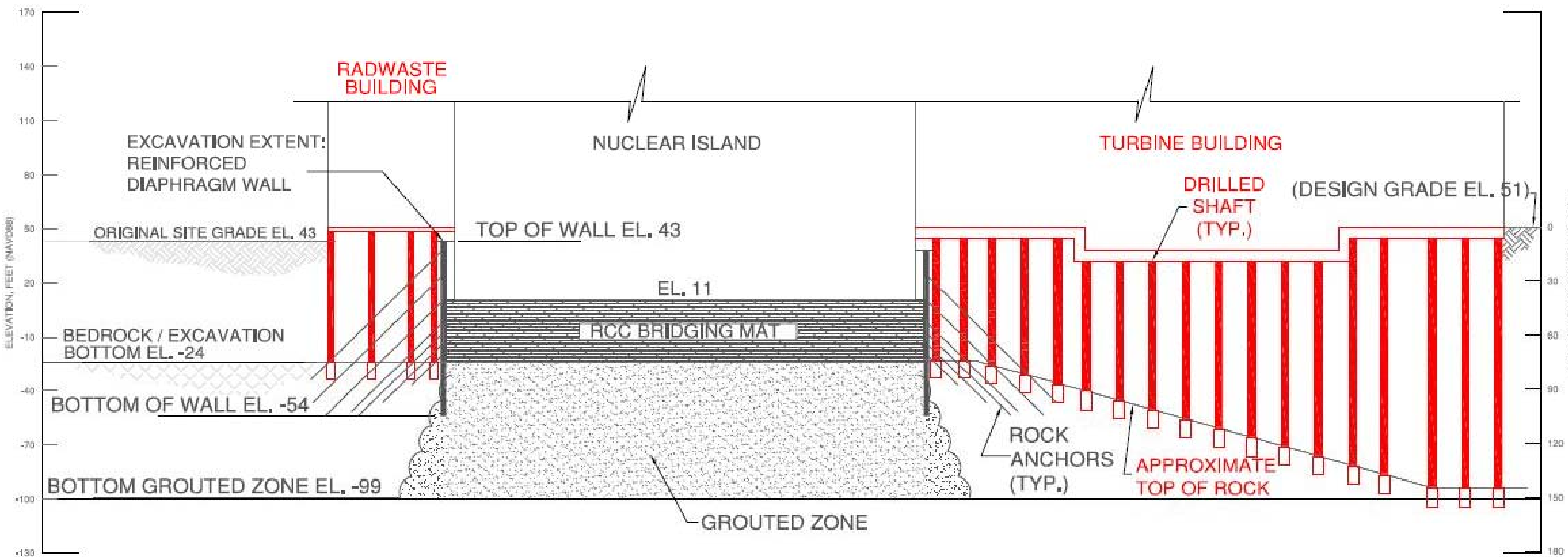
Construct 35 ft thick RCC Bridging Mat



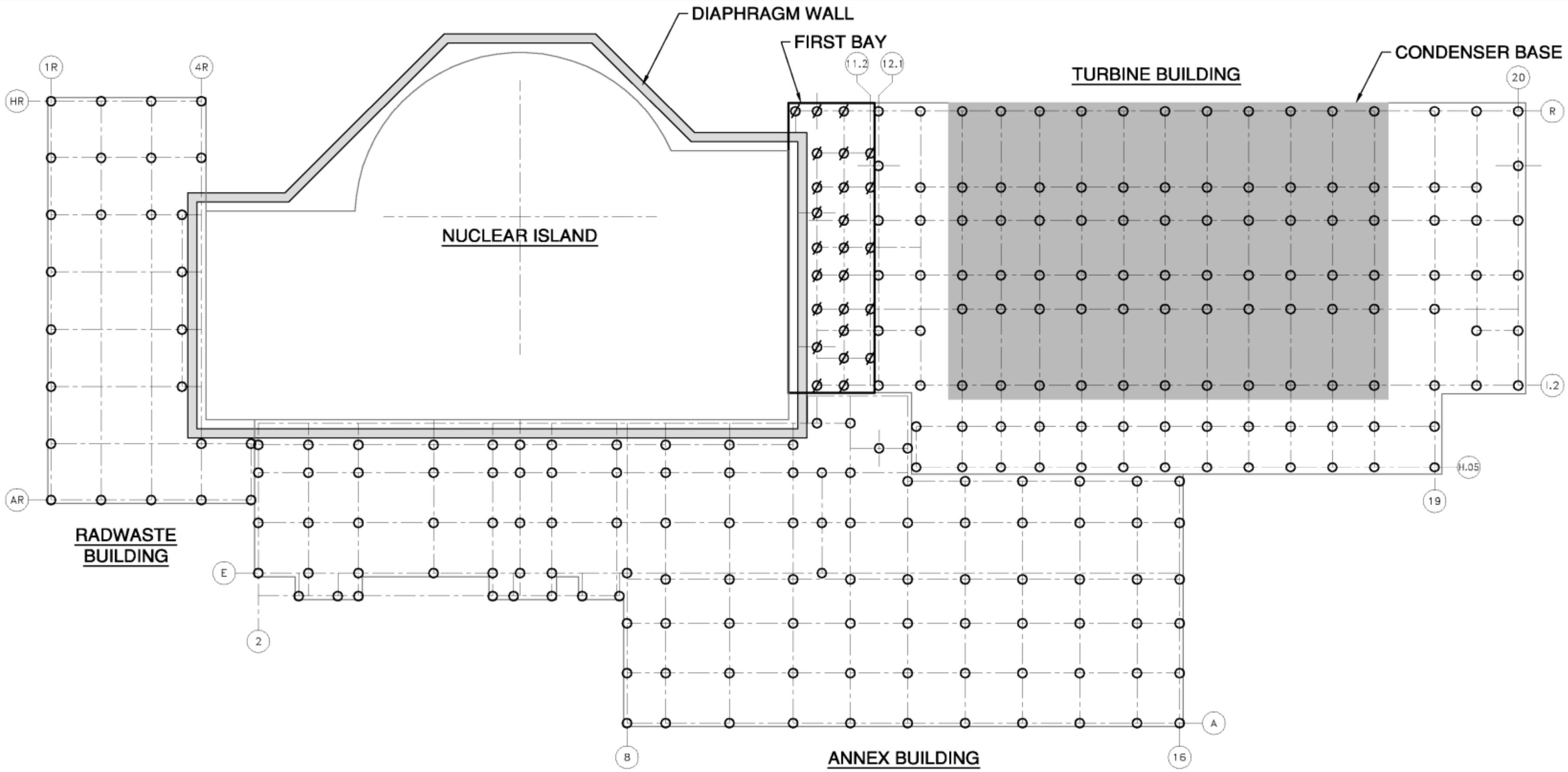
NGG Think Fleet.

Progress Energy

Install Drilled Shafts –Turbine, Radwaste, Annex



Drilled Shafts

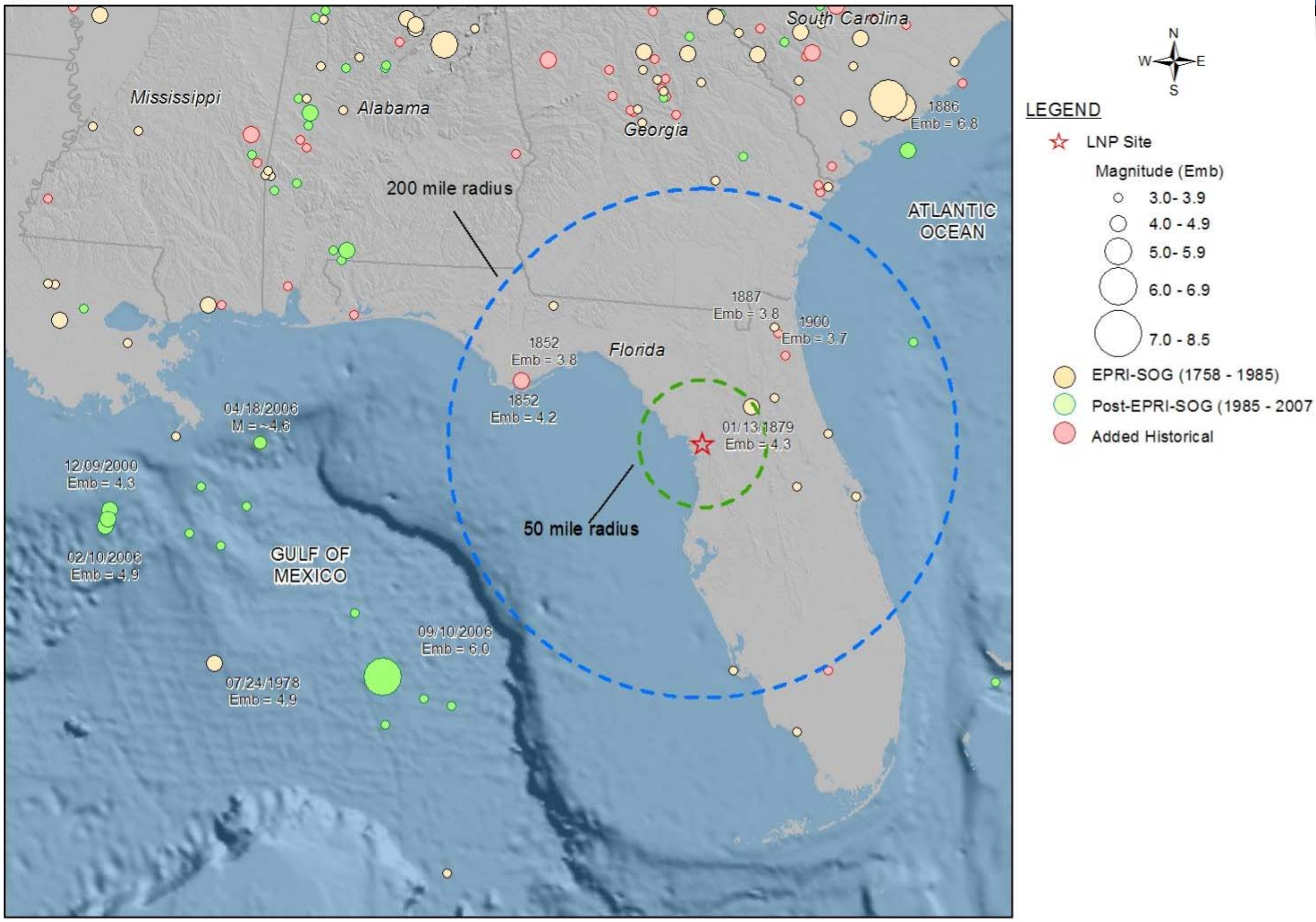


Roller Compacted Concrete
Taum Sauk RCC Dam

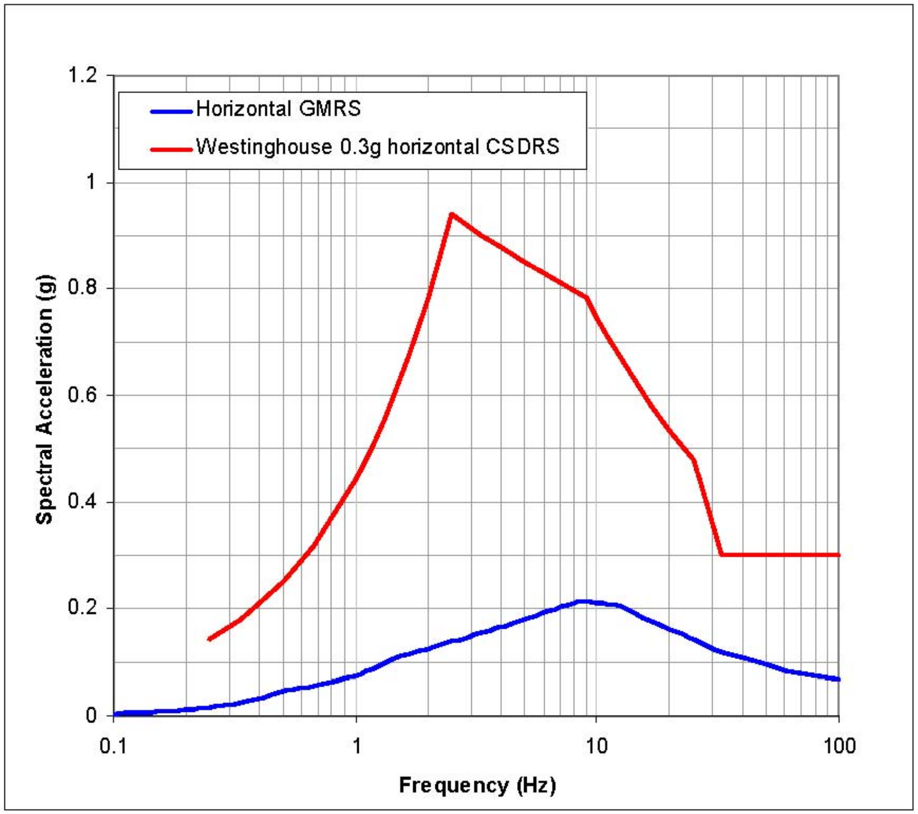
Roller Compacted Concrete
Taum Sauk RCC Placement

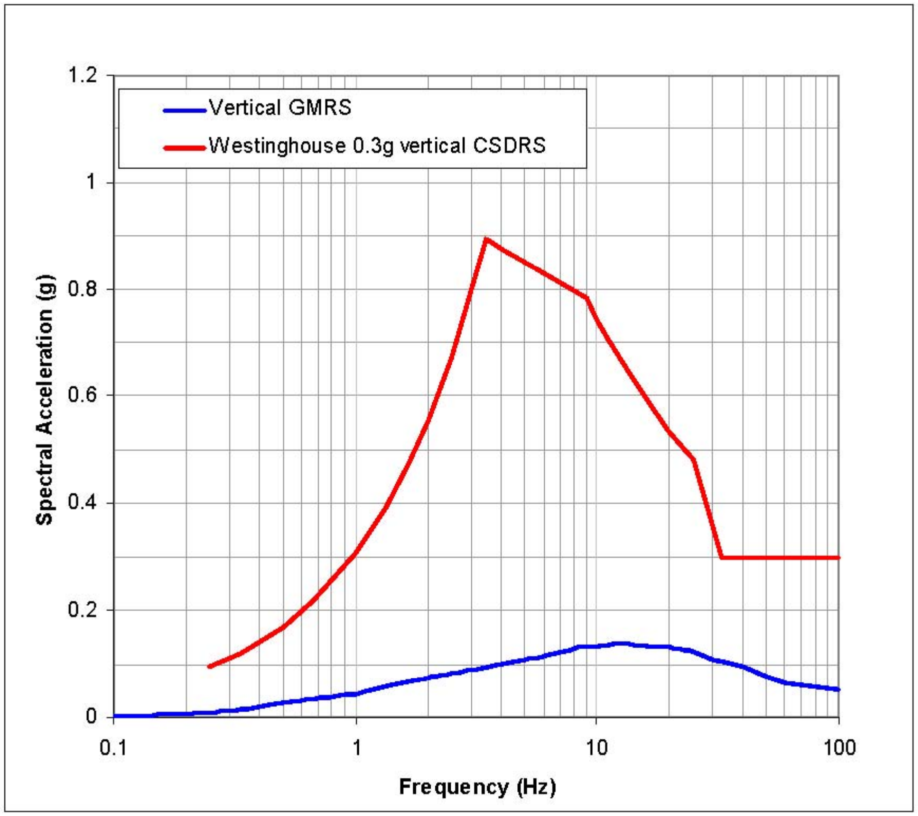
Regional Seismicity

LNP COL 2.5-2



Levy Ground Motion Response Spectra vs. AP1000 Certified Site Design Response Spectra





NGG Think Fleet.

Progress Energy

Site Specific Soil –Structure Interaction Analysis

- 3D SSI analysis performed considering site characteristics
  - LNP floor response spectra are enveloped by DCD AP1000 Floor Response Spectra (FRS)

Levy Units 1 and 2
FSAR Section 13.3
Emergency Planning

Bob Kitchen
Progress Energy

Levy Nuclear Plant
Emergency Plan Design

- Single Emergency Plan for two Levy Nuclear Plant units on a green field site.

- Developed in accordance with:
  - NUREG-0654/FEMA-REP-1 Rev 1
  - 10 CFR 50.47
  - 10 CFR 50 Appendix E

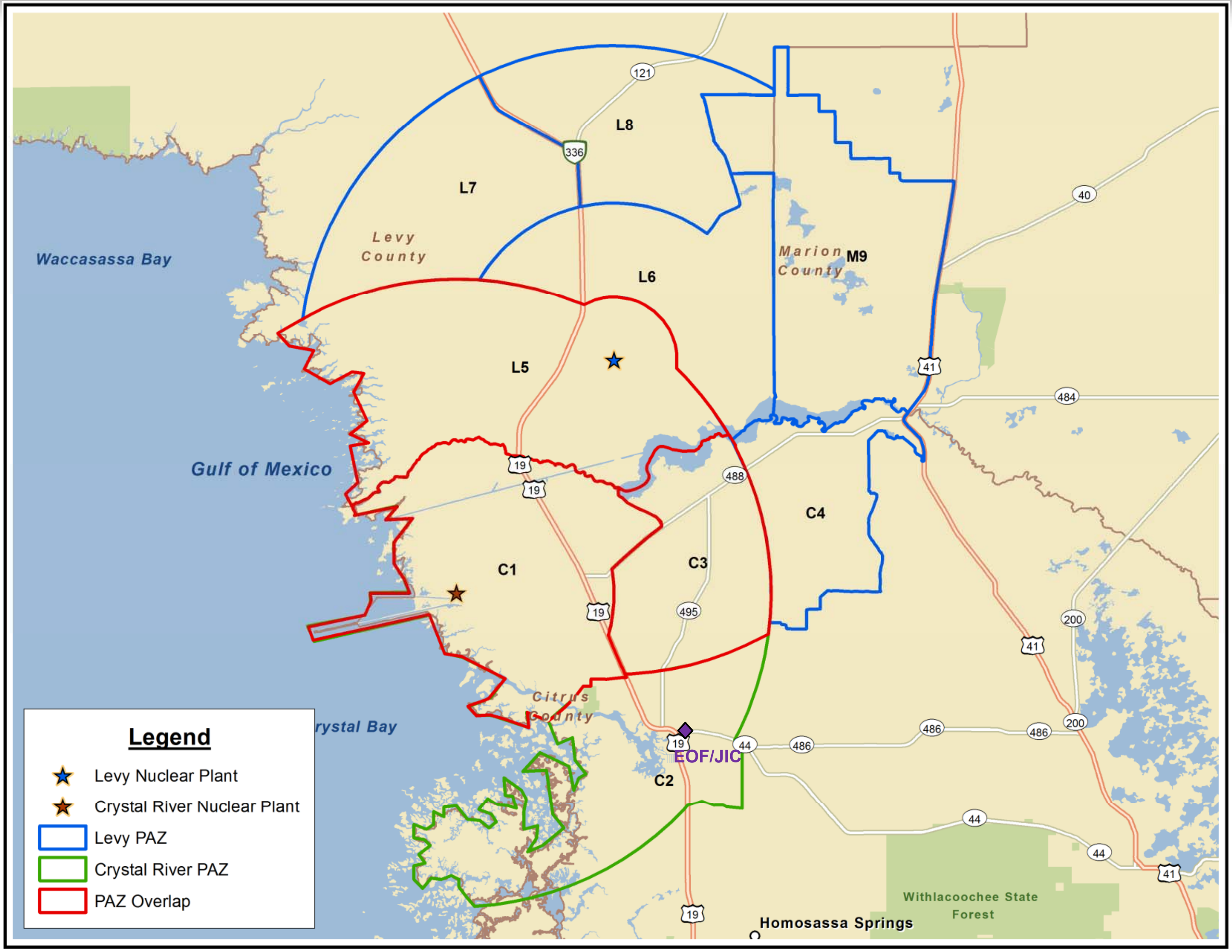
Levy Nuclear Plant
On-site Emergency Facilities

- Technical Support Center (TSC) and Operations Support Center
  - In Annex Building adjacent to control room
  - AP1000 Design Control Document (DCD) designated locations

- A single EOF location is intended to be used for both the Levy Nuclear Plant (LNP) and Crystal River Nuclear Plant (CRNP).

- The Emergency Operations Facility will be established consistent with NUREG-0696 guidelines

Levy and Crystal River EPZs



U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Levy County Units 1 and 2 COL Application

Staff Presentation to ACRS Full Committee

December 1, 2011

Levy County COL Review Team

- Technical Reviewers
  - Dr. Stephanie Devlin, Seismologist
    Geoscience and Geotechnical Engineering Branch
  - Pravin Patel, Structural Engineer
    Structural Engineering Branch
  - Tony Bowers, Emergency Preparedness Specialist
    New Reactor Licensing Branch, Office of Nuclear Security and Incident Response
- Project Manager
  - Brian Anderson

Staff Presentation

- COLA Overview
- Geology, Seismology, and Geotechnical Engineering
- Foundation Design and Seismic Analyses
- Emergency Planning

Levy County COLA Overview

- Third AP1000 COL application presented to ACRS
  - Revision 19 of the AP1000 DCD is incorporated by reference
- No site-specific departures or exemptions
- Utilizes a greenfield site
- Does not have any associated Limited Work Authorization (LWA) or Early Site Permit (ESP)
- No open items

Levy County Units 1 and 2
COL Application

Staff Presentation to ACRS Full Committee

Section 2.5
Geology, Seismology, and Geotechnical Engineering

December 1, 2011

Basic Geologic & Seismic Information, Surface Faulting

- **Primary concern for FSAR Sections 2.5.1 and 2.5.3 is the potential for occurrence of karst and related dissolution features at the Levy site**
  - Applicant identified karst and related dissolution features as the only potential geologic hazard in the site area.
  - Capable tectonic structures and surface faulting are of negligible concern because the entire Florida Platform, which contains the site region, has been tectonically stable for the last 145.5 Ma.
  - Outcrops are sparse, so core and geophysical borehole logs were examined during multiple site audits (April and September 2009, February 2010) for assessing the occurrence of karst and related dissolution features at the site.

Factors for Staff Assessment of Karst

- Low core recovery zones: Based on new borehole data, staff confirmed low-recovery zones in original site characterization boreholes were soft, laterally discontinuous, weathered zones in the normal stratigraphic sequence of the Avon Park Formation, not dissolution voids.

- Thickness of Quaternary sediments: Increased thickness of Quaternary deposits seen in some site borings likely related to deposition in paleochannels, not in collapse features.

- Dissolution rates: Upper 150 m (500 ft) of the Avon Park is primarily dolomitized limestone, so less susceptible to dissolution than pure limestone. Calculated dissolution rate for pure limestone at Crystal River 3 was 6E-3 percent over a 60-year plant life, so potential for dissolution of dolomitized Avon Park at the Levy site is negligible during life of the plant.

Factors for Staff Assessment of Karst Cont'd.

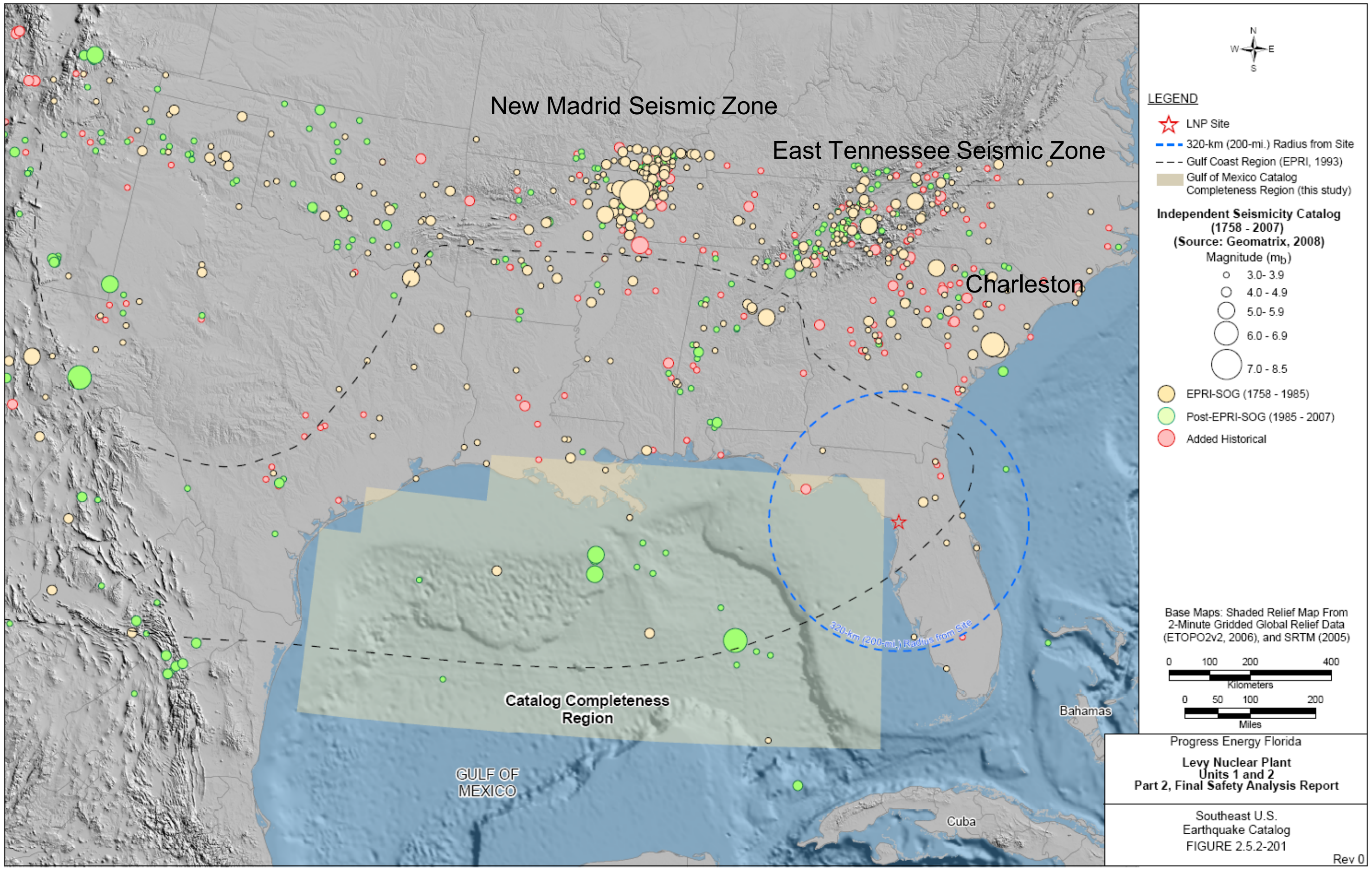
– Springs: No springs in the Avon Park in the site vicinity indicates a lack of subsurface conduits for rapid groundwater flow.

– Lateral extent of voids: Maximum lateral void extent in the Avon Park calculated to be 1.6m (5.3ft) from actual grout uptake. Maximum lateral extent then conservatively estimated to be 3m (10ft) based on increasing actual grout uptake volumes by 50% for vertical fractures and 100% for horizontal bedding.

– Fracture and bedding plane intersections: Borehole data show no evidence of extensive, dissolution-enlarged, interconnected fractures or bedding planes in the subsurface at the site location.

– Geologic mapping License Condition: License Condition relates to both tectonic (i.e., faulting) and non-tectonic (i.e., collapse and subsidence due to dissolution) deformation features. It provides a final check for evidence of dissolution voids at the site location.

Updated Seismicity Catalog

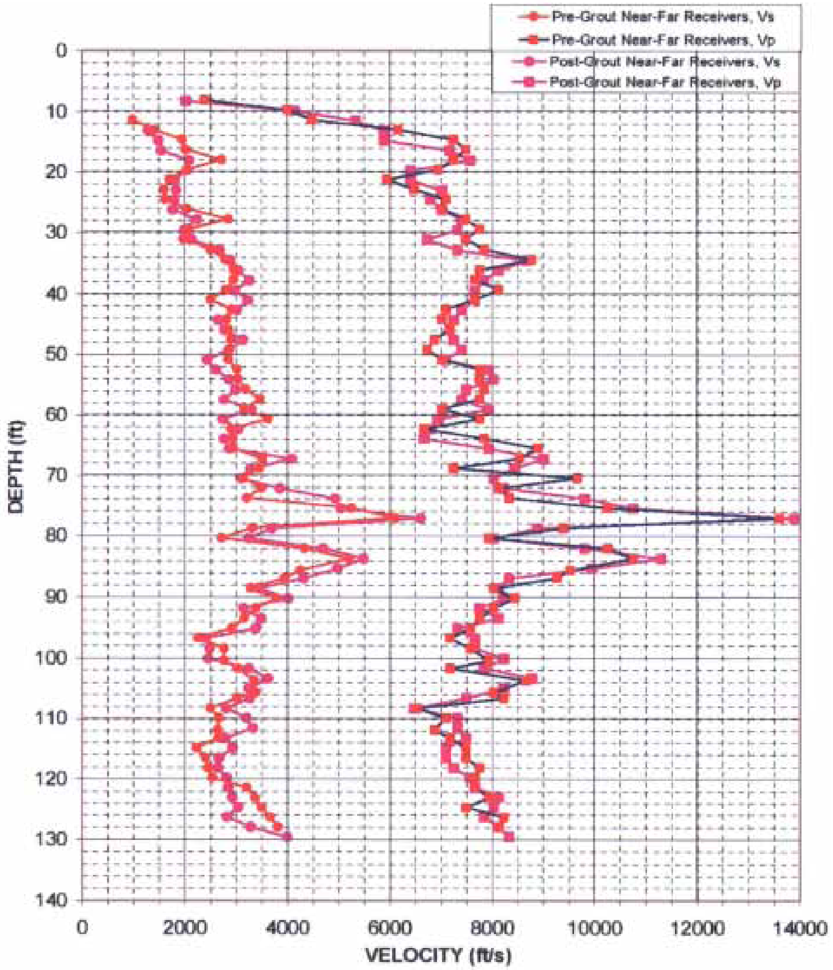


EPRI-SOG historical earthquake catalog complete from 1627-1984. Applicant updated it with seismicity from 1985 through December 2006 using more current seismicity catalogs. No earthquakes with m_b > 4.3 occurred in the site region.

Grouting Program and Seismic Wave Velocities

- Issue: Staff was concerned that seismic wave velocities are the same before and after the applicant's grouting program.

- Resolution: Applicant's grout test program measured velocities pre- and post-grouting. Measurements demonstrate that the grouting program do not alter the measurements of seismic wave velocities. Therefore, this issue is resolved.

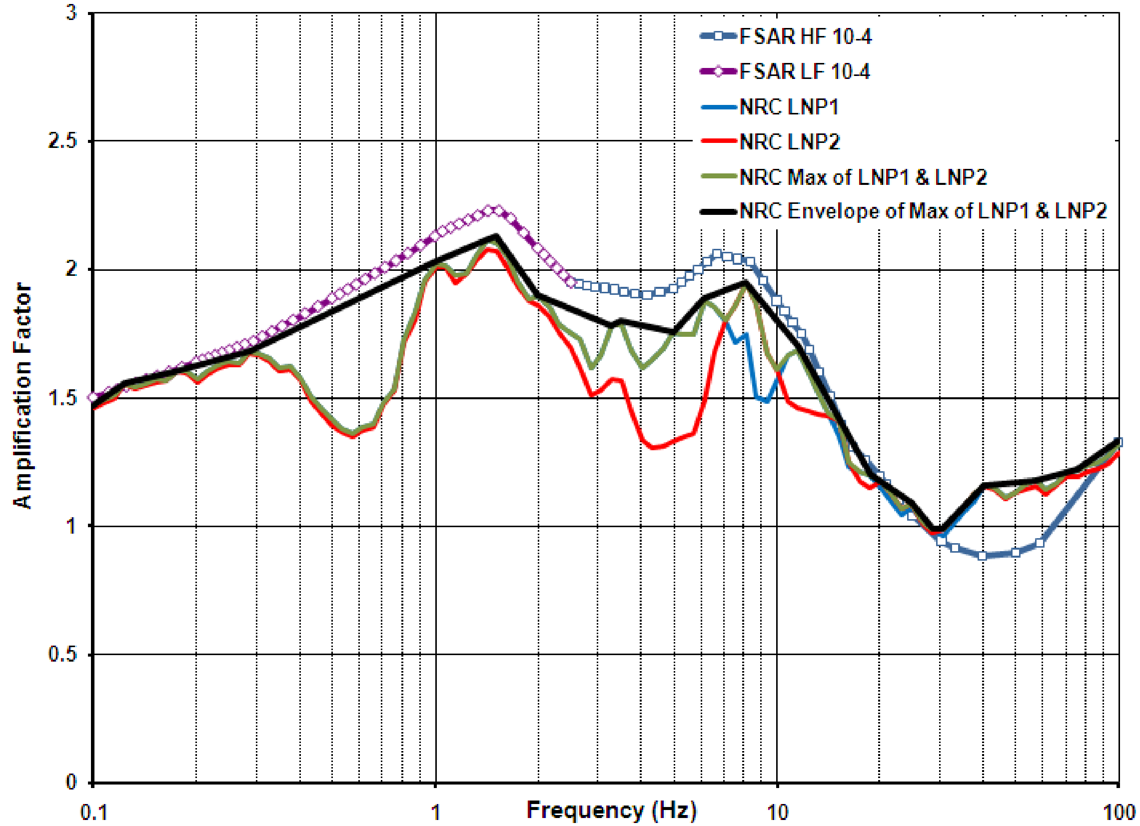


Pre- and post-grouting seismic wave velocity measurements (AFSER Figure 2.5.2-9)

Confirmatory Analysis of Site Response Calculations

- Site amplification functions were calculated for both LNP Unit 1 and 2 profiles and later enveloped to provide a conservative estimate.

- NRC Staff performed an independent site response analysis and confirmed the applicant's results.



Applicant's functions equal to or exceed the staff's in frequency ranges 0.1 to 30 Hz and 80 to 100 Hz. The staff's function exceeds the applicant's in frequency range 30 to 75 Hz. This exceedance is not significant, and is related to limitations of the different methods applied . (AFSER Figure 2.5.2-12)

Summary of NRC Safety Evaluation Results for Stability of Subsurface Materials and Foundations

- Dolomitization of the Avon Park Formation decreases dissolution rate, and no large dissolution cavities occur in the subsurface at the site location based on borehole data.
- Two-phase grouting from elevations -24ft to -99ft will inhibit percolation of meteoric water at the site location.
- Bearing capacity of the Avon Park is adequate to support static and dynamic loads.
  - Applicant's analysis assumed a 10 ft x 10 ft cavity beneath the 35-ft thick RCC bridging mat that will replace the Avon Park from +11ft to -24ft.
  - Applicant's sensitivity analyses varied locations of cavities and showed no detrimental effects on foundation rock stability.
- Settlement and differential settlement are below AP1000 DCD limits.
- Liquefaction is not possible under the nuclear island due to properties of the Avon Park Formation.
  - Liquefiable ground outside the nuclear island will either be removed and replaced with engineered backfill or stabilized with drains to prevent liquefaction.

Levy County Units 1 and 2
COL Application

Staff Presentation to ACRS Full Committee

Chapter 3 – Design of Structures, Components, Equipment, and Systems

December 1, 2011

Design Ground Motion Response Spectra

- **Issue:** Engineering backfill needed to raise the plant grade to be consistent with DCD soil profiles required site specific analysis.

- **Resolution:** The Staff performed confirmatory site response analyses and checked the minimum required ground motions per 10CFR Part 50, Appendix S.
  - Both the FIRS and surface PBSRS are well below the AP1000 CSDRS and HRHF.

Site Specific Soil Structure Analysis

- **Issue:** LNP free field response analysis showed that the AP1000 CSDRS for the vertical seismic excitation does not envelope the design grade deterministic surface spectra in the high frequency range.
- **Resolution:** The applicant developed an SSI model to compute ISRS for the site-specific soil profile and foundation geometry.
  - The applicant demonstrated that the LNP ISRS are enveloped by the AP1000 generic ISRS at all of the six NI key nodes with sufficient margin.

Maximum Relative Displacement Between the Nuclear Island and the Adjacent Building Foundation

- **Issue:** Applicant computed the probable maximum relative displacement between the NI and adjacent building foundations. The seismically induced lateral deformation of soils surrounding the drilled shafts needed to be incorporated into the analyses in addition to shaft deformation.

- **Resolution**
  - Maximum relative displacement computed by the applicant is 0.7 inches.
  - The computed displacement between the NI and adjacent building is less than the 2.0 inch gap required per the DCD.
  - Interaction between NI and adjacent buildings is not a concern.

Drilled Shaft Foundations Design and Installation

- **Issue**
  - The seismic Category II and non safety-related adjacent buildings are supported on drilled shaft foundations. NRC staff requested additional information related to the design methodology of the drilled shafts supporting the structures adjacent to the NI.
- **Resolution**
  - The applicant demonstrated that the backfill provides lateral support to the drilled shafts.
  - A description of construction sequence and practices to be used for construction of the drilled shafts was provided in the FSAR.
  - An ITAAC was proposed to ensure that the as-built design provides adequate vertical and horizontal capacity and stiffness.
  - The applicant demonstrated that the seismic separation between buildings is adequate to prevent interaction with the NI structures.

RCC Strength and Constructability Verification Program

- **Issue:** Roller Compacted Concrete (RCC) bridging mat (classified as safety-related) will be used to transmit the NI loads under static and dynamic conditions to the karst foundation**.**
  - Additional information required to demonstrate that the RCC Bridging Mat is capable of transferring the NI loads while providing the desired level of performance.
  - The applicant's Construction Verification Program did not initially address the capability of the as-placed material to transfer design forces across the bedding joints.
- **Resolution**
  - The RCC construction will follow standard industry guidance with additional enhancements related to Quality Assurance.
  - Nominal strength capacities established during conceptual design phase using ACI 349-01, 318-08 and USACE EM 1110-2-2006. Failure probability consistent with industry codes.
  - Finite Element Modeling of the RCC Bridging Mat was used to confirm capacities greater than expected loading conditions.
  - The applicant demonstrated that the stresses in the bridging mat will remain within code allowable limits and is therefore assured of performing its required function.
  - A detailed test plan describes the quality control and inspection to occur during production.
  - Post-COL RCC and bedding mix strength verification and constructability testing will be performed on a large test pad at the site prior to production of the RCC Bridging Mat.
  - License Condition for post-COL RCC testing.

Roller Compacted Concrete Strength and Constructability Verification Program (cont'd)

- **Issue:** During pre-COL mix design testing program, the concrete in the test panels did not attain the desired compressive and tensile strength. The applicant attributed the low strength of the cored cylinders from test panels that require the use of small mixing and compaction equipment.

- **Resolution**
  - Use mixing, placement, and compaction equipment consistent with USACE EM 1110-2006 and comparable to that used in large successful commercial projects.
  - Biaxial shear test results on block samples yielded shear strengths at least 1.67 times max design shear demand despite low compressive strength.
  - Post-COL RCC and bedding mix strength verification and constructability testing will be performed on a large test pad at the site prior to production of the RCC Bridging Mat.
  - License Condition for post-COL RCC testing.
  - ITAAC for RCC.

Levy County Units 1 and 2
COL Application

Staff Presentation to ACRS Full Committee

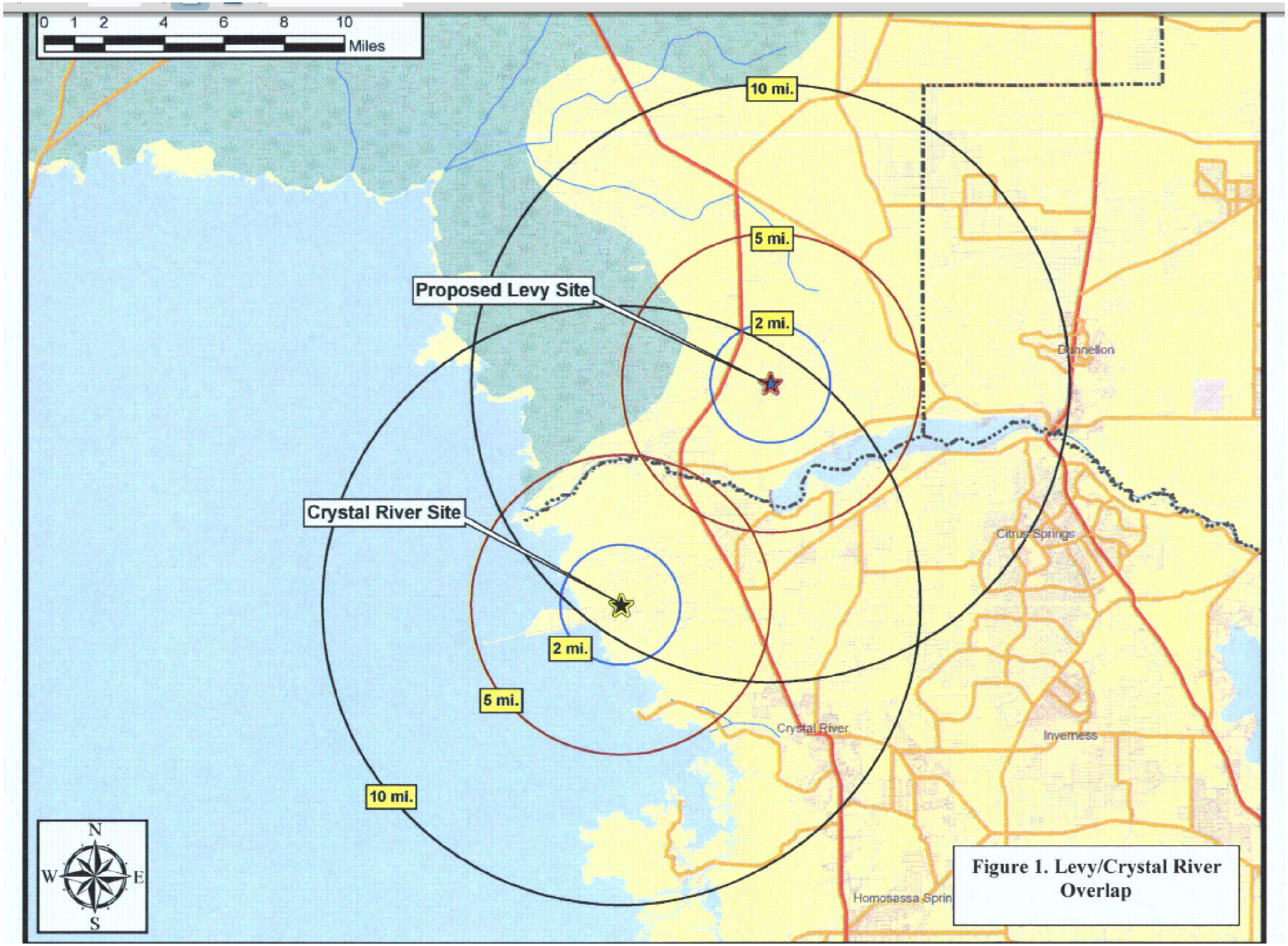
Section 13.3 - Emergency Planning

December 1, 2011

Emergency Planning

- No Open Items
- Approximately 30 Confirmatory Items
- Emergency Response Facilities
  - Technical Support Center and Operational Support Center
    - No Departure from AP1000 Design Control Document
  - Emergency Operations Facility
    - Existing facility approved for use by Crystal River 3 (CR3)
    - Proposed shared facility between the Levy Nuclear Plant (LNP) and CR3

Overlapping Emergency Planning Zones



Emergency Planning

- Conclusions
  - Reasonable assurance exists for the offsite plans
  - LNP Combined License (COL) application includes post-COL activities, including EP Inspection Tests Analyses and Acceptance Criteria that are necessary and sufficient to provide reasonable assurance for onsite plans
  - With the additional information and proposed textual revisions provided in response to the staff's requests for additional information, the NRC staff finds that the applicant addressed the required information relating to EP

Advisory Committee on Reactor Safeguards

Review of Draft Branch Technical Position on Concentration Averaging and Encapsulation

Maurice Heath, Project Manager
Dr. Christianne Ridge, Sr. Systems Performance Analyst
James Kennedy, Sr. Project Manager
December 1, 2011

Outline

- Introduction
- Comments from Subcommittee & Oct. 20^{th} Workshop
- Alternative Approaches
- Homogeneity Guidance
- Encapsulation
- Classifying Mixture of Items
- Summary

Introduction

Maurice Heath
Project Manager

What is the BTP?

- **Guidance document primarily for waste generators and processors**
  - **classifying waste for disposal under 10 CFR Part 61**
  - **provides a method for averaging and classifying radionuclide concentrations in waste over a volume or mass of waste package**
  - **widely used by generators, processors, disposal facilities, and Agreement State regulators**

10 CFR 61 Subpart C - Performance Objectives

- Protection of the general population from releases of radioactivity
- Protection of individuals from inadvertent intrusion
- Protection of individuals during operations
- Stability of the disposal site after closure

Regulatory Requirements Applicable to BTP

- § 61.42, "Protection of individuals from inadvertent intrusion"

- § 61.55, "Waste classification"
  - Tables 1 and 2 – define Class A, B, and C waste
  - § 61.55(a)(8) - Allows for concentration averaging in determining waste class

- 10 CFR Part 20, Appendix G

Waste Classification Table 2
10 CFR 61.55

Radionuclide	Concentration, Ci/m^3		
	Col. 1 (Class A limit)	Col. 2 (Class B limit)	Col. 3 (Class C limit)
Total of all radionuclides with < 5 yr half-life	700	n/a	n/a
H-3	40	n/a	n/a
Co-60	700	n/a	n/a
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

If concentration does not exceed column 1, waste is Class A. If concentration is > col. 1 and < col. 2, waste is Class B. If concentration is > col. 2 and < col. 3, waste is Class C. If > col. 3, waste is not acceptable for near-surface disposal

Background

- Low-Level Waste Strategic Assessment, October 2007
  - Revisions to CA BTP – high priority
  - Risk-informed, performance-based
- Blending of LLW and SECY paper— CA BTP on hold
- SRM-SECY-10-0043
  - Risk-inform blending position in BTP

Risk-Informed, Performance-Based

- Definition from NRC's Strategic Plan, NUREG-1614
- Risk-Informed:
  - Decision making approach: risk insights, engineering judgment, safety limits
- Performance-based: performance and results as bases for decision making
  - measurable, calculable or objectively observable parameters
  - objective, criteria exist or can be developed to assess performance;
  - licensees have flexibility

Major Changes in BTP

- Remove factor of 10 constraint for blending of LLW
- Increase recommended limit for Cs-137 sealed source disposal, among others.
- Add new section on “Alternative Approaches,” to allow for site- and waste-specific approaches to be approved
- Add homogeneity test

Major Changes to 1995 BTP

Revised BTP	1995 BTP	Reason for change
Removed factor of 10 constraint for blending of wastes	Blended wastes subject to factor of 10 constraint	Consistent with Commission blending SRM
Removed exceptions for blending of homogeneous wastes (resins, e.g.)	No constraints on blending if operational efficiency or worker dose reductions in play	Consistent with Commission blending SRM
Changed the Cs-137 sealed source limit from 30 Ci to 130 Ci, and Class B Co-60 limit from 700 Ci to no limit, based on new scenario.	30 Ci limit on Cs-137 sources, 700 Ci limit on Class B Co-60 sources.	1995 scenario unnecessarily conservative, creates orphan waste, esp. for DOE/NNSA
Consolidated sections addressing activated metals, contaminated materials, and cartridge filters into one	Three sections for each of these wastes, with virtually same technical positions	Improved readability and organization
Factor of 2 in place of 1.5 and factor applies to class limit, not average of mixture	Factor of 1.5 applied to variation around *average* concentration of mixture.	Uniformity (factor of 1.5) has no direct relationship to risk, especially when a mixture is uniform but well below the class limit. Tying factor to class limit gives risk connection. Two is a reasonable limit, staff believes
Factor of 10 tied to class limit, not average of mixture	Factor of 10 for non-primary gamma emitters tied to average of mixture	Same as above, first part
Added test for homogeneity for mixing similar homogeneous waste types	No test required	Need to ensure intruder protection, well drilling scenario
Added “Alternatives approaches” section and gives examples.	61.58 had to be invoked for alternative approaches, a high threshold	61.58 is for alternative to regulations, not guidance. Effect was to discourage use (only 1X in 16 years)
Revised and clarified technical bases in Appendix	Has technical basis for sealed source scenarios, but difficult to understand	Greater transparency, more realistic scenarios

*** Additional changes were made but they were not as significant

Site-Specific Analysis Rulemaking and BTP

Activity	Intruder Protection	Primary user	Regulatory status	Scenario or POP
Site-specific analysis rulemaking	Yes	Disposal facility	Regulation	Envision 20,000 POP
Concentration Averaging BTP	Yes	Generators and processors	Guidance	Scenario basis 500 years

Comments from Subcommittee & Oct. 20th Workshop

- Intruder protection and Part 61
- Scenario selection
- Risk-informed, performance-based (esp. probability of intrusion)
- Homogeneity test
- Previously approved topical reports on waste loading

Alternative Approaches

James E. Kennedy
Sr. Project Manager

Outline

- Introduction
- Comments from Subcommittee & Oct. 20th Workshop
- Alternative Approaches
- Homogeneity Guidance
- Encapsulation
- Classifying Mixture of Items
- Summary

Alternative Approaches and Alternative Provisions

- **Alternative Provisions**
  - 1995 BTP - deviation from BTP guidance via 10 CFR 61.58, a high bar
  - Revised draft BTP – Alternative Provisions restricted to deviations from Part 61 regulation
- **Alternative Approaches**
  - new section in BTP
  - deviations from positions in the BTP

Alternative Approaches

- **New philosophy:**
  - **BTP provides broadly applicable "look up" guidance & sets uniform level of safety**
  - **Alternative Approaches provides Licensees / Agreement States with *specific NRC guidance* on factors to consider in submitting / approving alternative guidance**
- **Example Alternative Approaches – BTP sets maximum curie limits for gamma-emitters that can be encapsulated, and new section states that larger curie sources might be safe, if buried > 10 m deep in long-lived source device**
- **Provides intruder protection, with flexibility**

Alternative Approaches

- Encapsulation of Sealed Sources
- Activated Metals, Contaminated Materials and Cartridge Filters
- Likelihood of Intrusion
- Large Components
- Other

Comments on Alternative Approaches

- BTP should acknowledge and endorse previous approvals of alternative approaches, in body of document (cartridge filters encapsulated in larger volumes, Trojan reactor vessel disposal, e.g.)

- BTP should provide as many specific considerations as possible for alternatives

- May not be a viable mechanism for having alternatives approved

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Summary: Alternative Approaches

- New philosophy
- BTP provides "look up" guidance, uniform level safety
- Provides guidance for deviations
- Stakeholders support

Homogeneity Guidance in the Draft Branch Technical Position on Concentration Averaging and Encapsulation

Dr. Christianne Ridge
Sr. Systems Performance Analyst

Outline

- Introduction
- Comments from Subcommittee & Oct. 20th Workshop
- Alternative Approaches
- Homogeneity Guidance
- Encapsulation
- Classifying Mixture of Items
- Summary

Reasons for Homogeneity Guidance

- Elimination of "factor of 10" constraint on inputs to a waste mixture
- Stakeholder concern
- Increased consideration of site-specific scenarios
- Commission direction (SRM-SECY-10-0043)

Basis for Draft Homogeneity Guidance

- Per Commission direction, the draft homogeneity guidance is based on an intrusion scenario
- Scenario is similar to scenarios used elsewhere by NRC and DOE
- Many comments were received on general and specific features of the scenario

Draft Homogeneity Guidance
Summary of Current Contents

Draft Homogeneity Guidance

- Draft guidance maintains category of “homogeneous waste types” used in 1995 BTP

- For waste not automatically assumed to be homogeneous, the draft guidance recommends a limit on the volume of waste with a sum of fractions greater than 10 in any waste package

- Draft guidance recommends an upper limit on the uncertainty in waste classification calculations for miscible wastes

UNITED STATES NUCLEAR REGULATORY COMMISSION

Homogeneous Waste Types

- **Homogeneous waste types are specific types of waste assumed to be homogeneous in the context of intrusion**
  - **Solidified or absorbed liquid, spent ion-exchange resins, filter media, evaporator bottom concentrates, ash, contaminated soil, and containerized dry active waste**

- **No homogeneity test is proposed for designated homogeneous waste types**
  - **These wastes are homogeneous or easily mixed, or waste is expected to become easily mixed after 100 years**
  - **Licensees are encouraged not to ignore existing information (e.g., surveys done for transportation)**

Intentional Blending During Waste Processing

- Draft Guidance: A container of homogeneous waste should not contain any pocket of waste larger than 0.03 cubic meter (1 cubic foot) with a sum of fractions greater than 10

- Processors either demonstrate that process creates homogeneous waste or apply test to individual containers

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Classification of Homogeneous Waste

- More rigorous consideration of uncertainties is recommended for waste with a sum of fractions close to 1
  - Consistent with 1983 Branch Technical Position

- Main sources of uncertainty expected to be
  - Spatial variability in radionuclide concentrations
  - Uncertainty in scaling factors

- Draft Guidance: Sum of fractions should be less than 1 minus its standard error

Draft Homogeneity Guidance
General Comments

General Comment – Intrusion Probability

- **Quantify probability of intrusion scenario**
  - **Risk is a function of consequence and probability**
  - **If the perception of increased risk from blended waste is the basis for recommending homogeneity testing, the NRC staff should present a technical understanding of the risk**

Staff Considerations – Intrusion Probability

- Intrusion probability can be quantified for short time periods
  - NAS concludes there no basis for long-term intrusion probability predictions
  - Expert panel for NNSS recommended 25 year review period for intrusion probability predictions

Staff Considerations – Intrusion Probability

- The general requirement at 61.40 indicates staff needs “reasonable assurance” that the performance objectives will be met
- Appears to allow for some consideration of likelihood of an intruder encountering a hotspot
- Staff considering appropriate technical basis for considering probability of intrusion

Staff Considerations – Likelihood of Scenario

- **Commenters expressed specific concerns about the drilling scenario used as a basis for the guidance**

- **In particular, commenters expressed concern about the assumption that drill cuttings will be spread on the surface**

Comments – Likelihood of Scenario

- Particular drilling scenario considered was used in the same manner as a design basis accident to test the site
- NRC staff is considering whether it will continue to rely on a scenario in which a small amount of waste is exhumed and spread on the surface
- Staff is considering a range of current technologies and associated consequences

Comments – Waste Redistribution

- Draft guidance is based on the assumption that the distribution of radioactivity in the waste when it is shipped remains unchanged during disposal

- Vibrations during transportation, thermal gradients, density gradients, concentration gradients, and other processes tend to redistribute radioactivity in certain types of waste

Staff Considerations – Waste Redistribution

- Redistribution may affect the utility of evaluating homogeneity of individual packages
- Stratification into horizontal layers may reduce the need for evaluation of intra-package homogeneity
- Irrespective of redistribution within packages, effective blending in processing equipment may be necessary to ensure packages meet class limits
- Disposal site worker dose is assumed to be addressed by relevant Part 20 regulations and licensee controls, as it is today

UNITED STATES NUCLEAR REGULATORY COMMISSION

Draft Homogeneity Guidance Potential Revisions

Homogeneous Waste Types

- Homogeneous waste types are specific waste streams assumed to be homogeneous in the context of intrusion
  - Solidified or absorbed liquid, spent ion-exchange resins, filter media, evaporator bottom concentrates, ash, contaminated soil, and containerized dry active waste
- No homogeneity test is proposed for designated homogeneous waste types
  - These wastes are homogeneous or easily mixed, or waste is expected to become easily mixed after 100 years
  - Staff considering whether recommendation to use all existing information (e.g., transportation surveys) is necessary to develop reasonable assurance

Intentional Blending During Waste Processing

- Processors either demonstrate that process creates homogeneous waste or apply test to individual containers
- Staff considering changing specific recommendation that waste should not have pockets with a sum of fractions greater than 10 to a recommendation that licensees show such pockets are unlikely
- Potential for radionuclide redistribution will be considered
- Staff developing appropriate technical basis to make the recommendation quantitative

UNITED STATES NUCLEAR REGULATORY COMMISSION

Classification of Homogeneous Waste

- More rigorous consideration of uncertainties recommended for waste with a sum of fractions close to 1
  - Consistent with 1983 Branch Technical Position

- Main sources of uncertainty expected to be
  - Spatial variability in radionuclide concentrations
  - Uncertainty in scaling factors

- Staff is considering acceptable levels of uncertainty in waste classification calculations based on waste concentration data and potential range of doses to an intruder

Major Changes to 1995 BTP

Revised BTP	1995 BTP	Reason for change
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Revised and clarified technical bases in Appendix	Has technical basis for sealed source scenarios, but difficult to understand	Greater transparency, more realistic scenarios

Encapsulation and Classifying Mixture of Individual Items in the Branch Technical Position on Concentration Averaging and Encapsulation

James Kennedy
Sr. Project Manager

Outline

- Introduction
- Comments from Subcommittee & Oct. 20th Workshop
- Alternative Approaches
- Homogeneity Guidance
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- Summary

Reasons for Sealed Source Guidance

- Increased awareness of safety and security threats from sealed sources
- 1995 BTP significantly constrains disposal of sources
- DOE/NNSA has large number of sources in storage
- Disposal is preferred and encapsulation of sources is preferred method for disposal
- In context of concentration averaging, sealed sources are a "hot spot" that needs to be addressed

Encapsulation of Sealed Sources and Other LLRW

- **What is encapsulation: Surround radioactive item (sealed source) in a binding matrix, in a container, where radioactivity remains in original dimensions**

- **Why it is good: increases protection of off-site member of public and potential intruders by increasing waste form stability, improves worker protection**

- **BTP sets limits on encapsulation to prevent use of extreme measures**

1995 Guidance: Encapsulation of Sealed Sources and Other LLRW

- **Max. encapsulating volume or mass 0.2 m^3 or 500 kg**
- **Max. curie non-gammas: Class C limit when averaged across encapsulating media**
- **Max. curie gamma-emitters: based on exposure scenario in BTP**

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1995 Gamma Curie Limits for Encapsulated Items

- 1995 curie limits for gamma emitters based on intruder exposure scenario in 1995 BTP
- Limits based on scenario where intruder is exposed for 2,360 hours to encapsulated source 1 m from intruder

Nuclide	For Waste Classified as Class A or B	For Waste Classified as Class C
Co-60	700 Ci	no limit
Nb-94	1 mCi	1 mCi
Cs-137/Ba-137m	3 mCi	30 Ci

Revised Draft Guidance: Encapsulation of Sealed Sources and Other LLRW

- **Maximum encapsulating volume or mass 0.2 m^3 or 500 kg - No Change**
- **Maximum non-gammas: Class C limit when averaged across of 0.2 m^3 encapsulating package - No Change**
- **Maximum gamma-emitter curie limits: new exposure scenario, with higher curie limits**
- **Alternative Approaches also available**

Development of Gamma-Emitting Sealed Source Carry-Away Scenario

- **Considered sealed radioactive source accidents for inadvertent intruder discovery of sealed radioactive source**
- **Developed "reasonably foreseeable, yet conservative" scenario**

Gamma-Emitting Sealed Source Carry-Away Scenario

- **Not real, but stylized scenario used to ensure the intruder does not receive an inordinately high dose, should intrusion occur**

- **Scenario basics:**
  - **500 years after LLRW landfill closure, loss of control, recognition, knowledge**
  - **Containers / wastes / encapsulating media decayed**
  - **Stainless steel Cs-137 sealed radioactive source survived**

Results of Gamma-Emitting Sealed Source Carry-Away Scenario

- Analysis demonstrates need to protect intruder from small, highly-radioactive items
- Cs-137 sealed source ≤ 130 Ci at disposal, dose intruder ≤ 500 mrem at 500 years

Nuclide	Waste Classified as Class A	Waste Classified as Class B	Waste Classified as Class C
Co-60	140 Ci	No Limit.	No limit.
Nb-94	1 mCi	1 mCi	1 mCi
Cs-137/Ba- 137m	0.0072 Ci	0.72 Ci	130 Ci

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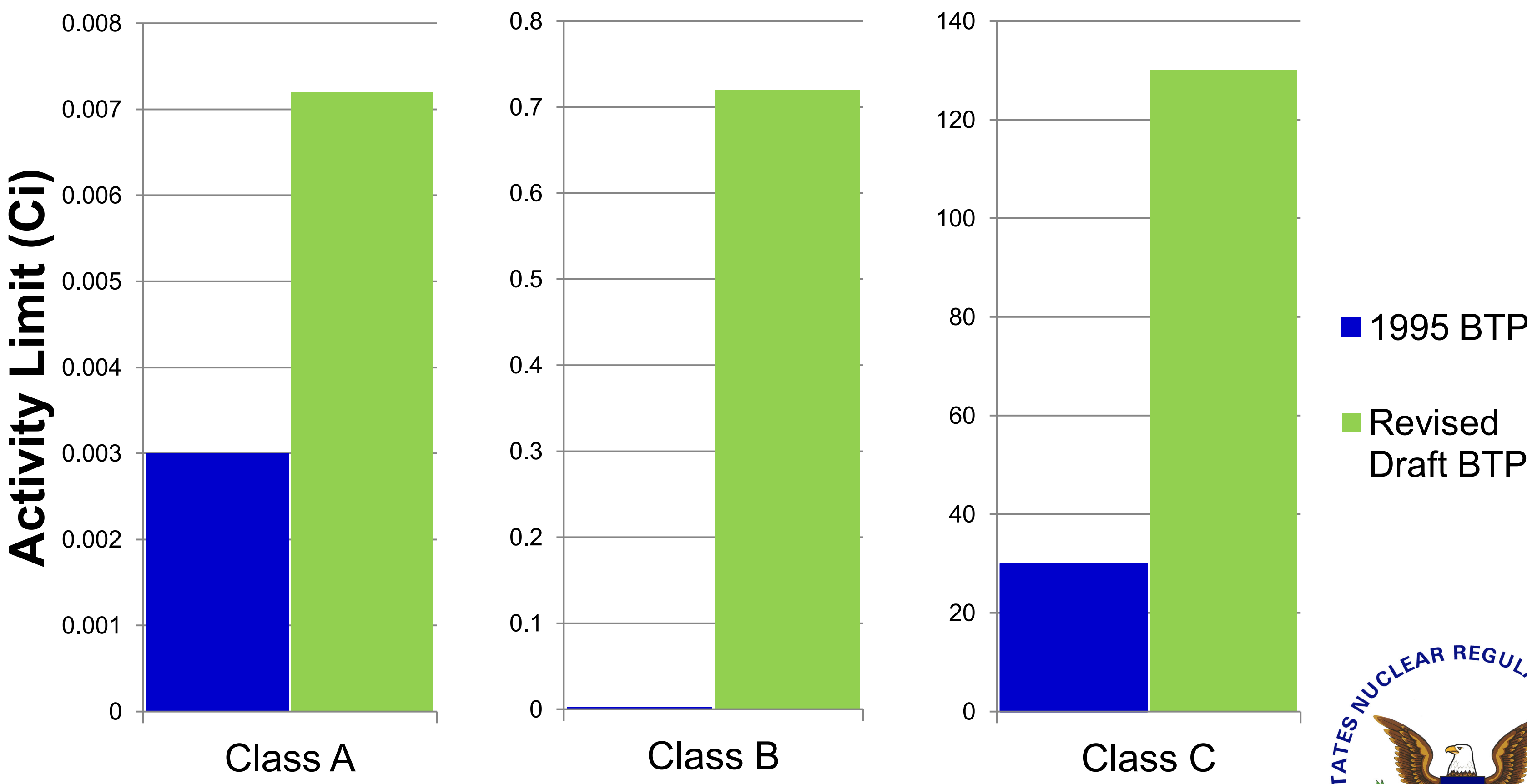
Revisions in Recommended Source Activity Limits (Table A in BTP) – Cs-137



General Comments

- Scenario chosen is “arbitrary,” inconsistent with Part 61 DEIS scenarios
- Accidents with sources are not applicable to disposed sources

Staff Considerations

- 1995 BTP established precedent, endorsed by regulators
- Revised draft uses different scenarios
- Staff is considering scenario selection

Summary: Revised Draft Encapsulation Guidance

- **New scenario basis**
- **Reasonably foreseeable, yet conservative**
- **Higher curie limits – more stranded sources can be disposed**

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Outline

- Introduction
- Comments from Subcommittee & Oct. 20th Workshop
- Alternative Approaches
- Homogeneity Guidance
- Encapsulation
- Classifying Mixture of Items
- Summary

Reasons for Guidance on Mixtures of Items

- Individual “hot” items in a container could cause inadvertent intruder to receive > 500 mrem dose--Need to constrain amount of averaging

- Items covered include activated metals, contaminated materials, and cartridge filters

- Hazard depends on whether gamma or non-gamma emitting radionuclides are involved

- Small items (<0.01 ft^3) are more hazardous

Areas Not Changed from 1995 to Current Draft

- **Mixture items: activated metals, *or* contaminated materials *or* cartridge filters *in a single container***
- **"Primary gamma emitters:" Co-60, Nb-94, and Cs-137/Ba-137m**
- **Non-gamma emitters: H-3, C-14, Ni-59, Ni-63, and alpha-emitting TRU half-life > 5 years (except Pu-241 and Cm-242)**
- **Size of small pieces (<0.01 ft^3)**
- **Classification of mixture may be based on piece with highest class (but doesn't have to be)**
- **Maximum activity levels of non-gamma emitters in individual items (Table B in BTP unchanged)**

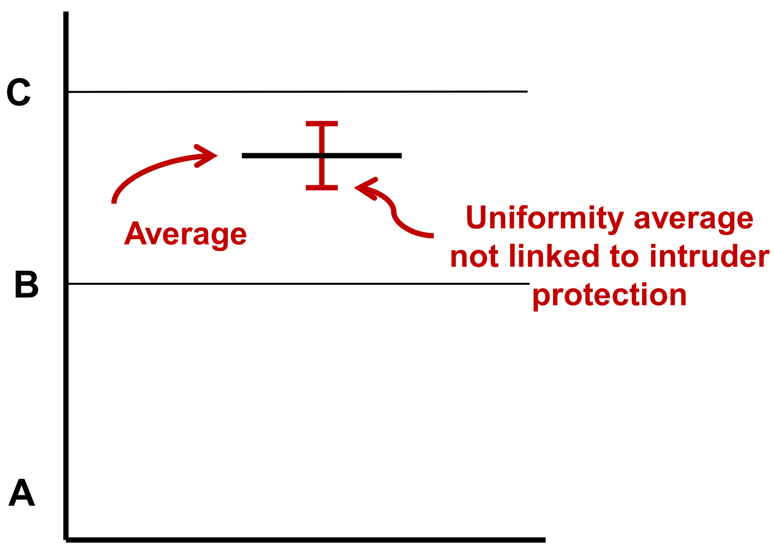
Changes to Positions in 1995 BTP in Revised Draft

Position	1995 BTP	2011 Revised Draft
Maximum activity of small piece (gamma emitters) in a mixture	30 Ci Cs^{137} 700 Ci Co^{60} (Class B) (examples)	130 Ci Cs^{137} Co^{60} – no limit for Class B (examples)
Constraint on variability among gamma emitting items	Factor of 1.5 "rule" (imposes uniformity on mixture)	Factor of 2 "rule" (imposes concentration limit tied to Class limit)
Constraint on variability among non-gamma items	Factor of 10 "rule" (imposes uniformity on mixture	Factor of 10 "rule" (imposes concentration limit tied to Class limit)

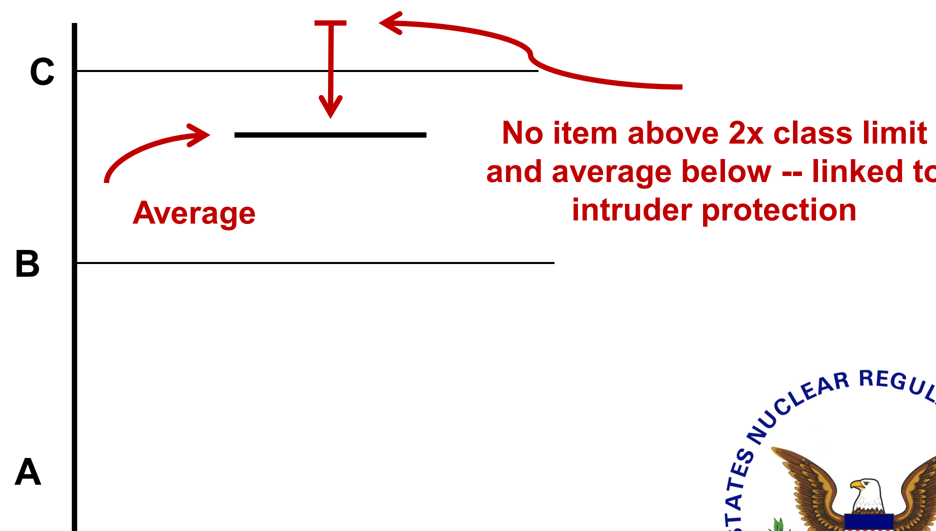
Revised Draft Guidance:
Why Factor 2 Is Better than Factor 1.5

- **Current, concentrations of individual nuclides, in individual items < 1.5 X *of respective average of each nuclide in mixture***
- **Proposed, concentration in individual items < 2 X *of the class limit for that nuclide***

Factor of 1.5



Factor of 2



Comments on August 2011Draft

- Cartridge filters should not be treated like activated metals

Summary: Revised Draft Guidance Classifying Mixture Items

- Higher limits for small gamma emitting pieces

- Factors of 2 and 10 "Rules"

  - Linked to class limits rather than average of mixture

Major Changes to 1995 BTP

Revised BTP	1995 BTP	Reason for change
Removed factor of 10 constraint for blending of wastes	Blended wastes subject to factor of 10 constraint	Consistent with Commission blending SRM
Removed exceptions for blending of homogeneous wastes (resins, e.g.)	No constraints on blending if operational efficiency or worker dose reductions in play	Consistent with Commission blending SRM
Changed the Cs-137 sealed source limit from 30 Ci to 130 Ci, and Class B Co-60 limit from 700 Ci to no limit, based on new scenario.	30 Ci limit on Cs-137 sources, 700 Ci limit on Class B Co-60 sources.	1995 scenario unnecessarily conservative, creates orphan waste, esp. for DOE/NNSA
Consolidated sections addressing activated metals, contaminated materials, and cartridge filters into one	Three sections for each of these wastes, with virtually same technical positions	Improved readability and organization
Factor of 2 in place of 1.5 and factor applies to class limit, not average of mixture	Factor of 1.5 applied to variation around *average* concentration of mixture.	Uniformity (factor of 1.5) has no direct relationship to risk, especially when a mixture is uniform but well below the class limit. Tying factor to class limit gives risk connection. Two is a reasonable limit, staff believes
Factor of 10 tied to class limit, not average of mixture	Factor of 10 for non-primary gamma emitters tied to average of mixture	Same as above, first part
Added test for homogeneity for mixing similar homogeneous waste types	No test required	Need to ensure intruder protection, well drilling scenario
Added “Alternatives approaches” section and gives examples.	61.58 had to be invoked for alternative approaches, a high threshold	61.58 is for alternative to regulations, not guidance. Effect was to discourage use (only 1X in 16 years)
Revised and clarified technical bases in Appendix	Has technical basis for sealed source scenarios, but difficult to understand	Greater transparency, more realistic scenarios

*** Additional changes were made but they were not as significant

Summary

- Provides guidance to help ensure intruder protection
- Addresses new developments since 1995—LLW blending, sealed source security, use of risk insights and performance-based regulation
- Initial stakeholder views--revisions are useful, and more work needed on some issues
- 1995 BTP remains in place in the meantime

Thank You

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Presentation to the ACRS Full Committee

ITAAC Maintenance Final Rule
and
Reg Guide 1.215 *Guidance for ITAAC Closure*

December 01, 2011

James Gaslevic, Earl R. Libby

Purpose

- ITAAC Maintenance Rule amendment 10 CFR 52.99 "*Inspections during construction*"

- New provisions require that licensees report:
  - New information materially altering the basis for determining that a prescribed inspection , test, or analysis was performed as required, or finding that a prescribed acceptance criterion is met
  - Notify the NRC of completion of all ITAAC activities

- Amend 10 CFR 2.340 and 10 CFR 52.99
  - Consistent with the language in the Atomic Energy Act of 1954 as amended (AEA), language change to acceptance criteria "are met "

Basis for ITAAC Rulemaking

- Without rule changes, licensees would not be required to notify the NRC of all issues or activities affecting previously-completed ITAAC

- Possible adverse effects on:
  - NRC staff ITAAC closure activities, including inspection and participation in ITAAC hearing
  - Validity of Commission § 52.103(g) finding that ITAAC are met
  - Interested parties requesting or participating in a hearing on ITAAC

Public Interaction

- Several Construction Inspection Program Working Group meetings prior to issuing as draft for public comment
- Conducted a Construction Inspection Program Working Group meeting during the public comment period
- Nuclear Energy Institute, NEI, provided comments for both the proposed rule and the associated regulatory guide

Final Rule Summary

- SRM on the proposed rule instructed that the details be included in guidance, such as documentation, additional notifications, and time to complete the notifications
- There was one correction in the final rule from the proposed rule
  - 52.99(e)(2) second sentence: The NRC shall make publicly available the licensee notifications under paragraphs (c)(1) through (**3**) of this section no later than the date of publication of the notice of intended operation required by 10 CFR 52.103(a)

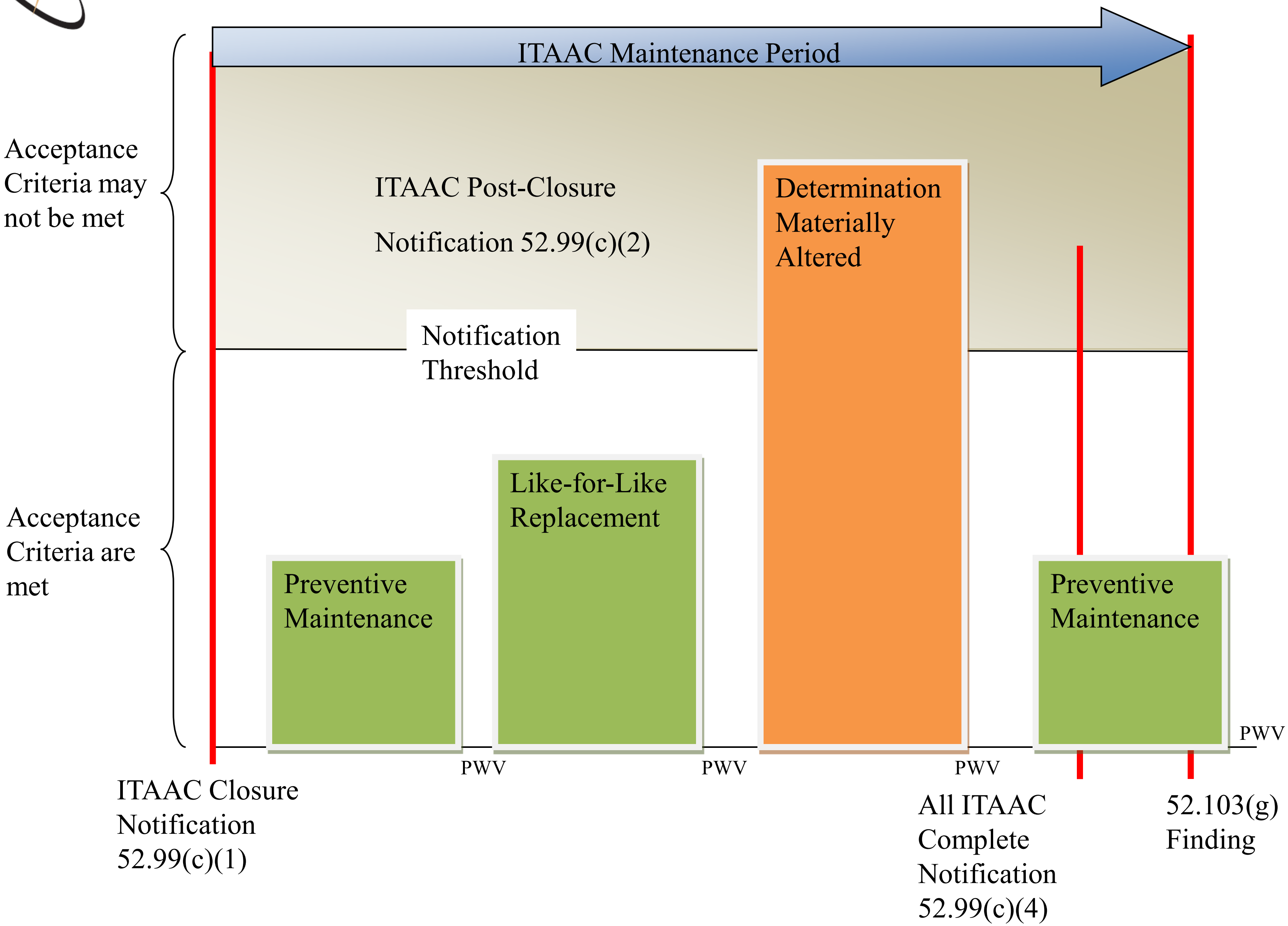
Final 10 CFR 52.99(c)

- 52.99(c)(1) ITAAC Closure Notification
  - Language change only
- 52.99(c)(2) ITAAC Post-Closure Notification
  - New notification
- 52.99(c)(3) Uncompleted ITAAC Notification
  - Renumbered and language change
- 52.99(c)(4) "All ITAAC Complete" Notification
  - New notification on completion of all ITAAC in the COL, and confirmation that all acceptance criteria remain "met" in preparation for the 52.103(g) finding

RG 1.215

- Used as a vehicle to endorse NEI 08-01
- Promotes a standardized approach to ITAAC closure and ITAAC maintenance
- ACRS Full and Subcommittee Meetings in July 2009
  - ACRS final letter: "RG 1.215 provides an acceptable approach for closing ITAAC"
- Initial issuance of RG 1.215 in Oct 2009
- NEI 08-01 Rev 4 submitted to NRC in July 2010

ITAAC Maintenance Approach



ITAAC Maintenance

- ITAAC "are met" if the following conditions hold
  - ITAAC were verified to be met at one time
  - There is confidence that the ITAAC continue to be met and the threshold for notification was not exceeded (AC would still be met if the ITA were re-performed)
- Notification required for events that exceed threshold
  - Provides public access to accurate information
  - Reports that the acceptance criteria continue to be met

ITAAC Maintenance Thresholds

- Material Error or Omission—Is there a material error or omission in the original ITAAC closure notification?
- Postwork Verification (PWV)—Will the PWV use a significantly different approach than the original performance of the inspection, test, or analysis as described in the original ITAAC notification?
- Engineering Changes—Will an engineering change be made that materially alters the determination that the acceptance criteria are met?
- Additional Items To Be Verified—Will there be additional items that need to be verified through the ITAAC?
- Complete and Valid ITAAC Representation—Will any other licensee activities materially alter the ITAAC determination basis?

Licensee Performance

- Licensee to include ITAAC maintenance provisions in existing programs
  - Quality Assurance (QA) Program
  - Maintenance Program
  - Corrective Action Program
  - Design and Configuration Control Program

- ITAAC maintenance provisions should include licensee plans and programs to ensure that activities affecting successfully completed ITAAC do not invalidate the conclusion that the acceptance criteria are met.

New Additions to NEI 08-01

- ITAAC maintenance examples
- ITAAC post-closure notification examples
  - To be submitted 30 days after resolution
- All ITAAC Complete template
- Guidance for ITA performed at other than final installed location, including generic technical justifications
- Attributes added for ITAAC maintenance in programs
  - QA program
  - Maintenance Program
  - Corrective Action Program
  - Design and Configuration Control Program

New Additions to NEI 08-01

- ITAAC Maintenance Thresholds
- Prompt notification emails for ITAAC maintenance to NRC Operations Center
  - Provides the NRC with early inspection opportunity
  - Licensees should notify the NRC within 7 days of determining the need to submit a 10 CFR 52.99(c)(2) notification
  - After submittal of the "All ITAAC Complete" notification, licensee should make an ITAAC maintenance prompt notification within 24 hours of determining that the new information exceeds a threshold
  - Template included in appendices

New Additions to RG 1.215

- RG adds ICN partial submittals
  - Meant for complex ITAAC and ITAAC that will be performed over a long period of time
  - Part of the ITAAC surge mitigation techniques
- RG adds enclosure from SECY-10-0100
  - Updated ITAAC maintenance threshold language from SECY-09-119
  - Discussion on when license amendments would be necessary

Public Comments on Rule and DG1250

- 75-day public comment period ended July 27, 2011
- Comments received only from NEI on both rule and DG2150
  - 11 comments on the rule
  - 25 comments on DG1250
- Comments were not considered "significant", and most were editorial in nature
- None of the comments resulted in a change to the proposed rule language

Next Steps

- This RG and NEI 08-01 show the success path by documenting current work as ITAAC topics evolve and are refined
- Staff to provide the final rule and final RG to the Commission in January 2012
- Issuance of final rule and final RG scheduled for May 2012

Backup Slides

Threshold - Postwork Verification

- Threshold 1: Will the Postwork Verification (PWV) use a significantly different approach than the original performance of the ITA as described in the original ITAAC notification?
- Example: The AC states that 300 gpm flow passes through an MOV. The MOV is replaced and water cannot be flowed through the valve (due to plant configuration/conditions) as part of the PWV to verify the AC continues to be met. Instead, the valve is stroked and an engineering analysis that verifies 300-gpm flow under all applicable conditions is performed to validate the AC. This condition requires an ITAAC post-closure notification because an engineering analysis was created to verify that stroke timing of the replacement valve is sufficient to validate the same requirements as the original ITAAC testing.

Threshold - Engineering Changes

Threshold 2: Will an engineering change be made that materially alters the determination that the acceptance criteria are met?

Example: A design change is required to add pipe snubbers to ASME piping to address water hammer damage to a support that occurred during pre-op testing. This condition requires an ITAAC post-closure notification because an engineering design change is required to address the issue of water hammer, and the design change is material to the determination that the acceptance criterion is met, i.e., that ASME piping can withstand combined normal and seismic loads.

Threshold – Additional Items To Be Verified

- Threshold 3: Will there be additional items that need to be verified through the ITAAC?

- Example: ASME piping is damaged and base metal repairs are made. The ASME Code Report is revised to add more welds from the base metal repair information. This condition requires an ITAAC post-closure notification because the scope of the ITAAC determination basis was increased with the addition of more welds that are reviewed as part of the updated ASME Code Report.

Threshold – Complete and Valid ITAAC Representation

Threshold 4: Will any other licensee activities materially alter the ITAAC determination basis?

Example: An addition or correction is made to a seismic report that was cited in the ITAAC closure notification. This condition requires an ITAAC post-closure notification to update the ITAAC determination basis to reflect the corrected or supplemented seismic report.

Subject: FW: Recommendation for the ACRS meeting Thursday Dec 1: discuss ITAACs as they apply to RAP

Importance: High

From: [ ] Comcast [mailto:]
Sent: Wednesday, November 30, 2011 3:23 PM
To: [ ]
Subject: Re: Recommendation for the ACRS meeting Thursday Dec 1: discuss ITAACs as they apply to RAP
Importance: High

Request for ACRS to review NRC ITAAC requirements for RAP (SRP17.4), tabled from ACRS Meeting April 20, 2010

Dear [ ],

Since the implementation of Nuclear Regulatory Commission's Part 52 Rule, "Licenses, certifications, and approvals for nuclear power plants," nuclear plant design has started – in principle -- from a Probabilistic Risk Assessment (PRA). Inherent nuclear plant component reliabilities therefore create "failures risks" as initiating events, based on their intrinsic reliability. Part 52's framers therefore required what they termed a "Reliability Assurance Program" (RAP) to assure "systems, structures and components" (SSC) used in the nuclear plant's design remained as reliable as the design's PRA projected in its assumptions. They intended that initial plant operations would begin with a completed RAP, to support the plants inherent design reliability as licensed. This was later interpreted as meeting the initial requirements under 50.65, the maintenance rule, to have an effective maintenance program or take corrective action.

Today, the RAP guidance remains as incomplete as it was under Part 50, forty years ago. Though Part 50 anticipated that plants would start up with complete scheduled maintenance plans, as a preventive maintenance** programs (Part 50/50.65) or equivalently, an equipment reliability programs (Part 52), they didn't. The Three Mile Island Accident, along with years of operating difficulties, were direct consequences. Two problems are (1) the rules framers never attempted to translate "RAP" into common English maintenance terms for convenient new licensing use, and (2) NRC's staff presumed, (see DC/COL-ISG-018, Interim Staff Guidance on Standard Review Plan, Section 17.4, Reliability Assurance Program) that new plant RAP could begin with the maintenance rule. Neither adequately meets initial nuclear plant maintenance requirements for safety related SSC.

I presented methods to the ACRS (April 20, 2010) used by other industries, notably commercial aerospace, to develop an initial licensed maintenance, operations monitoring and surveillance test program for a standard plant. That would operationalize RAP as Part 52's framers intended, making it initially actionable, standardized and complete, consistently, from the initial licensing ITAAC. (Currently, there is a general ITAAC calling for a RAP with the new plant.) Completing the current ITAAC, per DC/COL-ISG-018 and the SRP 17.4, requires only providing a list of in scope RAP safety related SSC equipment.

At the time, I recommended that the ACRS recommend to NRC's staff that they provide additional guidance. The ACRS tabled discussion of my recommendations, with no response. Nor has NRCs staff, which attended the ACRS presentation, offered any further response.

Please convey my request to the ACRS that they review NRC RAP ITAAC requirements, again. Delaying resolution of RAP ITAACs potentially could introduce critical path delays to new plant startup if NRC guidance for new plants changes -- that is, attempting to sign off the RAP ITAAC, when they are complete.

Best regards,
[ ]
[ ]

** The U.S. Navy's Fleet Planned Maintenance Program termed it 'Preventive Maintenance' (PM) System, including nuclear plant PM, in 1975.
On 11/29/2011 11:21 AM, [ ] wrote:
Mr. [ ],

Per our phone conversation, you can simply respond to this email with your written comments for the ACRS.

[ ]

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[ ]
[ ]
[ ]
[ ]
[ ]

CORE

Why Certify New Nuclear Plant Maintenance Programs?

"Nuclear Maintenance Certification: License Plants with a Plan"

[ ] [ ]

EPR Subcommittee
Advisory Committee on Reactor Safeguards
Rockville, MD
April 20, 2010

Summary

Ref: "Nuclear Maintenance Certification: License Plants with a Plan" (a white paper), by [ ], March 2010

I. Why RAP?
II. Part 52
III. What's the intent of Part 52?
IV. What is effective RAP?
V. Benefits
VI. Why now is the time?
VII. What we should do
VIII. Conclusion

After forty years, nuclear plants need scheduled maintenance plans!

Why Reliability Assurance Programs (RAP)?

- Part 50 Experience
  - Ineffective maintenance & unreliable equipment (SSC)
  - Legacy problems, delays and uncertainty
  - Designs sought to assure reliability even before Three Mile Island (TMI). After TMI, they sought it with diligence
  - NRC Operating Experience (Generic Communications)
    - Approximately 300 IE Information Notices, Generic Letters, and Bulletins (IEB) addressed design basis reliability concerns
  - Deterministic designs did not assure reliability

Part 52

- Requires a RAP
- Reasons:
  - Assure PRA reliability
  - Required for Operations
  - Assure safety design basis for certification
- Should answer:
  - What provides an effective RAP?
  - What meets RAP intent, effectively?
  - Design RAP (D-RAP)? Operational RAP (O-RAP)?

Doesn’t answer these completely, today

Part 52 (continued)

- Requirement for RAP is reasonable
- Designers should provide guidance for safety-related SSC
- Development responsibility rests with designers
- Continues the intent of Part 52
- Meeting Part 52's intent would leave less to chance
- Real question: what is a RAP?

What is RAP intent?

RAP should

- Assure nuclear systems, structures and components (SSC) operate with minimum unavailability and the fewest “maintenance-preventable function failures” (MPFF) as required by the Maintenance Rule, 50.65.
- Clearly, it should assure nuclear plant SSC meet design-assumed availability and reliability
- Provide actionable guidance to those who operate & maintain plants

RAP Gap

Difference Present Requirement vs. Effective Program

- Gap Analysis Consequence
- Question is effectiveness and adequacy

What would be effective?

- To be effective, RAP would
  - Address the certified design and the COL
  - Provide tasks that actually make SSC reliable
  - Give clear guidance
  - Complete the Design (e.g., D-RAP)
    - Not just provide lists of equipment
- Specify activities
  - Define specific tasks that make SSC reliable
  - Task/activities must be
    - Clear
    - Explicit
    - *Actionable*
    - Measureable

What would be effective?

- Equipment scheduled maintenance plans
  - completely specified
  - according to standards
  - as part of the certified design
- How?
  - With an effective, consensus-based SSC scheduled maintenance plan development process for complex safety designs. Should provide
    - An effective scheduled maintenance program that becomes the RAP, with
    - Complete, actionable guidance that will assure performance
    - Proven over time, tested with qualified systems and participants
- Nuclear plant programs could specify a much more effective RAP with scheduled maintenance

MSG-3 (2004)

- A documented, well-proven method for developing reliability programs in complex safety applications for over forty years
- Basic development requires:
  1. Identifying critical equipment, critical characteristics and causes of degradation
  2. Developing efficient, effective control tasks on that basis;
  3. Organizing the resulting structured work (composed of actionable tasks) scheduled to implement. [see ADA 066579/DOC-NTIS]
  4. Performing required outcomes – condition directed maintenance

Benefits

- Reduce risk
  - Could substantially reduce nuclear risk
  - Could prepare for new plant staffing
- Standardized reliability programs would
  - meet Part 52 safety intent
  - be more consistent
  - benefit everyone
- Clear RAP would
  - Make projections more certain
  - Lower nuclear costs
  - Improve design and operations consistency

Benefits (continued)

- Complete RAP programs
- Measureable, performable activities
- Fulfill D-RAP, completely
- Current program Inputs (Maintenance Rule etc) Complete
- Leading indicators provided (in contrast with lagging)

Why act now?

- Historical approach confusing & incomplete
  - The licensee was the developer – not the vender (17.4), who had the expertise
  - Finally answer, “What specific, performance-based activities make SSC reliable?”
- Fully address both parts of RAP – design and operations (D-RAP/O-RAP)
- Clarify responsibilities
  - Designers vs. owners
  - Certified design vs. site specific COL
  - Scopes
- Get the best possible certified designs
- Fundamentally support PRA projected
  - Deliver design reliability
  - Less overall cost risk

Why act now?

- Long overdue
  - Common sense
  - Consistent
  - Opportunity now
- Should encourage better methods
  - Safety
  - Design
- Broad benefits
- "Why not?"
  - Why shouldn't we improve RAP, just as we have safety design? Or the QAP? Or Technical Specifications? …..
- Standard nuclear designs (and processes) should improve

How to address RAP Gap

- Perform safety analysis
- Document & share results
  - Safety evaluation reports (SERs)
  - Commission Policy (SECY)
  - Generic Communications (GC)
- According to results, review and revise policy
- Encourage excellence, regardless

What should the ACRS do?

- Take a position
- Recommend action
- Ask for a response from the staff
- Discuss SECYs (referenced) and their basis
- Share responses with stakeholders
- Share conclusions with the Commissioners
- Be transparent!

NRC; Industry?

Alternatives

- Ignore
- Trivialize
- Claim impossibility (“Technology not available” etc.)
- Eliminate requirement
- Preempt

“We’ve always done it,”

“We’d been planning to do it, anyway,”

“We were planning to get to it, when the timing was right, it just hadn’t come yet…” etc, etc

Challenge today

- Improve safety processes
- The safety issue – we're never good enough
- Remove blocking to allow design options
- New plants present a one-time opportunity to get this right
- It will pay for itself; technically feasible – and very simple before construction
- Part 52 needs effective RAP
- We solved this problem forty years (40) ago; why not use it?

After forty years of similar aircraft experience, certifying and using an effective RAP process is just the right thing to do!

References

1. Nuclear Maintenance Certification: License Plants with a Plan" (a white paper), by J.K. August & J.J. Hunter, March 2010
2. Standard Review Plan (NUREG-0800), Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition (formerly issued as NUREG-75/087)
3. RegGuide 1.206, Combined License Applications for Nuclear Power Plants (LWR Edition), Jun 2007 (formerly DG-1145)
4. SECY-93-087, "Policy Technical and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs" fails to meet the Commission's objective of providing adequate guidance to maintain SSC supporting the certified design's PRA.
5. SECY-95-132, "Policy and Technical Issues associated with the Regulatory Treatment of Non-safety Systems (RTNSS)" fails to identify essential D-RAP elements, their development processes or adequacy to support O-RAP operating requirements.
6. SECY 95-132 fails in its intended purpose, too
7. ATA MSG-3(2004), "Operator/Manufacturer Scheduled Maintenance Development", Air Transport Association of America standard MSG-3
8. Approximately eight separate communications with NRC leadership, 2007-2010
9. IAEA-TECDOC-1264, "Reliability Assurance Program Guidebook for Advanced Light Water Reactors", December 2001
10. NUREG-0737, Clarification of TMI Action Plan Requirements (1980)
11. Part 50-Domestic Licensing of Production and Utilization Facilities
12. Part 52-Licenses, Certifications , and Approvals for Nuclear Power Plants