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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

535TH MEETING

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THURSDAY, SEPTEMBER 7, 2006

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The meeting was convened in Room T-2B3 of Two White Flint North, 11545 Rockville Pike, Rockville, Maryland, at 8:30 a.m., Dr. Graham B. Wallis, Chairman, presiding.

MEMBERS PRESENT:

GRAHAM B. WALLIS	Chairman
WILLIAM J. SHACK	Vice Chairman
SAID ABDEL-KHALIK	ACRS Member
GEORGE E. APOSTOLAKIS	ACRS Member
J. SAM ARMIJO	ACRS Member
MARIO V. BONACA	ACRS Member
MICHAEL CORRADINI	ACRS Member
THOMAS S. KRESS	ACRS Member
OTTO L. MAYNARD	ACRS Member
DANA A. POWERS	ACRS Member
WILLIAM J. SHACK	ACRS Member
JOHN D. SIEBER	ACRS Member-At-Large

NRC STAFF PRESENT:

JAKE ZIMMERMAN

FRANK GILLESPIE

P.T. KUO

DAN MERZKE

PETER WEN

PATRICIA LOUGHEED

MATT MITCHELL

FRANK GILLESPIE

CHRISTIAN ARAGUAS

PAUL PRESCOTT

BOB WEISMAN

DR. MICHAEL RYAN

BILL ROLAND

GEARY MIZUNO

MICHELE LAUR

JASON SCHAPEROW

FAROUK ELTAWILA

CHARLES TANKLER

CHRIS HUNTER

TOM MARTIN

GEORGE TARTAL

MERAJ RAHIMI

ALSO PRESENT:

PAT BURKE

JOHN GRUBB

JOE PAIRITZ

RAY DENNIS

RON SIEPEL

JIM ROOTES

MIKE ALEKSEY

DAVE POTTER

STEVE KRAFT

ALBERT MACHIELS

DON DUBE

C-O-N-T-E-N-T-S

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

8:32 A.M.

CHAIRMAN WALLIS: Good morning. The meeting will now come to order. This is the first day of the 535th meeting of the Advisory Committee on Reactor Safeguards. During today's meeting the Committee will consider the following; The Final Review of the License Renewal Application for the Monticello Nuclear Generating Plant; Lessons Learned from the Review of the Early Site Permit Applications; Draft Final Revision to 10 CFR 5068, Criticality Accident Requirements; State of the Art Consequence Analysis; the EDO Response to the ACRS Report on the Review of Ongoing Security Related Activities and the Preparation of ACRS Reports.

A portion of the meeting will be closed to discuss safeguards and security matters. This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. Dr. John T. Larkins is the designated Federal Official for the initial portion of the meeting. We have received no written comments or requests for time to make oral statements from members of the public regarding today's sessions. A transcript of portions of the meeting is being kept and it is requested that

speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so that they can be readily heard. This identifying yourself does not apply to members of the ACRS or the new members. Just speak up, they know who you are.

I'd like to welcome Michael Corradini and Said Abdel-Khalik who are now official members of the ACRS. Please welcome them.

(Applause)

CHAIRMAN WALLIS: Dr. Richard Savio, who's been with the ACRS for more than 30 years, will be retiring on September 30th, 2006. During his tenure on the ACRS staff he provided technical support on numerous matters, including development of safety goal policy, review of construction permit and operating license applications for several plants and safety research program report and the ACRS/ACNW self-assessment. I don't think Dr. Savio is here, but on behalf of the committee, I'd like to thank him for his contributions and wish him good luck in his future endeavors.

We're also going to say goodbye to Noble Green, who's been Administrative Secretary to the Executive Director for the past three years. He's

accepted a position as an Administrative Support Specialist in the Information Management Branch of NRR. He started his new job on September the 1st. I don't think he's here either. Is Noble here, but I will note that he has provided excellent administrative support to both the ACRS Staff and the Committee members and on behalf of the Committee, I'd like to thank him for his support and wish him much success in his new endeavors.

Now, we're going to get down to business. And the first item on the agenda is the Final Review of the License -- Operating License Renewal Application for the Monticello Nuclear Generating Plant. My colleague Mario Bonaca will lead us through this one. Mario.

MEMBER BONACA: Thank you, Mr. Chairman. Good morning. We're here to review the Monticello Nuclear Generating Plant License Renewal Application. The Subcommittee on License Renewal met on May 30th to review this application. We found an application that was over 95 percent consistent with GALL. That meant that this required a very small number of RAIs, and clarifications. We find an application also that had no open items in the interim review the we performed on May 30th and now we're going to see -- review the

results of the finals SER and with that, I'll turn to the NRC staff, I guess, Mr. Zimmerman?

MR. ZIMMERMAN: Yes, thank you, Dr. Bonaca. Good morning. My name is Jake Zimmerman. I'm the Branch Chief for License Renewal Branch B. With me today is Frank Gillespie, the Director for the Division of License Renewal, also Dr. P.T. Kuo, who is the Deputy Director for the Division of License Renewal. To my right is Mr. Dan Merzke. Dan will be leading the staff's presentation this morning. We also have Mr. Peter Wen, who was the Audit Team Leader for the Aging Management Program on site audits. We also have Ms. Patricia Lougheed, who is the Region 3 Team Leader, so is also available to answer questions.

We also have a lot of staff in the audience here to support any questions that may come up. We've got a lot of excellent support from the staff and we certainly appreciate their efforts. The staff has conducted a detailed and thorough review of this application that was submitted in March of 2005. Throughout this review we -- I'd like to acknowledge the Monticello staff. They provided excellent support to us throughout our audits, our inspections, our responses to request for additional information. As Dr. Bonaca indicated, this application wound up being

about 95 percent consistent with GALL.

Monticello submitted their application based on the draft Rev 1 version of the GALL report which was issued in January of 2005. During our review, we had to reconcile any differences that occurred when the final version was done in September of 2005 and they worked with us and the staff to reconcile those differences and that really helped out with our review. As Dr. Bonaca indicated, we issued the initial SER back in April of 2006. There were no open or confirmatory items. As a result of that, we were able to accelerate the schedule and we appreciate the ACRS accommodating us in accelerating the schedule, both for the subcommittee and now again for the full committee for this application that was under review.

With that, I'll turn it over to Mr. Pat Burke, who is the Manager of Projects to lead the Applicant's presentation.

MR. BURKE: Thank you, Jake, and thank you members of the ACRS full committee for allowing us to speak on behalf of the Monticello Nuclear Generating Plant for the license renewal application. We have a short presentation today and we'll start with introduction to the folks that we brought here to

support the meeting. Today we have --

MEMBER APOSTOLAKIS: Are you speaking on behalf of them? What did you mean by that? You're NRC, right?

MR. BURKE: No, I am the licensee.

CHAIRMAN WALLIS: No, George, when it comes in color and with pictures, it's the licensee.

(Laughter)

MR. BURKE: So the folks I'm going to introduce now are all members of the Monticello Nuclear Generating Plant. I'll start with Mr. John Grubb, who is our Director of Engineering. Again, I am Patrick Burke, the Manager of Projects up at Monticello. Joe Pairitz is the License Renewal Project Manager; Ray Dennis, who is in the gallery back here, is our License Renewal Civil and Structural Lead. We also have Ron Siepel, who is our Electrical Lead as well as Jim Rootes, who is our Programs Lead. Mike Aleksey is our Time Limiting and Aging Analysis Coordinator. Dave Potter is the Engineering Supervisor of Inspections and Materials and then from other sites within the NMC today, we have Gene Eckholt, who is a Perry Island (phonetic) Licensing Lead and Bob Vincent who is the Palisades Project Manager and they're observing today.

We've got a short agenda. We're going to start with a description of the Monticello Nuclear Generating Plant just to refresh your memory on what Monticello. Major plant -- we're going to go over some major plant enhancements. I'm going to talk a little bit about the project application and background, how we got to where we are today and then Joe will be discussing some of the ACRS subcommittee follow-up items specifically the shroud neutron fluence and dry well shell integrity discussions and we'll close with commitment tracking and implementation status.

At this point, I'd like to turn it over to Mr. John Grubb.

MR. GRUBB: All right, thank you, Pat, and again, Committee, we appreciate the opportunity to speak with you this morning about the Monticello license application. What we have here is just an aerial view of the Monticello Station. The plant is located roughly 30 miles northwest of Minneapolis. It's on the banks of the Mississippi River. You see the intake here, the discharge back from the Mississippi River, Substation, Reactor Building, Turbine Building, Cooling Towers, a pretty compact site.

The Plant is owned by Northern States Power Company which is a subsidiary of Xcel Energy and the plant is operated by the Nuclear Management Company. We have an onsite staff of approximately 420 employees. The plant is a single-unit General Electric BWR-3 with a Mark 1 containment. Our preliminary license was issued in September of 1970 and commercial operation began in June of 1971. The plant's licensed thermal power is 1,775 megawatts. Net electrical output is approximately 600 megawatts electric. The plant does operate on two-year fuel cycles.

Currently our material condition is outstanding, it's very, very good. On day 512 of our current operating cycle, the plant has run continuously since the last refueling outage. We've had no operational transients during this cycle. We've had no significant equipment challenges during this cycle. Additionally, the plant has had superb fuel reliability throughout the last 20 years. With that, I'd like to turn it back to --

MEMBER POWERS: None of those items you mentioned speak to the issue of material condition. The fact that it's run doesn't mean that the materials are in good shape.

MR. GRUBB: Yeah, we'll discuss the material condition in the rest of the presentation. This is kind of an overview.

MR. BURKE: The next part we want to talk about is some of the plant enhancements that we've done to support material condition for the long term operation of the facility. We have a couple of examples of major components and evolutions that we've taken over the years. In 1984 we did replace all the recirculation piping with material that's resistant to intergranular stress corrosion cracking. Those replacements included risers, supply headers, suction piping and safe-ends. That replacement significantly reduced the number of welds. We also incorporated induction heat stress improvements and electro-polishing applied to the new pipe.

In 1986 we did replace the core spray safe-ends, again with material of resistant to intergranular stress corrosion cracking. Those replacements have been successful and we have not seen intergranular stress corrosion cracking on those new pipes.

MEMBER POWERS: It's my understanding, correct me if I'm wrong, that there's a significant induction period or the development of evidence on

intergranular stress corrosion cracking. Have you gone long enough to -- I mean, the fact that you didn't observe it doesn't mean you won't.

MR. BURKE: Right. It's been 20 plus years. We do continue to inspect it. We have not seen it yet. We do not -- Dave, do you want to add to that?

MR. POTTER: Yes. My name is Dave Potter. The recirc piping, all the welds that are in the recirc piping are categorized as Category A welds according to I believe it's Generic Letter 88-01 and 10 percent of those welds by our current inspection methods are still included within our risk informed ISI program so we'll be periodically inspecting both the suction and discharge piping on the recirc system.

MR. BURKE: Okay, in 1989 we did implement a moderate hydrogen water chemistry and we have observed fully protection for the vessel internals as a result of that. In 1997 we replaced the emergency core cooling system suction strainers with strainers that have significantly larger surface area for debris loading. In `98 we did a fair amount of work on the condensate pumps and motors. In the last outage, we did replace the recirc pump motor and the pump internal rotating assembly internals which was a major

evolution and we are, as of 2005, we are in the two-year fuel cycles. Some life cycle management projects that we have in various stages going forward include replacement of feedwater heaters. We are planning to do the 12 recirc pump motor and internals during the 2007 outage. We are replacing service water pumps this fall. We have transformers and generator rewinds on the plans.

Next I'd like to talk a little bit about the project application and background. When we first started the project, we assembled a core team of site employees. They were site-based. Of those there were about seven folks that we assembled. Four of those seven folks had previous SROs or SRO certifications, so it was an experienced staff, multi-disciplined. We did supplement that onsite staff with onsite contractors. These contractors did come from various other sites with license renewal experience. We retained that team throughout the audits and inspections and still retain them to support implementation activities. As mentioned in the opening remarks, we feel that that did provide continuity throughout the review process and gave us a good review and good support of those review activities.

We contracted with General Electric to perform the reactor pressure vessel and internals time limiting aging analysis. They also performed the vessel and internals aging management reviews. And we did have significant site involvement in our aging management reviews and aging management program development through reviews by the system engineers and the program owners. If there's no questions on that part of it, I'd like to turn it over at this point to Joe Pairitz to talk about the ACRS follow-up items.

MR. PAIRITZ: Good morning, I'm Joe Pairitz. I'm the License Renewal Project Manager and also the Mechanical Lead for the Monticello Project. I'm going to start off by summarizing our responses to two follow-up items that we had from our May 30th subcommittee meeting, the first concerning shroud neutron fluence. There's approximately a factor of 14 difference between the value that was calculated for license renewal and the original 32 effective full power year number that was assumed. So we'll talk about that.

Secondly, I'll talk about the dry well shell integrity, specifically the location of the sand pocket drains with respect to the excavation that was

done in the late `80s in support of Generic Letter 87-05. Also I'll talk about the configuration of the sand pocket area.

CHAIRMAN WALLIS: Did you have any significant corrosion in that area?

MR. PAIRITZ: No, we have not found any degradation on the shell.

CHAIRMAN WALLIS: I'm trying to remember which one you are. No, you didn't, okay.

MR. PAIRITZ: I'll talk about that a little more in detail. Moving back to the shroud neutron fluence question, I'm going to provide an explanation for the relative magnitude difference between the 54 EFPY and 32 EFPY values. For license renewal, we calculated the maximum shroud fluence at 3.84 times 10^{21} neutrons per centimeter squared. This was done using the guidance in Reg Guide 1.190. The previous 32 EFPY shroud fluence was 2.7 times 10^{20} neutrons per centimeter squared. That number came from the General Electric Document APED-5460 entitled "Design and Performance of General Electric Oil and Water Reactor Jet Pumps".

So after our May 30th meeting, we went back to find out why this factor of 14 was large because it can't just be explained by power increases

or time. And what we found was, is that the major contributor to that large 14 factor is the water gap geometry. Monticello has approximately a 1.8 inch minimum water gap. The APED-5460 documents, for their number, they used a 6.7 inch minimum water gap. So that would account for approximately 75 percent of that difference right there. Any questions on that?

MEMBER POWERS: Well, there's 25 percent missing, right?

MR. PAIRITZ: Right, and that would be accounted for by the difference in the original number assuming we had a 1670 megawatt thermal license power limit, we increase that, then the additional time from 32 to 54 EFPY, but the vast majority of it is due to the water gap and that's what we discovered. It took a couple of days and we responded.

CHAIRMAN WALLIS: So you were going for several years with a figure which was incorrect presumably.

MR. PAIRITZ: Well, it wasn't incorrect. It was -- the APED-5460 document just listed I would call it a generic number and said, "This is it".

CHAIRMAN WALLIS: But it obviously wasn't, it didn't apply to your plant because you have a smaller gap.

MR. PAIRITZ: Right, it was -- yeah, it was based more on a bigger BRW, in fact.

With that I'll move onto the dry well shell integrity. Just to give you a brief overview of the Monticello Mark 1 primary containment. I'll use the cursor here, it might be easier than the laser pointer. We have the reactor pressure vessel located here. We have the inverted lightbulb shape of the dry well shell around the reactor pressure vessel. We have the vent tubes that lead to the pressure suppression chamber otherwise known as the torus. The areas that I'm going to concentrate on this morning, we're going to talk about the refueling bellows up here towards the top. We're going to talk about this air gap between the reactor building concrete and the reactor shell, the exterior of the shell, or the dry well shell, pardon me.

And then we'll talk specifically about the sand pocket area down here. Monticello has some design features that prevent water from accumulating next to the exterior of the dry well shell if water were to be introduced that area.

CHAIRMAN WALLIS: The best thing is to prevent the water getting there in the first place.

MR. PAIRITZ: That is exactly right. And

we'll start from the top and go down. I'm going to start with the refueling bellows and then we'll go down to the air gap and then down to the sand pocket region and I'll show you the design features that are there to prevent water from -- really from being there in the first place.

In the refueling bellows area, just to give you some perspective here, this is the outside of the reactor pressure vessel shell. We have the first set of bellows here that is between the vessel shell and the dry well. We come across, here's the dry well shell right here. The bellows that we're most concerned about here are the second set of bellows. If there were any leakage from these bellows, that leakage would be caught but this trough down here and then go into this eight-inch pipe. This eight-inch pipe does have a flow switch on it, set at three gallons per minute, which does give an alarm in the control room also. Now, this other drain listed here, that's how we drain down from normal refueling activities when this reactor cavity is flooded up. That is a normal drain path and it does travel through the inside of the eight-inch pipes. We have a pipe within a pipe.

During normal operation this is normally

all dry here. The only time this sees water is when we're flooded up for refueling operations. Right here you have the beginning of the air gap region and we'll talk about that next. We have done some testing on these outer bellows in the past in the late `80s. We did some visual inspections, we did some UT's and there was no significant degradation there.

CHAIRMAN WALLIS: That air gap connects to what? Is it -- it must be a vent or something.

MR. PAIRITZ: Oh, the air gap, I'll go back to the -- bear with me a moment here. The air gap is right here, actually.

CHAIRMAN WALLIS: It goes all the way around.

MR. PAIRITZ: Right, and if we go to the next slide, the next slide here, here's this air gap region here going up all the way to the top of the shell. Now, if water were to come in that region, there are four four-inch drain pipes at the bottom that would drain that water away but again, if we look at the way the refueling bellows is set up, any leakage should go into this trough and into this eight-inch pipe. You shouldn't get any water in the air gap.

CHAIRMAN WALLIS: I was thinking of the

air expanding and contracting, and the temperature changes. There must be some vent or something which you also keep dry. There must be --

MR. PAIRITZ: Yeah, there -- well, the drainpipes. Let's go to the -- yeah, we'll go to the next picture. The drain pipes at the bottom are open to the atmosphere at the bottom so you can get some air through there.

CHAIRMAN WALLIS: Okay, so air comes in and out of there.

MR. PAIRITZ: Correct. Now, these four four-inch drain pipes are open. They empty right onto the floor of the reactor building basement or the torus room, so it's -- first of all, it's obvious if you have any water and then they're open so that --

CHAIRMAN WALLIS: The air that's saturated out there, comes it and it's hotter inside so it doesn't condense.

MR. PAIRITZ: Right, during normal operation the dry well shell is well above ambient temperature. So the air gap region, if water were to get in that region, which would be a big feat in itself, then it would be drained away by these four-inch drain pipes. We've never seen water come out of any of these four four-inch drain pipes. In the sand

pocket region, we have an 18-gauge sheet metal cover over the top of the sand pocket region. It is sealed to the reactor building concrete and with the drywall shell. So that is a significant water-tight barrier that is in place. Not every Mark 1 containment has the cover. We do have that cover, however. For some reason, if water did get into the sand pocket region, we have four two-inch drain lines that drain the sand pocket region also. Again, we've never -- these drain right into the reactor building basement, again, and we have never seen water come out of those drains, and we do check these drains, both the air gap drains and the sand pocket drains.

We check them for obstructions before we flood-up for refueling activities and then we check them while we're flooded up to insure that there is no leakage coming from those drains.

CHAIRMAN WALLIS: The function of the sand pocket is what?

MR. PAIRITZ: Well, it's called a cushion.

CHAIRMAN WALLIS: Yeah, it seems like a cushion for this bulb to rest on?

MR. PAIRITZ: Right, so for any kind of -- you know, if you were to have a blow-down or seismic event, it's a cushioning type function. I've heard it

refer to before as the sand cushion in General Electric documentation.

CHAIRMAN WALLIS: It makes more sense than a sand pocket, yeah.

MR. PAIRITZ: Right. So we've talked about the design features that we have in place. I'll talk a couple minutes about the excavation of the drywall floor that was done in 1987. And I'm also going to talk about a little bit more -- well, right now about the UT's that were done for Generic Letter 87-05 and the drywall shell. It not only included the sand pocket area and the place that we excavated but we did do UT inspections at other elevations, higher up that would be equivalent to the air gap region and we did not find any degradation in those areas. We have no evidence of any corrosion going on in those areas.

One of the questions that specifically came up in our subcommittee meeting was the location of the sand pocket drains compared to where we excavated. These red arrows here represent the sand pocket drains, four of them at those approximate locations. In 1987 we did excavate at this location 225 degrees azimuth. It's approximately between these two drains here, so that would be a good place to look

if you're trying to find out if any water existed or if there was any corrosion there. Go to the next picture so we can look at this. What we did is the excavated region here was 31 inches deep. It was 18 inches wide. It exposed the full length of the sand pocket area at that location, 225 degrees azimuth.

We did UT's there. We did not see any degradation. The other thing I want to point out is just the geometry of the sand pocket region itself and I'm going to go back to this other slide. We had a question of whether there was sloping to these drains. We reviewed our documentation. We can't find anything to say that there was a slope, but I know that at the time this was constructed, Bechtel was the architect engineering. They had general construction specifications that would have required some slope on drainage paths. So I think at the best case it's sloped. I think at the worst case, it's level, but either way that's okay for us because I want to show that the -- back to this picture -- there is a radial slope on that sand pocket region down to the drain. So if there is any water accumulating here, it would be in the drain area first.

And in order for the water to get up to the top, or get to the area of the shell, the drain

line would have to be overflowing. There's a little stand pipe on the end of this drain and it's at the same elevation as the inlet here. So in order to have water up at the interface between the shell and the sand pocket, we'd have to have water overflowing into the reactor building basement and we would see that.

CHAIRMAN WALLIS: I suppose it wicks up through the sand, doesn't it?

MR. PAIRITZ: That's another purpose of the sand also. It should help absorb moisture if there were moisture.

MEMBER POWERS: Isn't he asking an inferred question? I mean, you say it has to overflow. Doesn't capillary action just take it up and make the wall wet even when you're not overflowing?

CHAIRMAN WALLIS: Yeah, it wicks up through the sand.

MR. PAIRITZ: Yeah, you would see it in the sand, but I mean, you couldn't -- it still wouldn't be in contact with the dry well shell.

CHAIRMAN WALLIS: But there would be moisture there, yes, there would.

MEMBER ARMIJO: How hot is that area?

MR. PAIRITZ: Well, let's go back to a

picture we can look at here. You know, the shell here -- you know, the average dry well temperature is about 135 degrees when we're running. So you're going to get some conduction down into this area. I can't tell you off the top of my head what the actual temperature would be here but it stands to reason that at least in this area were that we're going to get some conduction and some heat from that area.

CHAIRMAN WALLIS: So damp sand which is part water, part air is probably worse than pure water or pure air. I mean, you've got both constituents there.

MR. PAIRITZ: We shouldn't have any water there.

CHAIRMAN WALLIS: So the question about wicking and capillary action is not really relevant. I don't think you have a problem here but that's something you ought to think about.

MR. PAIRITZ: Yes.

CHAIRMAN WALLIS: Just thinking about levels doesn't really answer the question about whether there's moisture on the surface isn't --

MR. PAIRITZ: Correct, we're thinking of, you know --

CHAIRMAN WALLIS: -- there's a whole

theory of --

MR. PAIRITZ: -- gross failure that would allow water into a region, no. Now, moisture from humidity in the air or something like that --

CHAIRMAN WALLIS: The dirt that your houseplants are in is damp, but it's not wet.

MR. PAIRITZ: Correct.

CHAIRMAN WALLIS: It's still corrosive.

MR. PAIRITZ: Okay, so we talked about the design features. We talked about the excavation of the floor. I'm now going to spend a few minutes talking about commitment tracking and our implementation status.

MEMBER BONACA: Before you move on --

MR. PAIRITZ: Yes.

MEMBER BONACA: Your refueling ceiling is within the scope of license renewal, right?

MR. PAIRITZ: That is correct.

MEMBER BONACA: So, I mean, you're monitoring water leakage during the outages.

MR. PAIRITZ: Right, we do have that flow switch, so that would be an indication that three gallons per --

MEMBER BONACA: So that's an option that GALL gives you, right?

MR. PAIRITZ: Pardon me?

MEMBER BONACA: That's an option that GALL will give you.

MR. PAIRITZ: Right, you could put your refueling ceiling. Ours is in and we do plan on --

MEMBER BONACA: So the fact that you don't have UT doesn't mean you're not meeting the expectation of inspections.

MR. PAIRITZ: That's correct.

MEMBER BONACA: You're doing inspections of that type. Thank you.

MR. PAIRITZ: Going back to commitment tracking and implementation status; Monticello made 60 commitments to enhance the aging management at Monticello. These commitments are described in our license renewal updated safety analysis report supplement. They will be in our USAR. All the commitments are entered into the Monticello corrective action program. Each commitment has an owner and a due date. And as far as implementation status goes, we do have an implementation schedule in place. We are currently working on implementation activities. We have due dates and assigned personnel. We have inspections scheduled for our 2007 and 2009 outages in the area for the one-time inspections and selective

leaching inspections. So we feel we're making progress in that area and that we will meet our commitments.

Most of our aging management programs already exist, just require some minor revision to meet the requirements of license renewal. Right now, we're looking forward to getting our renewed license and meeting our commitments and proceeding into the period of extended operations. With that, I'll ask for any further questions.

MEMBER ARMIJO: When you did your UT in, I guess, 1987, what did you find as far as the thickness of the shell?

MR. PAIRITZ: We could not differentiate between what we found and the original thickness of the material when it was new was what it came down to, with the tolerances of the new material that fell into that region.

MEMBER BONACA: If I remember it was still in excess of nominal.

MR. PAIRITZ: Correct.

MEMBER ARMIJO: Do you have any planned inspection of that region at all during the period of extended operation?

MR. PAIRITZ: Not UT inspection. As part

of the IWE program, we do visual inspections on the interior of the dry well. I don't know if you want to go --

MEMBER ARMIJO: Just a question.

MR. PAIRITZ: There is a draft ISG out there right now, too, which gives some direction in that area. They recommend -- they direct you to do UT's if you believe that you may have water in an inaccessible area with the exterior of the shell or if you have evidence of water. So we will follow the ISG in that area.

MEMBER SIEBER: But on the inside of the containment where the sand pocket is, that's covered with concrete.

MR. PAIRITZ: That's correct.

MEMBER SIEBER: So there's nothing to see.

MR. PAIRITZ: Not much excavated the floor. If we had sand pocket drainage, you know, if we saw leakage from out sand pocket drains, then that would be reason to go dig up the floor.

CHAIRMAN WALLIS: Are those drains or sand pocket have a standpipe, you say? Is there something there that is kept full of water so that air doesn't get --

MR. PAIRITZ: No, it's full of sand,

actually.

CHAIRMAN WALLIS: Full of sand. I was just thinking, suppose you got water in there, the corrosion would soon eat up all the oxygen in the sand and then unless you've got air coming in, corrosion presumably would stop.

MR. PAIRITZ: Right.

MEMBER POWERS: Hopefully.

MR. PAIRITZ: Then it becomes the question of the porosity of the sand and how much air it would allow in.

CHAIRMAN WALLIS: Right, it takes an ingress of air as well as water.

MEMBER SIEBER: Sounds like thesis material.

CHAIRMAN WALLIS: Well, this is undoubtedly a topic we'll come back to with other BWRs.

MEMBER BONACA: Yeah, and remember we -- in some cases we have recommended UT's because they have experienced water leakage and so I believe a preferred way of the NRC has been to monitor water leakage and, in fact, monitor the bellows and the seals and then to prevent the leakage at all.

MR. PAIRITZ: I think a thing to remember

also is on this diagram, you know, there are many barriers that would have to fail in order to get water into the sand pocket region, at least from the upper areas like through the refueling bellows. I mean, the sheet metal cover on top of the sand pocket is a water-tight barrier. You've got the air gap drains. We had that trough at the top of the drain line from the refueling bellows. There are many barriers in place to prevent water from ever getting to that point.

MEMBER ARMIJO: You can't inspect that joint sealing compound. That region in there really is not --

MR. PAIRITZ: That's in concrete also.

MEMBER ARMIJO: Yeah, it's really inaccessible, so you can't really count on it that it's a seal.

MR. PAIRITZ: All we can say is that it was installed that way and it is a galvanized sheet metal surface and the joint sealing compound was used to insure that that was a water tight barrier when it was installed.

MEMBER MAYNARD: Where does the eight-inch pipe drain to?

MR. PAIRITZ: Yeah, let me go to that

again. This eight-inch pipe here, it goes to our rad waste system.

MEMBER MAYNARD: And is that the one that has the alarm on it?

MR. PAIRITZ: That's correct.

MEMBER MAYNARD: Do you have any other way -- okay, I guess any water that gets into there, couldn't get around the shell. That's going to drain away with --

MR. PAIRITZ: Well, we have to overflow this trough in order to get any water into the air gap region.

MEMBER MAYNARD: Yeah, okay.

MR. PAIRITZ: So you'd have a gross failure of that bellows in order to get water over into the air gap. So not only would the alarm go off but you'd probably see level dropping in the reactor cavity so that would be --

MEMBER MAYNARD: But the alarm set point is for a sizable leak.

MR. PAIRITZ: Right, three gallons per minute.

MEMBER MAYNARD: And I'm wondering about a leak below that level as to what indication you would have of that if it all goes down that eight-inch

pipe.

MR. PAIRITZ: The only thing we would have to monitor that would be our level of the reactor cavity.

MEMBER MAYNARD: Yeah.

MR. PAIRITZ: But like I said, we did do inspections on these bellows in the late `80s both visual and UT and found them to be in fine shape, no degradation detectable.

MEMBER BONACA: Any other questions? If not, thank you and we'll hear from the staff now.

MR. PAIRITZ: Thank you very much.

MR. ZIMMERMAN: Dan Merzke will lead the staff's presentation on the license renewal application for Monticello. All right, regarding the ISG, I just wanted to let the Committee know that we are in the process of finalizing the ISG on the dry well shell. We did receive some comments from industry and we've worked through those comments and we plan to issue the final ISG this fall. Probably late September, early October that ISG will be coming out.

MR. MERZKE: All right, good morning. My name is Dan Merzke. I'm the Project Manager for the staff review of the Monticello Nuclear Generating

Plant license renewal application. As Jake mentioned earlier today, joining me today is Patricia Lougheed who is the Inspection Team Leader from Region 3, Peter Wen, who is the Audit Team Leader and the rest of the technical staff who were involved in the review of this application.

Today, I'll cover a brief overview of the review, cover some highlights of the review and briefly touch on the review of the time limited aging analyses and follow that up with the staff conclusion. Most of this you've already heard today already. The application was submitted by letter to the agency dated March 16th, 2005 by the Nuclear Management Company. Monticello is a General Electric BWR 3 Model with a Mark 1 steel containment. The plant is rated at 1775 megawatts thermal with a 600 megawatt electrical capacity and that includes a 6.3 percent power uprate which was approved by the NRC in 1998.

The current operating license expires September 8th, 2010 and the plant is located about 30 miles northwest of Minneapolis, Minnesota. The staff conducted their GALL audits in June and July of 2005. The region based their inspections in January and February of this year, two weeks on site per each. The initial safety evaluation report by the staff was

issued on April 26th of 2006 with no open or confirmatory items. As you heard before, the staff issued a total of 113 formal RAIs during their review which was a somewhat lower than normal review. Part of this is based on the fact that the application was about 95 percent consistent with GALL Revision 1 which was issued in September of 2005.

The final Safety Evaluation Report was issued July 28th with a total of 60 commitments and three license conditions. The commitments will be implemented prior to the prior of extended operations. The three license conditions are to include the updated safety analysis report supplement and the next update of the USAR following issuance of the renewed license and to complete the list of commitments that are listed in Appendix A of the SER in accordance with the schedule that's in Appendix A.

And finally, for the reactor vessel surveillance program, all capsules must be maintained for future reinsertion into the reactor pressure vessel. And any changes to the capsule withdrawal schedule must be submitted to the NRC for review and approval. During the review, the staff concluded that the Applicant's scoping methodology met the requirements of 10 CFR 54 and the scoping and

screening results included all system structures and components within the scope of license renewal and subject to aging management review. During the scoping and screening methodology audit, the audit team reviewed the currently licensing basis for floor control measures and determined that storage steel plates and floor hatches that were designed to be installed for flood control were not included within the scope of license renewal. The Applicant initially did not include components stored in the warehouse within the scope of license renewal.

After further evaluation and extent of condition review, the Applicant brought these components into the scope of license renewal. Walk-downs conducted during the license renewal inspections resulted in a length of steam piping in a steam trap in the emergency diesel generator room being brought into scope as well as floor drains in the sodium hypochlorite building which penetrated the flooring to the intake structure. And those were the only components that the staff found were not in scope originally.

The Applicant is committed to following the BWRVIP guidelines through the period of extended operations as outlined in Commitment Number 57. The

examples include BWRVIP-139 for steam drier inspections and BWRVIP-26 for top guide inspections. In addition to the guidelines set forth in BWRVIP-26, the Applicant also committed to perform additional top guide inspections in the high fluence region.

CHAIRMAN WALLIS: While you're mentioning steam driers, is this one of those which has not had problems with the steam drier?

MR. MERZKE: That is correct.

CHAIRMAN WALLIS: Has there been any observed cracking?

MEMBER BONACA: There is some cracking.

MR. MERZKE: There is some minor cracking as I recall, found in the 2005 outage but, Dave, do you want to mention --

MR. POTTER: Yeah, I'm Dave Potter from Monticello. We found what I would call -- what I would characterize as four minor indications on the steam drier and there are believed -- three of them are believed to be original fabrication induced flaws.

MR. MERZKE: Concerning aging management of the dry well, the Applicant credits the primary containment in-service inspection program which the staff determined is consistent with GALL AMP ASME Section 11, Subsection IWE. Around the time the

initial SER was issued, the staff issues proposed license renewal ISG 2006-01 regarding the inaccessible areas of BWR Mark 1 steel containment dry wells. In a letter dated June 23rd, 2006, the Applicant amended its primary containment in-service inspection program to incorporate the points outlined in the proposed license renewal ISG. In response to the ISG, that Applicant verified that ultrasonic testing performed in the sand pocket region in 1986 and 1987 detected no degradation.

In addition, the Applicant verified that no water or moisture has been identified in the air gap or sand pocket region and that leakage monitoring is performed for all drains in accordance with plant procedures. Drains are verified open and no leakage detected every refueling outage. If leakage is detected, the Applicant will perform augmented inspections consistent with the guidance in ASME Section 11, Subsection IWE 1240.

MEMBER APOSTOLAKIS: What do they involve.

MR. MERZKE: Which would include UT inspections.

MEMBER APOSTOLAKIS: Thank you.

MR. MERZKE: The staff found that Applicant's program for managing aging effects of the

dry well acceptable. Concerning aging management of in-scope inaccessible concrete, the Applicant stated and the staff verified that the below grade environment is non-aggressive. Periodic testing of the groundwater will be performed as part of the structure's monitoring program.

As part of our review of the Applicant's time limited aging analysis, the following table summarizes the upper shelf energy for the limiting belt line components. Acceptance criteria for upper shelf energy is greater than 50 foot pounds. The Applicant has demonstrated and the staff has verified that the upper shelf energy for the limiting belt line components at Monticello will exceed 50-foot pounds at the end of the period of extended operations.

VICE CHAIR SHACK: Now, is this computed on Rev 2 of 199 or the upcoming Rev 3?

MR. MERZKE: Matt Mitchell is going to take this for component integrity.

MR. MITCHELL: Yeah, Matt Mitchell, Chief of the Vessels and Materials Integrity branch. This is definitely computed in accordance with Rev 2, which is our current review basis and review standard for all things related to Appendix G issues. So this is using those correlations.

VICE CHAIR SHACK: Now, what happens when you change the basis? You have to do a back-fit now to have them do an analysis?

MR. MITCHELL: Well, with respect to any future changes to Regulatory Guide 199, Rev 2 going to Rev 3, which I'm sure that the ACRS is aware is sort of an in-process activity, the staff is going to have to evaluate what type of follow-up actions we may feel necessary to take when that new revision is issued. If you go back to the last time that we revised Reg Guide 1.99, the staff issued a companion generic letter which requested that licensees re-evaluate their vessel integrity analysis in accordance with the revised regulatory guide. At this time, barring any other precedent, I would suggest that that may be, in fact, the course we intend to take for a future revision of the reg guide.

MR. MERZKE: Thanks, Matt. It seems kind of short but to summarize on the basis of its evaluation of the license renewal application, the NRC staff has concluded that the requirements of 10 CFR 5426A have been met. Does anybody have any further questions?

MEMBER BONACA: I would like to add that during the subcommittee meeting we had presentations

from the inspectors and they pointed out -- they were very positive regarding this site. I don't know if there are any comments that --

MR. MERZKE: Patricia, she has no further comments. I participated in the inspections and we did a 100 percent review of all the aging management programs on site and I think Patricia would agree, the material condition of the plant was at least above average.

CHAIRMAN WALLIS: Well, thank you.

MR. MERZKE: We don't like to give out top grades to anybody.

MEMBER POWERS: I see.

MEMBER ARMIJO: I had a quick question. The -- what are your criteria, what constitutes leakage? Is it prolonged leakage? Is it large quantities of leakage? To trigger excavation and UT, you know, there's got to be some potential damage to the shell. So and that's not going to happen with one leak event unless it's prolonged, undetected, you know, what are your criteria there?

MR. MERZKE: I believe the criteria, and Hans can probably speak to this better than I can but the criteria probably that would be followed would be the ASME Section 11 IWE 1240 criteria. I think it

specifies in there and I'm reaching back, that there has to be some sort of excess leakage and Hans maybe might --

MR. GILLESPIE: Let me address that. This is Frank Gillespie. This is exactly the point of the IHG we put out and what the IHG says is it tries to equate any evidence of moisture seen coming from those drains and the ISG basically says any leakage to the same thing as identified corrosion which is seen in the visual inspection from the inside. And the IWE already requires ultrasonics if you see enhanced corrosion problems on the inside and there was no equivalent kind of criteria for the outside.

So the ISG that the staff issued basically equates any moisture that's visible coming from those drains to actually seeing any kind of corrosion on the inside and the ISG attempts to equate those two and then uses exactly the same criteria as the IWE relative to ultrasonic testing being required.

MEMBER ARMIJO: So one event that had some leakage detected in one or more drains let's say even for a period of a couple of days, that would trigger a UT inspection and excavation?

MR. GILLESPIE: Not necessarily an excavation but a UT inspection. That's the way the

ISG is written right now.

MR. MERZKE: It would depend on if the Applicant believed that the moisture leakage entered the dry well or the sand pocket region. I think that's the area that would need to be excavated.

MR. GILLESPIE: Now, you need to look at the uniqueness of this design because this plant does have that seal and the galvanized material over the sand pocket and what we're going to be doing is coming to the Committee or the subcommittee next month on Oyster Creek who removed the sand from the sand pocket because they didn't have the seal to allow the leakage, if there is any, to drain directly through.

MEMBER ARMIJO: Yeah, but, you know, this corrosion takes time. It doesn't happen instantaneously and I just wanted to know if you had a time --

MR. GILLESPIE: I think what you're seeing is the ISG is very conservatively written. We've got a licensee who, for 30 years of operation has seen no leakage and if we see leakage in one of these operations it's going to be a point for discussion. So the ISG sets a very, very high standard on something no one expects to happen and the intent, quite honestly, encourages keeping that seal in good

shape, keeping it dry and that's --

MEMBER BONACA: I would expect you would allow an engineering evaluation of the leakage and the actions taken to prevent further leakage. I mean --

MR. GILLESPIE: Yeah, I'm not saying we wouldn't allow it. I'm saying the way the ISG is written right now, it's a very conservative ISG and basically equates water in that gap that's detected with seeing enhanced corrosion on the inside with the visual inspection. It just equates those two. It puts an equal sign to them.

MEMBER BONACA: Yeah. Any further questions to members? If not, I mean, I would like to be recognized, Mr. Chairman, for giving it back to you with 40 minutes and I didn't do much about that.

CHAIRMAN WALLIS: Thank you very much. We aren't allowed to start the next item until the time scheduled which is 10:15. What I've asked Mike Junge to do is to hand out to you a draft letter, if that's okay with you, Mario, hand out to the Committee the draft letter you prepared on this matter and ask the Committee during the break which is going to be almost an hour, to read it and if you have any comments, give them to Mario, so that we can get ahead of the game on this letter and maybe finish it very quickly if you're

in agreement with it, this evening. So we're going to do that. It's the same one that you sent. You haven't changed it from the draft? What's the status of this letter?

MALE PARTICIPANT: They're making copies of it.

CHAIRMAN WALLIS: We'll take a break until 10:15 and look for this letter, if you don't have a copy.

MEMBER MAYNARD: Mr. Chairman, I would just like to compliment both the staff and the licensee. I think they directly addressed --

CHAIRMAN WALLIS: Quiet, quiet.

MEMBER MAYNARD: -- they directly addressed questions that had come up in the subcommittee meeting. They took them head on and brought them to the Committee. So I'd like to compliment both the staff and the licensee for that.

CHAIRMAN WALLIS: Thank you very much. All right, now we're going to take a break now. 10:15, come back here at 10:15.

(A brief recess was taken at 9:26 a.m.)

(On the record at 10:18 a.m.)

CHAIRMAN WALLIS: Please come back into session. The next item on the agenda is the Lessons

Learned from the Review of the Early Site Permit Applications. I turn to my distinguished colleague Dana Powers, to lead us through this one.

MEMBER POWERS: Thank you, Mr. Chairman. We, as you are aware, have reviewed three early site permits and found the process to be generally a smooth one. Generally, we have written reports as we're required by law to do, on the safety portions of these applications in which we have complimented both the staff and the Applicant on the quality of their application and the safety evaluation report.

We have, on occasions, noted places where the application and the report could be improved. We've raised some issues, perhaps, to be addressed in the future but by and large, we've found it a very positive experience. Nevertheless, we felt it would be opportune since this was a first of a kind application of this revised regulation, to have a lessons learned session to see if there were things of a generic nature that might be improved. This is especially so since we knew well that the early site permit process is a subset of the process that would be associated with a combined license and anticipated that there might well be combined licenses showing up in the near future.

At any rate, we scheduled and held such a lessons learned session yesterday. Many of you attended, are familiar with it. The staff made a presentation which will be reproduced and enhanced and augmented here. I'll also note that each of the applicants made a presentation and the staff shall try to indicate those portions of the points made by the applicants that they feel they need to address. We reviewed a variety of different issues and whatnot. I think one of the findings that we came away from it is recognition that an application consists of two parts; those that deal with safety and those that deal with environment and we focused strictly on the safety ones and many came away feeling that the safety is in better shape than the environment. I don't know.

But with that introduction, I'll ask the staff to discuss their lessons learned and what they drew from our review.

MR. ARAGUAS: Good morning, my name is Chris Araguas and as I mentioned yesterday, I work in NRR and I'm one of the newer members of the Early Site Permit Review Team. As Dana mentioned yesterday, we went through -- the staff identified lessons learned and I plan to go over those in a little bit less detail today to the extent that that's acceptable to

the ACRS. Following that, we will attempt to discuss the lessons learned that were identified by the applicants and will attempt, to the extent possible, to address either what the staff is doing now or what it plans to do in the future.

Before I move onto what the lessons learned, I find it's important to go over what the staff is currently doing in terms of updates. In light of the lessons learned that we've identified during the ESP process, we are currently undergoing an update to the standard review plan as well as updating the guidance for COL applicants in terms of what's required for a COL application. Regarding the guidance out there for ESPs now, which is the RS002, the plan is actually to capture any deficiencies that were identified with that document and capture that in the SRP. So the SRP will be the guidance for the tech staff in terms of reviewing ESP applications, COL applications and design certifications.

As far as the RS002, what the staff plans to do, it's not going to go away completely but what it will do is within the document, it will contain a matrix identifying the applicable SRP sections that are required for an ESP application review. So with that I'll move onto the staff lessons learned. The

first lesson learned that we identified was a need to establish criteria in terms of how to identify a site characteristic and a controlling plant parameter envelope value included in ESP. During the review there was some confusion as to what exactly should be included in the permit and as a result, the staff has actually been able to characterize what the criteria is for site characteristic and what a controlling PPE should look like.

These criteria were presented in a May 5th, 2005 NEI meeting as well as previous ACRS meetings to support the ESP reviews. The staff recognized the importance of having these definitions and criteria embedded within staff review guidance and therefore, is making sure to capture these definitions and criteria in the SRP update as well as the RS002. The second staff lesson learned was regarding permit conditions and COL action items. The staff recognized that there was a need to put out criteria for how to identify a permit condition and a COL action item for the staff. During the reviews, we did come up with that criteria and prior to issuing the -- any of the FSERs, the staff did a scrub-through of making sure that it correctly identified what a permit condition was, what it should look like, and making sure that it

correctly identified the COL action items. The follow-up to that is these criteria will also be put into the SRP update as well as the RS002.

MEMBER POWERS: There's no -- we had reviewed those as a committee and found then praiseworthy, thought it was a good measure on your part.

MR. ARAGUAS: Thank you. The third lesson learned and this was a combination between comment and lesson learned, and that was the Commission's expectations for high quality applications. The comment really we wanted to put out to industry and for future reviews is that we're expecting that any RSP or COL application that comes in certainly will have done a review of what was done at the SP stage in terms of the RAIs that the staff issued, how those RAIs were addressed, the open items that came out and then any other safety issues that came out of the ESP so that they're aware or able to incorporate this into their applications that may be coming in, that way to support a more efficient review of any future ESP and COL applications.

The lesson learned here is that the staff recognizes that it too has a role in industry being able to support the submittal of these high quality

applications and therefore, as a result the staff has, as I mentioned before, taken on and endeavored to provide these updates to reg guides that are supporting new reactor licensing, updating the Reg Guide 1.70 in the form of DG-1145 and completing the proposed Part 53 rulemaking.

The fourth lesson learned that I wanted to mention was a combination of several different areas where the staff identified where it needed to update its review guidance to capture what we felt was -- well, to capture the first of a kind review process, issues identifying that first of a kind review process. And the first item that I have listed and I've already gone through, I don't know if there's any more discussion that needs to be had on that, but that was basically that the staff needed to capture the criteria for site characteristics, controlling PBEs, COL action items and permit conditions in appropriate review guidance.

The second item we had listed down was the performance based methodology for seismic hazards. And I'm just briefly going to go over where this comment comes from or this lesson learned, is this came out of the Clinton ESP application review where Clinton submitted a new performance based methodology

the staff had not previously reviewed and in light of this, the staff encountered some delays as far as how long they would take to complete its review having to look at a new methodology. The end result was that the staff found that this methodology was acceptable. It realized that we don't want to encounter these kinds of future delays down the road for another potential ESP or COL applicant that's going to reference this performance based methodology. So the staff has taken on the approach of developing an update to Reg Guide 1.165 in the form of DG-1146 which will capture this performance based methodology.

The next item I had was the major features of the emergency plan and there was certainly a lot of discussion yesterday in regards to what the staff is currently doing and hopefully, I'll be able to capture all of those items. During the previous three ESP applications, several questions were raised regarding the major features option. Three questions that seemed to be a common theme were regarding the level of review being conducted under the major features option for applicants that reference an approved emergency plan for an existing nuclear power plant co-located to the site. Another was regarding the definition of major features.

And the last item was the level of -- regarding the level of finality that an applicant receives under the major features option. To address the first comment, the staff recognizes the need for updating the existing review guidance in NUREG-0654, Revision 1, Supplement 2, which is the guidance for major features. Currently Supplement 2 calls for the review of a description of proposed emergency plans for the major features option. The Review Guidance in Supplement 2 should be revised to provide additional guidance relating to the level of information necessary for each of the 14 planning standards. To the extent the review -- to the extent that information in existing approved plans is referenced, the staff level review of the plans is limited to the following three criteria. Is the information up to date; is the information applicable to the proposed site and does it reflect the use of the proposed site for possible construction of a new reactor?

Although the staff recognizes the need to update NUREG 0654 Revision 1, Supplement 2, since the staff has not been indicated by industry that any future ESP applicants would be coming in with major features, it feels that this is a low priority work item and therefore, wouldn't be addressed in the near

future. I think th staff is more focused on addressing the appropriate guidance for COL applications. And one thing I wanted to note is that currently in house we do have the Vogel (phonetic) ESP application which has come in not referencing -- not doing a major features approach but doing a complete and integrated emergency plan approach with ITAC which is what the staff feels and what industry has conveyed to the staff is the more appropriate approach during the ESP stage.

Regarding the definition of major features of the emergency plan, major features is currently identified in NUREG 0654 Revision 1 to Supplement 2 and the way the definition reads, is that major features include the exact sizes of EPZs and planning standards in evaluation criteria located in Section 5 of Supplement 2. As part of the proposed Part 52, the staff plans to provide language clearly defining the major features of emergency plans.

The third item that we wanted to discuss was the level of finality at the ESP stage regarding the major features option. The staff has also proposed additional language in 10 CFR 52.18 that specifies that the review of major features of the emergency plan will be against 10 CFR 50.47 and

Appendix E of Part 50 which are the basic emergency planning requirements that are directly associated with a reasonable assurance determination. As a part of this rulemaking, the staff has intended to not only clarify what major features are but expand on the information that would be allowed for review and approval of major features.

The next item I had that the staff felt it needs to address was the applicability of 10 CFR Part 21 to ESP applicants. This was an issue that was raised early on in the review process where somebody raised the question in regards to what's the -- you know, is 10 CFR Part 21 applicable to ESP pre-applicants. Is it applicable to an ESP applicant and is it applicable to an ESP holder? As a result of that comment, in a June 22nd, 2004 letter, the staff clarified its position on 10 CFR reporting requirements regarding an ESP pre-applicant, ESP applicant and ESP holder. And as far as the pre-applicant is concerned, 10 CFR Part 21 reporting requirements are not directly applicable in the sense that the pre-applicant does not have any obligation under the regulations during the pre-application phase to comply with 10 CFR Part 21.

For both the ESP applicant and the ESP

holder, the staff stated that 10 CFR Part 21 reporting requirements do apply. Because site characteristics form the part of the basis for design and because the design forms part of the basis for the license, the staff feels that it is appropriate to require an ESP applicant and ESP holder to apply a 10 CFR Part 21 reporting program. In order to verify an applicant's program, established just finished writing --

CHAIRMAN WALLIS: Just tell the new folks here what 10 CFR Part 21 is all about since you keep referring to it, but you haven't said what it is.

MR. ARAGUAS: Sure. Paul, can you go into a little bit of detail of what's required under Part 21 in terms of the reporting requirements for an applicant?

MR. PRESCOTT: This is Paul Prescott of the Quality in Vendor Branch. What that refers to is reporting of defects. In other words, if they were to find design inputs that had been calculated wrong or had been applied incorrectly, and could effect safety related FSCs at a future date of construction that they would have to report that to the NRC.

MEMBER CORRANDINI: Thank you.

MR. ARAGUAS: The next item I had was --

MEMBER POWERS: Wait, before you go on

from there, it seemed to me that the applicant yesterday conceded the applicability but asked for guidance on the implementation of both 21 and Appendix B, which for our new members is the appendix to 10 CFR Part 50, which is a quality assurance requirement. Did you react to that?

MR. ARAGUAS: Yes, we did and one of the comments they made to me was that the staff attempted to capture this and the SRP updates but there was a lot of push-back from industry regarding that and there was no requirement to have a Part 21 program, at least its description, in the application. So the staff, right now is relying on its inspection program and feels that it's documented there in terms of what the staff would be looking for, for this type of program.

MEMBER POWERS: I guess I would have resisted the push-back because it seems to me -- I'm scratching memory a little bit but that the defect in the quality assurance explicitly asked for in the Part 52. I'm scratching memory. I have -- I can't quote you chapter and verse on this.

MR. ARAGUAS: Paul, did you want to address this a little bit further?

MR. PRESCOTT: Paul Prescott again. Per

50.34 that lays out what the requirements are for what needs to be in an application and you have to describe your quality assurance program per 50.34, but there is no requirement that your Part 21 program be described for that.

MR. ARAGUAS: Does that satisfy your question?

The next lesson learned that I have listed here is the applicability of Appendix B to 10 CFR Part 50 to ESP applicants and that's regarding a quality assurance program. Current regulations in 10 CFR Part 52 do not require that a 10 CFR 50 Appendix B quality assurance program be implemented in support of an ESP application. However, the staff determined that ESP activities associated with the site safety must be controlled by quality assurance measures sufficient to provide a reasonable assurance that future safety-related systems, structures and components of a nuclear power plant or plants that might be constructed on the site will perform adequately. Implementation of this guidance for the first three ESP applications proved challenging and the staff believes that future ESP reviews will be significantly improved by the addition of an explicit QA requirement for ESP applications.

The staff believes that the level of quality used to control activities related to safety related SSEs should be equivalent in ESP and COL phases. The staff's position is that applicants must apply quality controls to each ESP activity associated with the generation of design information for safety related SSEs that meet the criteria for Appendix B. The reasoning for this similar to the reasoning provided for Part 21 implementation is that the site characteristics approved at the ESP stage will form the part of the basis of the design which, in turn, will form part of the basis for the license.

To avoid any future -- any problems in the future, the staff is proposing to modify 10 CFR 50.55F, Appendix B and 52.17 to make these QA requirements applicable to ESPs. The staff is also capturing this proposed change in the rule in SRPs and the SRP updates.

MEMBER APOSTOLAKIS: Give me an example of this.

MR. ARAGUAS: An example of --

MEMBER APOSTOLAKIS: That you have to worry about Appendix B because the future safety systems --

MEMBER POWERS: Bore holes.

MEMBER APOSTOLAKIS: Huh?

MEMBER POWERS: Bore holes.

MEMBER SIEBER: Or your seismic stuff.

MEMBER APOSTOLAKIS: Or my seismic stuff?

MEMBER SIEBER: Yeah, you're going to build a foundation for the plant, including safety related buildings based on what you determined the seismic site characteristics are. You make a mistake there, you have an impact on the qualification, seismic qualification of the structures.

MEMBER APOSTOLAKIS: Well, is it Appendix B that will be preventing me from making a mistake?

MEMBER SIEBER: That's one of the tools.

VICE CHAIR SHACK: You have a quality control program to --

MEMBER SIEBER: To make sure you do it right. And if you don't do it right --

MEMBER APOSTOLAKIS: Well, if you're going to force Appendix B on them, they will not evaluate and review their calculations. I mean, that's absurd.

MEMBER SIEBER: You could say that about any activity in a nuclear power plant.

MEMBER POWERS: Yeah, you could say that about anything, George. I mean, we've created Appendix B to create a discipline.

MEMBER SIEBER: What Appendix B does is provide documentation that the work was done in accordance with the plan.

MEMBER POWERS: Well, it also provides mechanism for how you handle deficiencies and things like that.

MEMBER SIEBER: It makes the processes dependable.

CHAIRMAN WALLIS: It gives a message to the agency that those things that are going on are being done right.

MEMBER APOSTOLAKIS: When they do the evaluation of the site and the NRC staff reviews it, I'm sure there is documentation. So it's stretching it a little bit, isn't it?

MEMBER POWERS: Well, I think you're railing up against Appendix B and that's subject for a separate discussion and I will regale you enormously with my views on Appendix B.

MEMBER APOSTOLAKIS: No, I understand, Appendix B is very useful for a plant itself, but to say that in the early site permit stage they have to make sure they don't make mistakes, I mean --

VICE CHAIR SHACK: Well, but I mean, it's like any of your data that goes into your design.

MEMBER SIEBER: Right, it's all fundamental stuff.

MEMBER APOSTOLAKIS: If you guys are happy with that, I yield.

MEMBER SIEBER: And if there is no documentation as Appendix B requires, the NRC wants assurance that everything has been done properly, there is no way to enforce the fact that the licensee should have prepared documentation unless you apply Appendix B or something like it.

MEMBER APOSTOLAKIS: I mean, they are reviewing the application, so anyway it seems to me that should be documented. But anyway --

MEMBER POWERS: Well, I mean, I want to distinguish here between feelings about Appendix B and the applicability of that appendix to the early site permit. I think we can have a long discussion about the merits and demerits of Appendix B. Set those aside, accept Appendix B, now is it applicable here and I think the applicability is to activities at the site is clear.

CHAIRMAN WALLIS: Now we can move onto a physical consideration instead of being ensnared in all the bureaucracy?

MR. ARAGUAS: Okay.

MEMBER POWERS: A harsh view.

CHAIRMAN WALLIS: Well, I mean, all these references are about different parts of the regulations must be really something for someone who is coming here for the first time, that's --

MEMBER SIEBER: I think we have an additional comment over here.

MR. WEISMAN: This is Bob Weisman on NOGC and it appears to me that the Committee is under the impression that Appendix B applies to the current early site permits, but it doesn't. Appendix B does not apply to the current early site permits. What the staff has done is it has inquired into the reliability and integrity of the information that supports the permit and come to a conclusion that really equivalent in substance to Appendix B but Appendix B does not now apply. I will note that the proposed rule Part 52 issued on March 13th, 2006 includes a provision that would apply Appendix B to early site permits, but you know, we don't know what form the final rule is going to take.

MEMBER APOSTOLAKIS: I have one last question. If you apply Appendix B, okay, the next guy who comes requesting early site permit what would you do different from the other people?

MR. WEISMAN: I think for that I would probably have to turn to Mr. Prescott.

MEMBER APOSTOLAKIS: Then why don't you do that?

MR. WEISMAN: Okay.

MR. PRESCOTT: This is Paul Prescott.

MEMBER APOSTOLAKIS: Turn around a little bit so we can see you.

MR. PRESCOTT: Sure.

MEMBER APOSTOLAKIS: Thank you very much.

MR. PRESCOTT: There was -- initially it was interpreted, legally interpreted that Appendix B did not apply to ESP applicants. So we felt that in order to provide reasonable assurance that the data -- that the data that the staff was receiving for review was adequate, we worked in hand with OGC to come up with okay, something that's equivalent in substance to Appendix B. And so what we essentially drafted was a standard review plan 1711 which outlined the general requirements of quality assurance that should be applied to activities related to the ESP application which we also performed in an implementation inspection to insure that they were doing these controls.

The difference here is that the only thing

that was applied was the essence of Appendix B. So if you read Appendix B in 10 CFR, that's what was applied. What is different is in the way the current plants operate and in the way the future applications will be reviewed is that Appendix B will be applied but Appendix B, when we talk about Appendix B in quality assurance space, that includes the interpretations that the staff and the industry have come up with over time to include that enhances or it goes into greater detail to explain how to properly implement Appendix B. And this would include such guidance as industry standard and QA1 and included in the past the daughter standards that were born from ANSI 45.2 series of standards that explained how to implement, properly implement Appendix B and that's the difference.

MEMBER MAYNARD: George, let me take a shot at this. In reality there will probably be very little difference as far as what's actually done and performed for most of the licensees that are coming in for early site permits have been operating plants and they've kind of ingrained the methodology and the way they do business anyway. There may be a few more audits of what's been done by imposing the Appendix B program as opposed to not having it. Audits may be a

little more formal.

Documentation, that way it's handled, and record keeping requirements may be a little bit different but the actual physical work, physical calculations will probably be very little -- maybe a little bit more rigor in assuring qualification of some of the vendors and some of the people doing the work, but I believe that would be the differences.

MEMBER APOSTOLAKIS: Okay, thank you.

CHAIRMAN WALLIS: Please continue, Chris.

MR. ARAGUAS: Okay. The last item that the staff identified as lessons learned was the issue that came up from the Clinton review, which was establish a criteria for computing the probable maximum flood. During the proprietary review period for the final safety evaluation report on the Clinton ESP application, Exelon discovered a discrepancy between its calculated probable maximum flood elevation and what the staff had included as the probable maximum flood in the final safety evaluation report. After several discussions with Exelon and after performing several independent analysis, the staff concluded that the revised analysis conservatively estimated the probable maximum flood elevation at the Clinton ESP site.

As a result of this issue, there was two lessons learned the staff identified. The first was that it is not the job of the staff to do a bounding type analysis in the review and ESP and then use the staff's value as a value used to characterize the ESP site. The second lesson learned was that that staff recognizes it needs to update the guidance and data used for computing the probable maximum flood elevations for future ESP and COL applicants. As part of this ongoing SRP updates, the staff has planned to revise the staff review procedure and acceptance criteria for calculating the probable maximum flood elevation.

That concludes the staff's identified lessons learned that we covered in yesterday's subcommittee meeting. What I'm going to attempt to do here is discuss briefly some of the lessons learned that were projected to the staff from the ACRS and attempted disposition what the staff is doing now, or what it felt was the lesson learned.

The first was regarding the review of the staff's analysis of the hazards posed on the proposed site by explosions and transportation accidents on the Mississippi River that was done for the Grand Gulf ESP application. During the December 8th, 2005 ACRS

meeting on this area ESP application, the staff's -- and the staff's FSER, the ACRS identified a concern on the evaluation conducted for the potential hazards along the Mississippi River that could impact the site. In light of the ACRS' concern, the staff determined that the Applicant needed to clarify how it was in compliance with 10 CFR Part 100.

This was an area where the staff should have requested additional information along the lines of a quantitative analysis as opposed to the qualitative analysis that was provided by the Applicant. In this case, the ACRS did a great job in identifying a concern that needed to be addressed further by the staff and the Applicant. As a part of this, the staff does not feel this was an indication of poor or outdated review guidance and therefore, feels that the guidance in RS002 and the future guidance and SRP updates will -- is sufficient for the review of site hazards.

MEMBER POWERS: I think we agree with you on that.

MR. ARAGUAS: The second lesson learned that was identified was for the staff to review the development of study -- and the study of climate change for the next 20 years. In each of the previous

early site permit reviews, the ACRS identified a concern with how the staff was addressing climate change that may complicate the prediction of future weather extremes based on historical records. As a result of yesterday's ACRS meetings, the staff recognizes this concern and will consider how this might be captured in staff guidance specifically the SRP updates with a review of future ESP and COLs. Regarding what that would look like, I don't think the staff has a clear picture of how but I certainly will attempt to.

MEMBER POWERS: I mean, I don't think we disagree with your disposition of the issues. We disagree with what you've written in RS002 and maybe the appropriate way to handle it is in a guidance statement. I think the agency generically has an issue here. I don't think it's your responsibility. I mean, that's the contention you've made and I think we agree with you on that. And I think it's difficult for you to disposition the issue in finality, but it is your guidance but you need to just modify some of the words.

MR. ARAGUAS: Okay. Now I'm going to move onto some of the industry identified lessons learned and what the staff is currently doing to address those

comments that were made. Regarding the first two, I want to address those two at the same time. That's the plant parameter envelope approach and the major features option that seemed to be discussed quite a bit yesterday. The staff recognizes the challenges associated with both the PPE approach and the major features option but at this time, it's the staff's understanding that any future ESP applicant will be submitting an ESP application with a specific technology in mind and will be submitting complete and integrated emergency plans with ITEC (phonetic).

As a result of this understanding, the staff is really focused on addressing the guidance that is out there for COL applicants so that it does not encounter these same problems it's encountered during the SP reviews. Aside from the fact that the staff needs to update its guidance with respect to the PPE approach and the major features option, the staff also feels that some of the challenges arose due to the fact that industry was initially just testing out the Part 52 licensing process. Had a design been selected it would have made for a more efficient review.

The next item that was discussed yesterday was permit content and the fact that industry felt

that it had not seen what the draft permit or what its actual permit would look like. The staff understands the industry's interest in seeing what the actual early site permit will look like --

CHAIRMAN WALLIS: Interesting, they're applying for something but they don't know what it is.

MR. ARAGUAS: And I'll get to that. We understand their interest in seeing what the permit looks like and as far as the safety side is concerned, we feel that Appendix A is a good representation for the terms and conditions that will be placed on the permit. It is unlikely that the language will change as identified in Appendix A unless the ASLB identifies some fundamental mistake with the language being proposed. This has been relayed to industry and they are aware that, in fact, those conditions in Appendix A will go in the permit.

As far as the environmental portion of the permit, we realize that the staff has been silent on this issue but in light of the ASLB hearings to take place in the next few months, following these hearings we will with certainty know what the permit will look like. An aside to this as the staff mentioned yesterday, on June 22nd, 2004, the staff did send out a permit template to each of the applicants to provide

feedback on. So they are aware of what the permit will potentially look like and it shouldn't be any surprise to them the type of information, the level of detail that will be captured.

The next item that we had that was brought up was the -- was regarding seismic methodology, and this was regarding the high frequency issue. The staff is very much aware of this issue and has engaged industry on this issue. And currently the staff is reviewing a topical report that was submitted by NEI and EVRI (phonetic) and has issued RAIs on the topical and is not awaiting response to the RAIs.

Another item that was raised was regarding the quality assurance program, specifically internet data. Right now the staff has been requiring that an applicant's technical reviewer within the technical discipline document his or her review of the internet data and we also require the information be in a hard copy form to insure that we know specifically what data is -- what the data is they reviewed since data could potentially change with time. The plan right now is to incorporate this information in the SRP updates.

Another item that was discussed was regarding electronic submittal guidance. The staff is

certainly aware of this issue.

MEMBER POWERS: Let me come back to the internet data a little bit.

MR. ARAGUAS: Sure.

MEMBER POWERS: Let me predicate my remarks by saying there's no problem with the current applications. They've -- everything has been dealt with appropriately and conservatively. I'm worried more in the future. I may not even be worried about early site permits or COLs but engineering and safety analysis in general. The problem I see is that internet data only available via the internet could be defaced and the -- or changed by third parties unbeknownst to any user or reviewer. And that's the -- I mean, that's the reality is that you can get into these sites and you can do things to them.

MR. ARAGUAS: Right.

MEMBER POWERS: The gentleman to my right probably can do it. I can't but -- and how do you assure integrity of data that may have languished there for years before it actually gets used by someone is the issue that has to be confronted.

MR. ARAGUAS: Right.

MEMBER POWERS: And I don't think it's your responsibility. I think it's just something in

the future.

MR. ARAGUAS: Okay.

MEMBER CORRANDINI: Can I ask, just to understand Dana, so you're saying there is real data. It's stored somewhere but in the transmission through the internet it's modified?

MEMBER POWERS: Oh, no, Mike, somebody goes in an hacks the site.

MEMBER CORRANDINI: Okay.

CHAIRMAN WALLIS: Maliciously modified. Is that the idea?

MEMBER POWERS: That's the problem and the problem is that there are going to be changes over the next 20 years and the availability of information is just going to be different. I mean, there's a paradigm where as now, and appropriately so, most people -- you can use the internet to go and say, "Ah, somewhere there's this volume that I can go look at, put my hands on and look up this number". Okay, I might not actually do that but I know that it exists.

In the future, that volume won't exist. The only thing that will exist is an electronic page and so how do you assure the integrity of that electronic page?

MEMBER CORRANDINI: So let me just ask my

question differently then. So right now, there has probably been a reference that's untouchable.

MEMBER POWERS: There's something untouchable. For instance, somebody uses data from the National Weather Service, okay. He got it off the internet but he knows he can go to the National Weather Service and say, "I want to assure that this data I got off the internet is in fact, truly represents what you claimed it to be", and sure enough, they can do something. It may well be going to their separate computer files and say, "Yeah, that's exactly the number we said it was", and there's some assurance. In the future, you may not be able to do that.

Okay, it's forward looking. I don't know that these gentlemen have any responsibility for this. I think the agency has a responsibility to think about this issue because based on what I see, electronic libraries are the way to the future. That actually going in and being able to pick up a printed volume is going to become an anachronism. And what I have seen, it's really marvelous for the stuff, but it's -- I can see it fraught with difficulty because there are a lot of people out there that like to tear down institution, and destroy things just for the fun of

it.

MEMBER CORRANDINI: One last question, just for my own edification; so right now there's no requirement by the licensee to have a reference -- what I'll call, I'll use the word "hard reference" on engineering specifications.

MEMBER POWERS: Oh, I think there is.

MEMBER CORRANDINI: But that's why I'm still going back to your worry. Your worry is that somehow you'll get to that in the future because there will never be -- the hard reference will disappear? Is that your --

MEMBER POWERS: Yeah, there just won't be any.

MEMBER CORRANDINI: Okay.

MEMBER POWERS: There will never be one. I mean, we will have valuable data obtained through great labor, the only place it exists is electronically. And we're going to use it, I mean, it will be silly not to use it. Now, what do you do? How do you insure the integrity of it? I don't know the answer to that but I know that we've got to think about it.

MEMBER CORRANDINI: Right, thank you.

MR. ARAGUAS: That's a good point. As I

started to mention, one of the issues that was raised yesterday by industry was the electronic submittal guidance and this has been a challenge for quite some time now. The staff is very much aware of this issue and has certainly engaged industry over the course of the last two years not specifically on this issue but in several meetings has raised this issue. Currently the staff is coordinating with the Office of Information Services to develop a program to be able to up -- not a program but to update the guidance so that it makes it easier for an applicant to submit information on the docket.

The next item that was raised --

MEMBER MAYNARD: Kind of a caution on that; one of the -- in that consideration, one of the things that causes problems is when you update to later versions and if the NRC doesn't, the industry does or vice versa, that's where you run into a lot of problems where you -- what you're submitting may not be compatible with what the NRC can receive or vice versa. And I think it needs to be taken into account, you know, how are different versions handled and are they locked. And do the specifications say you know, pdf and this version only or whatever.

I think that it's not only what types of

programs but also what versions that have to be taken into account.

MR. ARAGUAS: That's a good comment. The next item that was raised yesterday which seemed to be a common theme amongst the three also was the NRC guidance documents in place during the time of the ESP review. We understand this was a challenge because the RS-002 didn't come out until it was too late.

CHAIRMAN WALLIS: Are you talking about time or length here?

MR. ARAGUAS: Excuse me?

CHAIRMAN WALLIS: Are you talking about time or length?

MR. ARAGUAS: Regarding?

CHAIRMAN WALLIS: Because these are -- are you talking about the length or the time?

MR. ARAGUAS: The time.

CHAIRMAN WALLIS: The time, okay.

MR. ARAGUAS: The point that I wanted to capture regarding the NRC guidance documents is the staff recognizes this was a problem and therefore, as you can see and as I've mentioned already the staff has undergone a significant effort in terms of getting the SRPs up to date, putting out guidance for COL applications, putting out the proposed rule and this

is all going on in a timely fashion to support the COL, the preparation of the COL applications. The other comment that I wanted to point out is this is all being done with the support of industry. They are certainly very much involved in this process and certainly shaping how these documents will look.

MEMBER POWERS: The conclusion I came out of this is that all parties learned a lot from ESP and it's applicable to the COL and the staff deserves high praise for the reacting to it now. And none of this surprised me given the nature of the early site permits which in my mind certainly snuck up on me. It may not have snuck up on the staff and whatnot, but it certainly got sprung on me very early. I mean, I know I scrambled to catch up on reviewing first RS-002 and then recognizing that I didn't know a lot of the background and scrambling there.

MR. ARAGUAS: Right. The last item that I had that was identified by industry and as I was corrected, it's the early site permit review time and why, in fact, it's taken the staff so long to get out an early site permit. The points that I wanted to make on this were the staff recognizes that because these were first of a kind reviews, it could not anticipate some of the issues that arose causing

delays. For example, one was an issue that came on the environmental side and that was the mass amounts of public comments that were received when the staff issued its Draft Environmental Impact Statement. I don't think the staff ever anticipated this level of participation and therefore, was not prepared to handle addressing all these public comments.

Another issue that I wanted to point out that more lies on the applicants was the fact that the staff had built in a review process to review these ESPs in series and this came out of a I don't want to say commitment, but an understanding from industry that these applications would be very, very similar in terms of how they would look and, in fact, when they came in the door, were not similar at all and the problem with that is that you really couldn't gain any efficiencies in trying to review these applications in a series. And I think the staff was attempting to take this approach because of the lack of resources in terms of the reviewers to review these applications.

So that I think was one of the challenges the staff saw on the part of industry. Another was the fact that -- and this was raised yesterday, regarding the submittal of new methodologies. The staff schedules, as they stand now, are built on a

level of understanding that there's no surprises. What we get we've seen. And that's not to say that we won't review it as we have with Clinton. The understanding is that if you want the staff to meet a certain schedule, there shouldn't be any surprises. And in the case of Clinton, as I mentioned, it was really up until the day that we got the application that we were made aware of this new performance based methodology for determining that the safe shutdown earthquake ground motion.

Another issue that we wanted to raise was not so much the fact that RAIs were received late but that there was not timely responses to the RAIs. I think this is something that has been thrown around industry and that they've committed as far as these future ESPs and COLs to getting responses in at least within 30 days to support the staff's shortened review times. And I think the point of this that I bring here is not necessarily to put the onus on industry but it was a combination of both staff and industry problems throughout the review that I think have been correctly identified now in the process of developing shorter review times for any upcoming ESPs and especially with the early site permit application that we have in house and that's for the Vogel site.

Currently the staff has put together a 21-month review schedule and that's to issue the FSCR and the FEIS and that's taking into account that there's these expectations that have been clearly indicated to the applicants that they submit high quality applications and that they don't attempt to submit applications with new proposed methodologies for the staff to review. As I mentioned again, we don't discourage that from the standpoint if they want us to review it, we will but expect schedule delays.

And I think that's all I have in terms of what was captured yesterday. Any other questions?

MEMBER MAYNARD: I think I would agree with you that both parties, the NRC staff and the licensee, have some improvements that they could make on time for the review, different areas there. I would caution you, you seem to put probably most of it on the industry. It's not going to help you guys improve your process if you don't take a little bit harder look at within the agency as to how these things are being handled and managed there, because I think the industry would have maybe some different views on some of the things that you brought up there, but I still think that three years is too long for this type of review on something that is a -- really

a fairly small part compared to the overall licensing process that's going to be coming up soon.

So I think that there's still some lessons to be learned there and I would focus more on what the staff can be doing internally to change their processes and what -- and one of the areas that I haven't seen -- some of the things that generated RAIs and some inconsistencies in applications, I think, some of the guides that's being developed as we went along and some of the interpretations. Also some of the guidance documents and some of the regulations had some wording in it that made it somewhat difficult, took some time to get around that. Those are some areas to be taking a look at as to in some cases it's better to change the guidance document or the branch technical position than it is to spend a lot of time trying to figure out a way to get around that. So I think there's opportunities there.

MR. ARAGUAS: Correct. And I think the staff agrees with you and I think that the gist of my presentation or the staff's presentation was mainly identifying the issues that the staff had in terms of its not having sufficient guidance out there. And so we recognize that there are a lot of problems in terms of where the staff certainly contributed to schedule

delays and I think those have been captured here. I just -- my point was to also capture that it's a combination. As you said, it was both parties and just to point out one fact how industry contributed to that problem as I felt that the staff had already acknowledged what its problems are and how it plans to address those.

MEMBER POWERS: Any other comments?

MEMBER ABDEL-KHALIK: I guess I'm concerned about the internet data issue. This seems like a generic problem and the issue then is how does one assure the fidelity of the data and consistency with the primary source? Is the concern that over time the primary source of the data will disappear and we will only have what's available?

MEMBER POWERS: What's certain is the internet is becoming the primary source. There would be no -- there will be nowhere, anywhere a hard document that you can put your hand on.

MEMBER ABDEL-KHALIK: Well, it doesn't have to be a hard document. It can be an electronic document, but nevertheless, it's still a primary source that's verifiable by the originator of the data.

MEMBER POWERS: Well, it may be the

solution --

MR. ARAGUAS: Can you provide some clarification?

MEMBER POWERS: Yeah, you may have identified a solution but it's --

MEMBER SIEBER: It's not there now.

MR. ARAGUAS: Paul, could you shed some light on what our concern is in terms of internet data?

MR. PRESCOTT: This is Paul Prescott. The concern started with us right with the first applicant, Dominion, and again, keep in mind, we're focused from a quality assurance standpoint, not from a technical standpoint of the information that the data is supplying to whatever technical reviewer is going to look at it from the staff and however the licensee is going to use it. What we were looking for, we essentially outlined.

Our concern was some of the concerns that were expressed by you, could the data have been tampered with because the internet is not fool-proof. Another concern was from a legal standpoint that ESPs are considered something that goes through hearing space and so what are the current legal requirements that are placed on internet data used in legal

proceedings. And what we found is that at least for most of the -- for most of the internet data that we were concerned about from a safety standpoint, most of that data could be certified by the outfit that was supplying it.

Like a lot of the governments like NOAA and the Census Bureau, they will actually certify that their data is authentic, thank you, is authentic and what Dominion did and a number of the other ones was that the data that could be certified they actually went through the process to get it certified and insure the integrity of the data.

Now, there was some concerns with -- especially with population data for local population, density requirements, like county data. Our concern there was that at least -- that somebody technically competent in that area review the data to insure that it appeared at least to be adequate because we had concerns that data like that could easily be corrupted from various outside sources. So -- and so these were the controls that at least from a quality assurance standpoint that we put in place for us to have some level of confidence that what the staff was getting was good information.

MEMBER POWERS: And again, I don't think

there's any problem with these applications at all. I mean, I think everybody was very conservative. The internet is still moving to this process. I foresee in 20 years it becoming a bit difficult.

Any other comments you'd like to make? I think Chris has done a marvelous job of summarizing the major points.

MR. ARAGUAS: Thank you.

MEMBER POWERS: And I think the staff's reacted appropriately to this lesson. What the ESP provides is a predicate to the COL process which has -- as Maynard just pointed out, is only Chapter 2 of the COL process. So we have a lot to do in the COL but I think this has been a worthwhile exercise. I also note that the industry, too, feels that the early site permit was a useful introduction to what the COL is going to look like and, yes, there are going to be challenges in getting this to be as timely as we'd like and whatnot. If there are not other comments, I'll turn it back to the Chairman.

CHAIRMAN WALLIS: Thank you very much. We seem to again have gained a great deal of time, which amounts in this case to a half an hour and we're not allowed to proceed with the next item on the agenda. So we will take a break until 12:45 and you will have

an opportunity to review this Monticello draft.

We also have I believe, a draft on the EDO response on the security matter which you have to treat a little bit more carefully, but if you're interested in that matter, you can contact Eric Thornsberry and look at it ahead of time. I think those are the only drafts which are available at the moment.

MEMBER BONACA: Just a comment on that is that it's a rough first draft because we need to hear a response but I think that the elements are all there. All it needs is a concluding statement at the end.

CHAIRMAN WALLIS: So we'll take a break until 12:45.

(Whereupon at 11:17 a.m. a luncheon recess was taken until 12:45 p.m.)

CHAIRMAN WALLIS: On the record. So please come back in session, the afternoon session, of the first day. The next item on the agenda is the draft final revision to 10 CFR 50.68, Criticality Accident Requirements. I invite my colleague, Sam Armijo, to get us going on this one.

MEMBER ARMIJO: Thank you, Mr. Chairman. The Committee will consider a proposed final rule to

amend 10 CFR 50.68 so that the requirements governing criticality control for spent fuel pool storage racks do not apply to the fuel within a spent fuel transportation package or a storage cask when these packages are in the spent fuel pool. The Committee was given the package at the last meeting. We didn't have time to really consider it or meet as a subcommittee. So the decision was made to have it presented at this meeting. The presenters will be Tom Martin of NRR and there will be comments from Mr. Kraft of NEI. I believe he is here. So Tom.

MR. MARTIN: I would like to turn it over to Mr. George Tartal, the Project Manager, to begin the presentation.

MR. TARTAL: Thank you. This ACRS briefing is on NRR's rulemaking activity to amend 10 CFR 50.68 titled Criticality Accident Requirements. I'm George Tartal. I'm the Project Manager for this rulemaking activity. I work in the Regulatory Analysis, Policy and Rulemaking branch in the division of the Policy and Rulemaking in NRR. As you heard a moment ago, Tom Martin here is one of my co-presenters. He's the Division Director, Division of Safety Systems in NRR and to my far right is Meraj Rahimi who is the Senior Project Manager from the

Licensing section of the Spent Fuel Project Office in NMSS. Together we'll be presenting on various slides throughout the presentation sort of as a team approach as we did in developing the rulemaking package.

These first few slides will give a brief overview of the topics we'll be discussing in more detail during today's presentation. Criticality accidents are prevented or controlled in accordance with Parts 50 or 70 for fuel in a spent fuel pool, Part 71 for fuel in a transportation package and Part 72 for fuel in a dry storage cask. These are --

CHAIRMAN WALLIS: I would hope that most of the time they're prevented.

MR. TARTAL: It depends on which regulation you're talking about. We'll go into those in a little more detail shortly, so bear with me. So these are the current regulations regarding fuel criticality.

Now in 2003, a question arose regarding which regulation or regulations apply to fuel being loaded into a dry storage cask while the cask is submerged in a spent fuel pool. The NRC determined that licensees must meet the requirements of Part 50 and Part 72 when loading casks in a spent fuel pool and this determination was documented in the form of

a RIS in March of 2005. The NRC did not intend to create overlapping requirements between Part 50 and Part 72. That wasn't the intent when 50.68 was written in 1998. However, this is the current state of criticality accident requirements for fuel within a cask in a spent fuel pool.

Now in order to comply with the Part 50 requirements --

MEMBER APOSTOLAKIS: I think just an explanation.

MR. TARTAL: Yes.

MEMBER APOSTOLAKIS: When you are asking people to meet both requirements, what was the thinking? That they are complimentary? How can you say you did not intend to create overlapping requirements?

MR. TARTAL: Well, when 50.68 was written back in 1998 it was written as an alternate means of meeting Part 70. An alternate means of meeting Part 70, that's right. So the intent wasn't to overlap between 50 and 72 when we wrote the rule.

MEMBER APOSTOLAKIS: Okay.

MR. TARTAL: So to --

CHAIRMAN WALLIS: So presumably it's not critical by either analysis.

MEMBER APOSTOLAKIS: That's correct.

MR. TARTAL: Yes.

CHAIRMAN WALLIS: Okay. So it doesn't really matter which one you use.

MR. TARTAL: Different assumptions.

MEMBER APOSTOLAKIS: Right. Different assumptions.

CHAIRMAN WALLIS: But the answer is the same. Right?

MEMBER SIEBER: Hopefully.

MR. TARTAL: Yes.

MEMBER APOSTOLAKIS: What do you mean the answer? There is no answer. If you meet, if you satisfy these requirements, then you are subcritical.

MEMBER ARMIJO: Right. That's the answer.

MEMBER APOSTOLAKIS: Yes. No, no. It doesn't tell you how much.

MEMBER ARMIJO: Go ahead. Keep going.

MR. TARTAL: So to comply with the Part 50 requirements, licensees basically have two options. One is to perform an additional criticality analysis and amend their tech specs or they could (2) receive an exemption from 50.68. So those are the current options for licensees, either meet the regulation or be exempt from it.

MEMBER KRESS: Generally, the fuel in the cask is denser in the sense that the rods are closer together, more of them.

MR. TARTAL: Yes.

MEMBER KRESS: Than rods in a pool. So that's where you get a kind of a different --

MR. MARTIN: It would be a different pitch, a different analysis that would be required if there -- There would be a separate analysis that has been done for the fuel in the cask that's separate from the analysis of the pool because of the configuration, the geometry change.

MR. TARTAL: Our position is that this additional criticality analysis is unnecessary to protect public and health and safety since the required analyses for fuel in the spent fuel pool under Part 50 and for fuel in a dry storage cask under Part 72 are adequate to ensure safe movement of the fuel.

CHAIRMAN WALLIS: So putting the cask in the fuel doesn't make any difference to the criticality of the fuel within the cask.

MR. TARTAL: The point is there are regulations covering the cask whether it's in the pool or out of the pool.

CHAIRMAN WALLIS: The leakage and all that.

MEMBER KRESS: But when the criticality analysis for just the cask. They assume it's surrounded by water?

CHAIRMAN WALLIS: Yes, they find out that leakage is a reflection --

MR. TARTAL: We'll get into that.

MEMBER KRESS: Okay.

MEMBER APOSTOLAKIS: They are considering all their scenarios.

MEMBER ARMIJO: There are different assumptions that can be applied when it's dry. Transportation casks can be flooded, but apparently the dry storage casks can not be flooded. So these are very -- You know there are a lot of variations in here that kind of confuse.

MR. MARTIN: An assumption as part of the dry storage cask is not that it would be permitted to be flooded with pure water. An assumption as part of the spent fuel pool is that the spent fuel pool should tolerate a dilution event so that the fuel will still remain subcritical even if --

MEMBER SIEBER: Pure water.

MR. MARTIN: -- you have pure water in the

spent fuel. You lose boron in the spent fuel pool. So for the period of time that you have a dry storage cask in the spent fuel pool where the dry storage cask has an assumption of you either dry with no moderator or full of boron, those casks haven't been analyzed to ensure that they can remain subcritical with --

MEMBER SIEBER: Pure water.

MR. MARTIN: -- pure water.

CHAIRMAN WALLIS: So there is something different about putting it in the pool.

MR. MARTIN: There is something.

CHAIRMAN WALLIS: Could it get pure water in it in the pool?

MR. MARTIN: Pardon me?

CHAIRMAN WALLIS: Could it get pure water in it? Could the cask have pure water?

MR. TARTAL: We're going to get into that.

MR. MARTIN: There are a couple of scenarios that you could get into that and that's at the crux of the issue.

CHAIRMAN WALLIS: You're going to address that. Okay. So that is the crux.

MR. MARTIN: And we're going to get into that, some assumptions.

CHAIRMAN WALLIS: I'm bothered by your

assumptions. I guess you're considering different situations rather than making some answers or assumptions. You're considering different situations, different situations where there is or is not water and there is or is not boron. Those to me are different situations. Assumptions are things you do to get on with the analysis.

MEMBER ARMIJO: There are different situations and different assumptions.

CHAIRMAN WALLIS: I see. I guess this will all become clear.

MR. TARTAL: And the regulations are different as well. So we'll get into that shortly.

MEMBER CORRADINI: Just to clarify since I'm a bit new to this. So your point is that what is going to be suggested for the elimination that it's unnecessary that you're getting to, the last bullet you had just said.

MR. TARTAL: Yes.

MEMBER CORRADINI: So you're going to get to how you're going to resolve this unnecessary requirement.

MR. TARTAL: We're going to describe the technical basis for the rulemaking and how we came to that conclusion.

CHAIRMAN WALLIS: And you're going to be convincing.

MR. TARTAL: We hope so. The cost to licensees to comply with this is considerable and by considerable, we're talking on the order of several hundred thousand dollars per request as we heard from the industry.

CHAIRMAN WALLIS: You don't just put something into a computer and get an answer?

MEMBER APOSTOLAKIS: For heaven's sake, let them speak.

CHAIRMAN WALLIS: It costs hundreds of thousand dollars to do an analysis?

MR. TARTAL: You have to submit it for review as well at the cost to the licensee.

CHAIRMAN WALLIS: Ah, that's the cost. Okay.

MR. TARTAL: There are a lot of things involved in this cost.

CHAIRMAN WALLIS: Okay.

MEMBER ARMIJO: Is the exemption as expensive as the analysis?

MR. TARTAL: It's still on that order. I don't remember the exact numbers. I believe we put the numbers into the rulemaking package. I don't

remember them off the top of my head.

MR. MARTIN: But we would prefer not to regulate by exemption.

MEMBER ARMIJO: Of course.

(Several conversations at once.)

MR. MARTIN: And this is a situation where we would require exemptions in many, many cases. So rather than have a continual process of exemptions, it's apparent that we have to change the regulation.

MR. TARTAL: So the solution here is to change the regulation and that's the subject of our presentation to the Committee today. The purpose of the rulemaking is to reduce regulatory burden by regulating the criticality fuel loaded in a package or cask exclusively under Part 71 or Part 72 and the rulemaking clarifies the boundary between Part 50 and Part 71 or 72 for criticality accident considerations.

CHAIRMAN WALLIS: So this is reducing burden while preserving public safety.

MR. TARTAL: Yes. So I'm going to turn the presentation over to Tom Martin.

MR. MARTIN: Slide No. 5, as an overview, the regulations that relate to criticality controls for storage of fuel are 10 CFR 50.68 and General Design Criteria, the GDC 62 and 63. The regulatory

framework established by these regulations emphasizes the prevention of an accidental criticality and the capability to detect one should it occur. General Design Criteria provide high level expectations for design of fuel storage systems. 50.68 provides specific limitations on the reliance of soluble boron for criticality control.

Criticality safety requirements. 50.68(b)(4) requires that the analysis demonstrates that subcriticality is maintained in an unborated condition. In general, specifically in 10 CFR 50.68 requires that K-effective be maintained less than 0.95 with boron and less than one without boron. Having soluble boron --

CHAIRMAN WALLIS: Less than one by how much?

MR. MARTIN: Pardon me?

CHAIRMAN WALLIS: Less than one by how much?

MR. MARTIN: Less than one, as long as if you take credit for boron in the pool.

CHAIRMAN WALLIS: 0.9 recurring is acceptable?

MR. MARTIN: If you -- There's a 95/95 requirement on 0.95 K-effective with boron, however

the regulation is it just says less than one --

CHAIRMAN WALLIS: That's all it says.

MR. MARTIN: -- under accidental conditions. There is nothing less than --

CHAIRMAN WALLIS: There is no margin of uncertainty or anything? One is okay.

MR. TARTAL: There is the 95/95 on it.

MR. MARTIN: It's still at 95/95 on less than one.

CHAIRMAN WALLIS: On less than one.

MR. TARTAL: Yes.

CHAIRMAN WALLIS: So there's a finite probability of being more than one.

MR. MARTIN: -- and k-effective must remain below one at 95 percent probability/95 percent confidence level.

CHAIRMAN WALLIS: So there is a finite probability of it being more than one. Right? That would seem to me there's a finite probability of it being more than one.

MEMBER POWERS: That's what it means.

CHAIRMAN WALLIS: Yes.

MEMBER POWERS: Not for long though.

CHAIRMAN WALLIS: Not very much.

(Off the record comments.)

MEMBER KRESS: Yes, it will take of that.

MR. MARTIN: Generally, the water in the spent fuel pool is borated to around 2300 bpm boron and to go from that level of boron to --

CHAIRMAN WALLIS: To one. Takes some doing.

MR. MARTIN: -- to no boron, it would be a very big challenge to do.

CHAIRMAN WALLIS: Right.

MR. MARTIN: Okay. Let's go to the next slide please.

MEMBER ARMIJO: Before you leave that, what are the additional controls you have for fresh fuel?

MR. MARTIN: Fresh fuel is generally stored dry. However, when it is placed in the fuel before it goes into the vessel, it's controlled in terms of the locations in the spent fuel pool to ensure that the --

MEMBER ARMIJO: So the fresh fuel is spread out in the pool.

MR. MARTIN: So the fresh fuel is spread out amongst the other assemblies in the pool. Correct. Meraj.

(Off the record comments.)

MR. RAHIMI: What I would like to do just briefly is go over the transportation storage criticality safety requirements. Transportation criticality safety requirements are under Part 71, specifically Part 71.55 and 71.59. They provide, establish, the requirements for transportation packages under normal and accident condition for single and an array of packages.

CHAIRMAN WALLIS: Does this apply to fabricated fuel or to -- No, it applies to new fuel too.

MR. RAHIMI: Yes, those are --

CHAIRMAN WALLIS: For fabricated fuel. It's not the ingredients. It's not the transportation of the uranium or enriched uranium. It's fabricated fuel it applies to.

MR. RAHIMI: It could be. Those criticality safety requirements is for transporting any kind of the fuel, pellets, fuel assembly, fuel rods, fissile material.

CHAIRMAN WALLIS: So material not even fabricated. Okay.

MR. RAHIMI: Right.

CHAIRMAN WALLIS: Thank you.

MR. RAHIMI: The requirements in there

under Part 71.55 and 17.59, they are for non-site specific. Those are general requirements for general cask design, that they have to satisfy those requirements and under Part 71, there is, the criteria, a little bit more specific with respect to presence of moderator in the containment system of the package. Specifically under 71.55(b), it does state that if water were to enter the containment system between fuel assembly, it means between the fuel assembly, that with fresh water, fresh water intrusion, the package must remain subcritical.

CHAIRMAN WALLIS: Presumably it's all light water.

MR. RAHIMI: Yes. Well, no. Actually we -- They are required to look at the variation of water density as a function of hydrogen. Yes, they look at the range of "the most optimum moderation." Those are the words. So it could be the heavy water. It could be light water.

(Off the record comments.)

PARTICIPANT: -- light water, not detorium.

MR. RAHIMI: Not detorium (PH) no.

PARTICIPANT: No.

MR. RAHIMI: So with that respect, 71.55

is kind of consistent with the Part 50.68 specific requirements that the scenario they have under boron dilution meaning fresh water that remains subcritical. So with respect to transportation packages, there is no problem. But we're including those transportation packages in the rulemaking in order to define clearly that when the transportation packages or storage casks are in the pool, the requirements for those under Part 71/72, they apply to the casks, the fuel in the casks.

MEMBER ARMIJO: Under this regulation, does the transportation -- Does a rule allow a credit for burn-up on spent fuel for the transportation cask?

MR. RAHIMI: Okay. The rule is not specific, but in the implementation of the regulation the staff considers what's the most creditable conditions and historically in the implementation of Part 71, we have allowed, at this point, we allow actonite only credit but not all the fission products. We would allow that if the applicant comes in with the data and proves in terms of benchmarking that they know the isotopic content of the fuel, they know very well, they have quantified all the uncertainty with respect to cross-section of these isotopes, neutron cross-section of these isotopes, so it depends on the supporting data, we would give credit, burn-up credit.

CHAIRMAN WALLIS: Now you say it's subcritical if water leaks in and fills the cask. Right?

MR. RAHIMI: Yes.

CHAIRMAN WALLIS: Doesn't it make a difference if there's water outside the cask too? It makes a slight difference but it could be significant if you're talking about less than one or not.

MR. RAHIMI: Under our --

(Court Reporter comment.)

MEMBER SIEBER: It makes a little difference.

CHAIRMAN WALLIS: It makes a little tiny difference, doesn't it?

MR. RAHIMI: Yes.

CHAIRMAN WALLIS: It's a reflection from outside.

MR. RAHIMI: Right.

CHAIRMAN WALLIS: But is that part of the rule or not?

MR. RAHIMI: Yes. The regulation says --

CHAIRMAN WALLIS: It is. So it's submerged in water, too.

MR. RAHIMI: Yes, the regulation says "reflection by water, water intrusion" all scenarios.

CHAIRMAN WALLIS: Everything.

MR. RAHIMI: Everything they have to consider. So what's the most reactive configuration.

Now moving on to the next slide, now Part 72 regulation.

CHAIRMAN WALLIS: Presumably including being next to the next cask.

MR. RAHIMI: I'm sorry.

CHAIRMAN WALLIS: Presumably being adjacent to another cask, too.

MR. RAHIMI: That's right. Actually under 71.59 is array of packages they need to look at and an array could be more reactive than a single package. So they are supposed to look at all connecting configurations and under Part 71 with respect to the criteria is the 0.95 k-effective. That's the limit we set.

MEMBER APOSTOLAKIS: Under which? I thought it was 50.68 that has that.

MR. RAHIMI: No, I'm talking about Part 71/72 what the criticality safety requirements are under Parts 71/72. But you're right. Under 50.68 they have one scenario that if you lose all the boron in the pool, all you have to show is that you're just below one. But they still have that 0.95 limit with

the boron that they take credit for.

MEMBER APOSTOLAKIS: That's in 68.

MR. RAHIMI: That's correct. That's in 68.

MEMBER APOSTOLAKIS: If I look at 72, am I going to see anything like that?

MR. RAHIMI: No, you're not going to see that.

MEMBER APOSTOLAKIS: No. That's what I was saying.

MR. RAHIMI: You're not going to see it. Under 72, again 72, the criteria is -- That's the next one. Yes. The criteria are not very specific. They are more general criteria, the criticality safety requirements under Part 72. But you will see it has to take two unlikely independent changes before criticality can occur. Those are the criticality safety requirements under Part 72.

CHAIRMAN WALLIS: It changes its geometry that they are --

MR. RAHIMI: In addition, yes.

CHAIRMAN WALLIS: -- drops that the fuel doesn't move in any way.

MR. RAHIMI: Right. Under Part 72, there are scenarios that they look at tip-over, cask tip-

over. Those are part of the scenarios they look at, but under Part 71, they look at the 30-foot drop. So under Part 71 transportation, there are very stringent requirements in terms of fire, drop, puncture. But you go to the Part 72, what you have in terms of the configuration or change in configuration, you have the cask tip-over.

So this Part 72, the criticality safety requirements, those are the general requirements.

CHAIRMAN WALLIS: What these margins require which take of it being less than one to some degree, isn't it?

MR. RAHIMI: Yes.

CHAIRMAN WALLIS: The margins require.

MR. RAHIMI: Yes, under Part 72, our margin is five percent.

CHAIRMAN WALLIS: Right.

MR. RAHIMI: Our design criteria is 0.95.

CHAIRMAN WALLIS: But it gets you away from being on the edge. Right?

MR. RAHIMI: Yes. Our subcriticality, you know, limit is 0.95. It cannot be more than 0.95 including all the uncertainty biases.

MEMBER APOSTOLAKIS: This sub-bullet two "unlikely independent changes before criticality can

occur," can you elaborate a little bit on that?

MR. RAHIMI: Sure. Under Part 72, it's a double contingency principle. I mean that's what it stems from and it says, basically what it means, that the design has to be in such a way that it shouldn't go critical with the first event, unlikely event. It has to take a second unlikely event in order for it to go critical, meaning what you design for, let's say, during loading in the pool, for example. One of the first -- The requirement is in the text like for the 72 cask, there has to be a minimum boron concentration level in the pool before they can commence loading and unloading. And that is one of the events, let's say, and normally they take two independent measurements to satisfy sort of this double contingency that indeed if the first person messed up on the first measurement, you know, it was the boron concentration was lower than it was supposed to be --

MEMBER APOSTOLAKIS: No, but I thought it meant something else.

MR. RAHIMI: Okay.

MEMBER APOSTOLAKIS: That the boron concentrate has to be greater than a number.

MR. RAHIMI: That's correct.

MEMBER APOSTOLAKIS: And that if it goes

below, that's one of the unlikely event and something else.

MR. RAHIMI: That's right.

MEMBER APOSTOLAKIS: But you're saying no. You're monitoring it with two different independent means, that boron concentrate.

MR. RAHIMI: Right.

MEMBER APOSTOLAKIS: And these independent monitoring activities must fail. Is that what you mean?

MR. RAHIMI: In addition to this, yes, we have a criticality monitoring requirement under Part 72.

MEMBER APOSTOLAKIS: No, but what are the two independent changes? That's what I don't understand because this is so fuzzy.

CHAIRMAN WALLIS: I think he hasn't gotten to it yet.

MR. RAHIMI: Right. Well, no. This is a slide to discuss. This is the --

CHAIRMAN WALLIS: The two different measurements aren't the independent changes.

(Several speaking at once.)

PARTICIPANT: The geometry change.

MEMBER BONACA: Now I'm thinking that

there are two, I'm really anxious to hear about this example.

MEMBER APOSTOLAKIS: Yes, I'm looking for an example too.

MEMBER BONACA: I suppose --

CHAIRMAN WALLIS: What is the other independent change?

MR. RAHIMI: If you lose -- I mean historically what we've been relying on again is those two measurements of the boron concentrate.

CHAIRMAN WALLIS: Those are the two independent changes.

MEMBER APOSTOLAKIS: Yes. That's not what I understood.

CHAIRMAN WALLIS: That's not what I understood either. No.

MEMBER APOSTOLAKIS: I thought if there is for some reason the bottom concentration becomes too low, something else also must happen for the criticality to be achieved. You're saying no, no, that event by itself can lead to criticality but I have two independent means of making sure that it will not happen.

PARTICIPANT: Right.

MEMBER APOSTOLAKIS: And the whole thing

comes from the fact that the word "change" is not well defined.

MEMBER BONACA: That's right.

MEMBER ARMIJO: In contrast to the transportation cask for moving spent fuel, the transportation cask will remain subcritical even if it's flooded with pure water --

MR. RAHIMI: That's correct.

MEMBER ARMIJO: -- and surrounded with pure water. So it has enough poison built into the structure that it's going to be okay no matter what.

MR. RAHIMI: That's correct.

MEMBER SIEBER: In case it falls into the river.

MEMBER ARMIJO: Right. Now the dry storage cask, does it not have the same amount of structural boron in there to achieve the same goal in fresh water?

MR. MARTIN: It's not analyzed for that.

MR. RAHIMI: Right. It's not analyzed for that but although at the same time, this fuel that we're talking about that these are the burned fuel and we're not relying on the fact that the fuel is burned, they assume the fuel is fresh under storage even. That boron concentrate that is needed, it is for the

fresh fuel configuration. So you have that other factor that we don't take into account. The fact that the fuel is burned but we may assume the fuel is fresh and --

CHAIRMAN WALLIS: A big difference.

MR. RAHIMI: Yes, and the boron concentrate is based on that.

MEMBER APOSTOLAKIS: Okay. So you want a k-effective less than 0.5.

MR. RAHIMI: 0.95. Oh, what I'm saying, no. I said that typically when they're on the pad, they're dry. You look at the k-effective. There is substantial margin. The only time when it's submerged in the pool, that's when you sort of approach into it.

MEMBER SIEBER: Submerged in any place.

MR. RAHIMI: I mean that number, I'm just giving typically just -- That's what the k-effective is when it's dry.

MEMBER APOSTOLAKIS: Okay.

MR. RAHIMI: When it's sitting on the pad.

MEMBER APOSTOLAKIS: Okay. So all these things are valid.

MR. RAHIMI: Okay. So again --

MEMBER APOSTOLAKIS: This was -- This document was --

PARTICIPANT: You just keep going.

MEMBER APOSTOLAKIS: I should respect my own advice. Okay. Go on.

MR. RAHIMI: Okay. So when the loading of the storage casks for transportation packages, again I mean the regulative language for transportation, we use package and package is really the cask and the content, we call it package, when it's submerged in the pool actually that is when the reactivity is increased due to the moderation and that's when the margins are decreased. And normally, these casks, these storage casks or transportation packages, they are licensed, you know, based on generic analysis, generic information about the fuel and I guess as I alluded earlier that the burn-up credit is available to an applicant if they want to take credit for it provided they have the supporting benchmarking, meaning they can quantify all the biases and uncertainties that are associated with burn-up credit in a cask environment, not at the reactor core, in the cask environment because it's a total different environment or a different temperature from the reactor core, the cross-section function of temperatures. So it is different.

So under those conditions since

historically the vendors, you know, I guess they found it cumbersome to have all that data. The most straightforward path was credit for the boron that was in the pool that they could satisfy. They said these are the storage only casks. They said we're not going to use them for transport. Therefore, we shouldn't assume fresh water in there. So there is boron. As long as we put a minimum boron concentration requirement as far as tech spec for Part 72, we have satisfied the criticality safety requirement for Part 72. And historically, we've allowed that for the vendors to rely on the boron because we believe that the boron dilution scenario during cask loading, the likelihood is low.

MEMBER ARMIJO: But you also know that there's burn-up on that fuel.

MR. RAHIMI: That's correct.

MEMBER ARMIJO: You're not taking credit for it. Do you have any -- So you have a real advantage, but you're not taking account of that or crediting that in your analysis.

MR. RAHIMI: That's right. It goes back. It's more like a defense in depth that I know is, boron is in there.

MEMBER CORRADINI: If I -- I guess I'm

new to this again, but I'm confused and I'm getting more confused. So is there somewhere that I can look, not now but later, that I would have a little chart that said in the pool on the transportation system in the dry cask the initial conditions that are real and then must be assumed by the licensee. Because as you explain it, the assumptions are different in every different situation.

PARTICIPANT: Right.

MEMBER CORRADINI: And they're not consistent and I don't -- I'm not -- Maybe I'm just too new to this. I'm not catching it. So is there somewhere where this is laid out in some simple or at least on one page way so that --

MEMBER ARMIJO: Michael. I want to apologize. There is as a matter of fact, but it may not be accurate. It was so murky for me that I made a little Excel spreadsheet for each of these things and when the time comes, I'll just pass it around so we can kind of have all our facts in front of us.

MEMBER CORRADINI: Okay.

CHAIRMAN WALLIS: This is my problem too. What's the difference? I said it a long time ago. What's the difference between there's a real situation you're analyzing and the assumptions you're making

which sometimes make it more conservative and so on. To separate those two is sometimes difficult.

DR. RYAN: If I may, can I just chime in with a second to the question? One of the things that strikes me is when you're loading fuel in a pool cask or in a pool in a cask, the strategies that you're using that cask for might be completely different than the strategies you use for transportation. So for that reason, the loading could be completely different and I'm sitting here listening to the discussion trying to think about what's the range of criticality loading that could occur in transportation versus in the pool in the same cask. So I think I'm asking the same question a slightly different way, but I'm a little bit stuck too.

MR. MARTIN: From my perspective, the biggest concern is with the Part 72 issue on the dry storage cask that is not analyzed to be filled with pure water and then the likelihood when you're in the spent fuel pool for the spent fuel pool to become pure water and we're going --

CHAIRMAN WALLIS: I hope I'm never in the spent fuel pool.

MR. MARTIN: Pardon me?

CHAIRMAN WALLIS: You said when you're in

the spent fuel pool.

MR. MARTIN: When the cask is.

(Several speaking at once.)

MR. MARTIN: When the dry storage cask is in the spent fuel pool and then for that to turn into fresh water and what's the likelihood of that and even if that were to happen, would the fuel become critical because it's burned up? Now we have -- There have been a variety of analyses that have been done so far and I have some notes here indicating for relative initial percent uranium-235, say roughly, an initial fuel load of about four percent uranium-235 burned up at around 42,000 gigawatts days per metric ton, the expectation would be that that would not --

MEMBER POWERS: 42,000 gigawatt days per ton?

MR. MARTIN: Per initial --

MEMBER POWERS: That's a bunch.

MR. MARTIN: I'm sorry. 42,000 megawatt DAIS per metric ton. The expectation would be, or 42 gigawatt days per metric ton, the expectation would be that that fuel would be subcritical.

CHAIRMAN WALLIS: There might be cases where you would unload earlier for some reason.

MR. MARTIN: There might be cases where

you would unload for some reason and there could be under a worse scenario a cell of relatively fresh fuel that could occur.

MEMBER SIEBER: Yes, damage.

MR. MARTIN: It's possible but unlikely.

MEMBER SIEBER: If you get damage, you might have to move that fuel around or ship it someplace.

MR. MARTIN: Move that fuel around, ship it someplace or put it, zone it even within the cask to ensure you could maintain an optimum configuration to minimize the reactivity.

MR. RAHIMI: Okay. Yes. I'm sorry. Did you have a question?

MEMBER APOSTOLAKIS: Just one last question.

MR. RAHIMI: Sure.

MEMBER APOSTOLAKIS: The issue of burn-up arises only in the context of 50.68. Is that correct?

PARTICIPANT: No, in 71 also.

MR. RAHIMI: Burn-up credit.

MEMBER APOSTOLAKIS: Burn-up credit is only in 68.

MR. RAHIMI: Burn-up credits is under 50.68. Yes, that's one of the assumptions that you

use up burn-up credit under 50.68.

MEMBER APOSTOLAKIS: Okay. So you don't get credit for it.

MR. RAHIMI: The credit on the Part 71/72 is available but not to the extent that it is available under Part 50.68.

MEMBER APOSTOLAKIS: But that's not what the documents says though. That's why I'm confused.

MR. RAHIMI: Well, I will go later on to talk about burn-up credit, the differences with the 50.68 and 71/72 with respect to burn-up credit.

MEMBER APOSTOLAKIS: 10 CFR 72 was in part predicated on the assumption that spent fuel without any burn-up would remain subcritical when stored dry in a cask and remains subcritical when placed in a cask in a spent pool fuel at the commensurate power reactor.

MR. RAHIMI: Yes.

MEMBER APOSTOLAKIS: Implementation of Part 72 relies on soluble boron rather than on burn-up to assure subcriticality.

MR. RAHIMI: That's correct. Yes.

MEMBER APOSTOLAKIS: I have digested that. Now you're changing it.

MR. RAHIMI: No. What you just digested

was correct under Part 72. Yes, they assume the fuel is fresh.

MEMBER APOSTOLAKIS: Okay. And the way you're going to modify the Rule 68 you will add a paragraph C that will say this rule doesn't apply to casks in the pool.

MR. RAHIMI: Yes.

MEMBER APOSTOLAKIS: Therefore, they cannot, they will not address the issue of burn-up. They will satisfy 72.

MR. RAHIMI: Yes.

MEMBER APOSTOLAKIS: Now you mentioned that they may want to do it, but then that would be - that would deviate from whatever the practice is and you guys would have to review the whole thing from the beginning. Right?

MR. RAHIMI: In partial. Right now, the licensing basis for granting those Part 72 licenses is boron, soluble boron, credit.

MEMBER APOSTOLAKIS: You rely on boron?

MR. RAHIMI: Yes.

MEMBER APOSTOLAKIS: Okay. Now I'm back to understanding.

MR. RAHIMI: Okay.

CHAIRMAN WALLIS: The only way you get rid

of the boron would be some sort of catastrophic flood or something.

MR. MARTIN: Well, we'll get into that. That's right. There's basically a slow scenario and a fast scenario and catastrophic flood is possibly from a seismic event or a --

CHAIRMAN WALLIS: Or a dam breaks or something. You know there are ways which you can flood everything with a lot of water.

MR. RAHIMI: Okay. So I would like to end this slide by saying that at the end for the Part 72 licenses that the reliance on solid boron is made to maintain subcriticality and these are normally for early storage casks that was licensed, they didn't have poison plates, or newer casks that they are high capacity, high density casks like a 32 P. But if you look at normally what has been loaded, there are 24 PWRs. They have flux draft design in there and normally they haven't needed to rely on the solid boron in the pool. So those are the instances you were talking about.

I guess at this point I'll turn it over to Tom.

MR. MARTIN: Okay. Back into the reactor implementation arena. In March 2005, NRR issued

Regulatory Information Summary, RIS 2005-05 to alert licensees of our position that criticality requirements of both 10 CFR 50.68 and Part 72 apply while fuel is located in the spent fuel that's within the boundary of the spent fuel pool.

Before this time, licensees had not been applying these considerations, both of the requirements of 50.68 and of the Part 71/72 requirements. This was intended to clarify the regulatory position and the interpretation that we got on 10 CFR 50.68 that while the cask is within the pool, the regulations of both 50.68 and Part 71 and 72 applied. This then affected the licensees such that they would have to analyze the fuel, conduct an additional criticality analysis and either request an exemption of their technical specification, request an exemption of their license or amend their license to modify it to be in conformance with the requirements.

CHAIRMAN WALLIS: They do have to perform some sort of criticality analysis, don't they?

MR. MARTIN: Yes, they would have had to perform an additional criticality analysis.

CHAIRMAN WALLIS: Using different assumptions.

MR. MARTIN: Using different assumptions

for the --

CHAIRMAN WALLIS: In regulatory space, they're not really a criticality analysis of what's really there. They're doing something with various assumptions. That's different. I guess that's what's different.

MR. RAHIMI: Yes, under Part 50.

CHAIRMAN WALLIS: If they were doing a criticality analysis of what's really there, it would always be the same presumably.

MR. MARTIN: Right.

PARTICIPANT: Or no --

MR. MARTIN: I have to apologize. I was --

MEMBER APOSTOLAKIS: It's a worst case analysis, isn't it? That's what it is. You're assuming you have fresh fuel. You have unborated water. Prove that it is subcritical.

CHAIRMAN WALLIS: There are assumptions that are different in the two cases.

MEMBER APOSTOLAKIS: Yes, the assumptions, but the analysis --

CHAIRMAN WALLIS: But the reality --

MR. MARTIN: They were doing a realistic analysis.

MEMBER APOSTOLAKIS: Realistic analysis. The assumptions --

MR. MARTIN: They were doing a realistic analysis to show that they would be subcritical under the actual conditions if you have pure water in the dry storage sitting in the spent fuel pool. Mr. Kraft, is that correct?

MR. KRAFT: I'm sorry. I'm having difficulty with the ins and outs of the conversations.

(Off the record discussion.)

MR. KRAFT: I apologize. I'm having difficulty following the ins and outs of the conversation.

CHAIRMAN WALLIS: You're the expert, are you?

MR. KRAFT: No sir. I have experts with me, but I will tell, Dr. Wallis, that I think you put your finger right on the nub that there are different methodologies for calculating the same thing.

MR. MARTIN: Right.

CHAIRMAN WALLIS: You're forced to make different assumptions.

MR. KRAFT: Not just that there are different assumptions.

CHAIRMAN WALLIS: But the situation is the

same. Right? The physical situation is the same.

MR. KRAFT: Well, the situations can be different. They're in a cask. You're in a pool. Those are different --

CHAIRMAN WALLIS: Once you define the situation, it's clear what it is.

MR. KRAFT: Yes. And how you calculate --

CHAIRMAN WALLIS: Then you use different methods of analysis. Is that it?

MR. KRAFT: Well, our view is that how you calculate -- The radionuclide doesn't care where it is. It's going to decay the same way. The difference is what geometry and what assumptions you're making for that geometry. That's okay.

CHAIRMAN WALLIS: What assumptions you're required to make. That's the difference.

MR. KRAFT: But if you dig into what NRC requires that you to do or does in their own analyses, they have different methodologies that apply in different geometric settings. Am I wrong about that, Meraj?

MR. RAHIMI: No, you're correct in terms of, yes, under Part 72 that the licensees would rely on the boron. The situation is the same, I mean, the configuration instead of burn-up credit. When you go

to the Part --

CHAIRMAN WALLIS: Methodology, that to me means a different method, I mean, two group theory or something or other different or seven group theory or --

MR. RAHIMI: No, but what Steve means by "methodology," (1) taking into account the burn-up of the fuel. The other method does not.

CHAIRMAN WALLIS: Methodology to me means the way you analyze. We're not talking about that.

MR. RAHIMI: No.

CHAIRMAN WALLIS: We're talking about the assumptions, the variations, of the analysis.

MR. RAHIMI: The assumptions, correct. We're talking about different assumptions under Part 50.68 --

CHAIRMAN WALLIS: Which are in the direction of being conservative. So it's different conservatisms you're talking about.

MR. RAHIMI: That's correct.

MR. MARTIN: And the problem --

CHAIRMAN WALLIS: Is that right, Sam?

MEMBER ARMIJO: The frustration to me is and I'm frustrated because there's reality. The fuel has a certain amount of burn-up whether it's in the

cask, in the pool or in a transportation package. But sometimes you can use it and sometimes you can't. But it's real. It's still there and so the problem I'm having is, and I agree it's bad to do two analyses for very different conditions to apply to the same physical thing, but there is something very confusing about --

What we're supposed to do is assure safety and then the other part of the argument is assure that you mean requirements. Regulatory requirements are not the same thing. So how do we assure safety and the way to assure safety is to work with --

CHAIRMAN WALLIS: If either the requirements assures safety, I don't care which one you use.

MEMBER ARMIJO: Well, maybe and maybe not. But yes.

MR. ROLAND: Can I say something for a minute? My name is Bill Roland. I'm the Deputy Director for the Spent Fuel Project Office for Inspection and Licensing. What I know Meraj and NRR is going to eventually get to is the difference in the way we do the analysis in that for a specific reactor we use the specific fuel design and the specific data that they provide. The Spent Fuel Project Office,

these casks are generically approved so that there's more bounding analyses that has to be performed as a result of that and I know Meraj later on has that on his slide. So we're going to get there.

CHAIRMAN WALLIS: Get to that.

MR. RAHIMI: Yes.

CHAIRMAN WALLIS: Everything will become clear in the last act.

MR. RAHIMI: I hope so.

CHAIRMAN WALLIS: It will all be certain.

MR. ROLAND: We hope, Dr. Wallis. No doubt if it isn't, you'll help us. You'll point that out. Thank you.

MEMBER SIEBER: The point is they're trying to simplify the regulation.

MR. RAHIMI: Yes. Correct. Simplify the application.

MEMBER APOSTOLAKIS: And clarify.

MEMBER SIEBER: We have certainly established the need for simplification.

MR. RAHIMI: Yes.

(Laughter.)

MR. MARTIN: I apologize. As a -- My staff person who was intended to give this presentation today was called for jury duty and I was

thrown into the breach at the last moment to give this presentation.

MEMBER SIEBER: I bet you that's true.

MR. MARTIN: But it was all clear to me beforehand.

PARTICIPANT: Before talking to us.

MEMBER SIEBER: I would be too.

MR. MARTIN: As far as the conclusion on this slide, at the time we issued this regulatory information summary, we were clarifying NRC expectations and we made it clear that licensees must comply with the requirements of both 10 CFR 50.68 and the requirements of 10 CFR 71 and 72 which then resulted in licensees having to do additional analyses.

MEMBER SIEBER: Right.

MR. MARTIN: And either requesting an exemption of the regulations or requesting an amendment and that became quite much more labor intensive and expensive for both the NRC and the industry than we had anticipated.

CHAIRMAN WALLIS: But it's a kind of defense in depth. If you have public safety assured by two different independent methods that's a kind of defense in depth.

MEMBER APOSTOLAKIS: No. That's one of the major problems of the structure of this defense in depth. There is no end. You can spend millions of dollars and --

CHAIRMAN WALLIS: But here we only have two.

MEMBER APOSTOLAKIS: I think they are doing fine, Graham. They are just not explaining it very well.

MEMBER ARMIJO: I think they're doing what is.

MEMBER APOSTOLAKIS: Let's get into the scenarios.

CHAIRMAN WALLIS: Let's move on.

MR. MARTIN: So the purpose and scope of the rulemaking.

VICE CHAIR SHACK: Let me just go back to this for one second. If the purpose wasn't to make them do both analyses, why did you issue the RIS in the first place?

MEMBER APOSTOLAKIS: That's exactly the question.

MR. MARTIN: We -- At the time the RIS was issued, we did not appreciate the extent of the burden that this would create.

VICE CHAIR SHACK: I see. So you did intend for them to do both analyses.

MR. MARTIN: We did intend for them to do the additional analyses, however, we did not appreciate that the burden was going to be as extensive.

CHAIRMAN WALLIS: Why did you ask them to do it in the first place? I mean there must be some reason why you wanted them to do independent of burden. You thought it was a good idea.

MR. RAHIMI: No because technically, they would have been out of compliance according to the rule when you introduce something in the pool.

CHAIRMAN WALLIS: So you were saying that they would have been out of compliance.

MR. RAHIMI: Yes, they would have been out of compliance.

MR. MARTIN: And previously what's not clear to the staff --

CHAIRMAN WALLIS: You're clarifying the situation.

MR. MARTIN: -- around the six/seven years ago that there was this overlap in the regulations that did exist and then --

CHAIRMAN WALLIS: Okay. So you were just

clarifying the compliance requirements. You weren't --

MR. MARTIN: -- a careful reading of the regulations by someone around five or six years identified that these conditions existed and that they really had to comply --

CHAIRMAN WALLIS: Both rules applied.

MR. MARTIN: -- to both the requirements, the criticality and criticality analyses requirements of 50.68 and the Part 71/72 and our initial impression was in order to be in compliance with the regulations and, as I might add, an unintended consequence of the regulations at first we did not feel that this was going to create a significant burden.

CHAIRMAN WALLIS: The cask comes along and it obeys some regulation and then it crosses some border and it shows its cask to all and it satisfies some other regulation. That's what you want?

MR. MARTIN: Yes.

MEMBER SIEBER: Right. Two different offices.

MEMBER APOSTOLAKIS: So it's getting out of the reactor arena. Right?

MEMBER SIEBER: Well, cost is.

MR. MARTIN: We're not here to discuss the

reason this came to past, but we're trying -- But we're here to try to straighten it out.

MEMBER APOSTOLAKIS: But the ACRS did not review it.

PARTICIPANT: Okay.

MEMBER APOSTOLAKIS: But we're trying to help.

(Several speaking at once.)

MR. MARTIN: I know you're trying to help and we appreciate that.

Okay. The purpose and scope of the rulemaking. To reduce the regulatory burden imposed by compliance with both 50.68 and Part 71 and 72 as applicable.

MEMBER APOSTOLAKIS: This is the key.

MR. MARTIN: Our intention is that the requirements of 50.68 would not apply to the fuel that has entered the physical boundary of the cask or package located in the spent fuel pool.

CHAIRMAN WALLIS: What happens when it's halfway in?

MR. MARTIN: The requirements of Part 71 or 72 would apply.

CHAIRMAN WALLIS: Both apply. Okay. So do you have to do an analysis when it's halfway in.

MR. MARTIN: The requirements of Part 68 would not apply.

MEMBER APOSTOLAKIS: They are different. This is like establishing boundaries between the ACRS and ACNW.

(Laughter.)

MR. MARTIN: For example, if a licensee is moving a fuel assembly from a spent fuel pool storage rack into the cask 50.68 would apply to the fuel assembly until the bottom portion of the fuel assembly crossed the boundary of the cask, the plane made up by the top surface of the cask.

CHAIRMAN WALLIS: Ah.

MEMBER SIEBER: There you go.

CHAIRMAN WALLIS: So it's if any part of it has entered the physical boundary. Right?

MR. MARTIN: Correct.

CHAIRMAN WALLIS: Okay. Thank you.

MR. MARTIN: Okay.

MEMBER APOSTOLAKIS: Now I have a complaint about the technical evaluation before you even jump into it.

MR. MARTIN: Okay. Would you like to express your complaint before I talk or after I talk?

MEMBER APOSTOLAKIS: I would like to

express my complaint. You describe in this document several scenarios and one has to do mental acrobatics to follow you. You know at this day and age an event tree would go a long way towards explaining what you're trying to do. Show the scenarios for heaven's sake and then discuss. Now I have to figure it out myself. I have to draw the scenario myself. I mean this is really a case where this simple tool would have helped a lot. You know what an event tree is, don't you?

MR. MARTIN: Yes. And I --

MEMBER POWERS: George will tell you.

MR. MARTIN: I'm not sure the members of the general public if we publish this in the Federal Register would be able to follow an event tree as opposed to the mental acrobatics of the --

MEMBER APOSTOLAKIS: They would follow it.

MR. MARTIN: But I can appreciate your comment and I --

MEMBER APOSTOLAKIS: It's so simple to show the scenarios. Now it's very difficult to remember how much scenario two and three they share or they are different and so on.

MR. MARTIN: Well, let me try to lay it out for you in general.

MEMBER APOSTOLAKIS: Okay.

MR. MARTIN: Just to talk you through it. If we start with the probability of a cask being in the pool which could be as generally licensees fill three casks per year and there could be a period of about three days where the fuel is in the cask with the head off the cask and that would probably be generous. We do not -- We do object from a standpoint of the regulator to licensees having any intent to leave the cask in the pool for any period of time because our consideration is that this would not comply with the design basis of the racking of their spent fuel pool and it would become -- We would not permit this to become part of the permanent storage in their spent fuel pool, but rather a device that was intended to transit the fuel pool.

So you have to start from the standpoint of the probability of this cask being in the pool with the spent fuel which if you're talking average loading of three casks per year in about three days you're talking about nine days out of the year where you potentially have this vulnerability and that's order of magnitude 10^{-2} or around 2×10^{-2}.

MEMBER APOSTOLAKIS: Why do you say three? In the document it's five. Have you updated that or

what? Historical data suggests that approximately five storage casks are loaded on an annual basis.

MR. MARTIN: Right. We -

MEMBER APOSTOLAKIS: It's still 10^{-2}. I mean it doesn't change the probability.

MR. RAHIMI: Right. For the technical basis, we made conservative assumptions. What Tom is giving you is a more realistic scenario.

MR. MARTIN: It may be more realistic. I'm giving you something more realistic as opposed to a conservative assumption that might be discussed in the document you have in front of you.

MEMBER APOSTOLAKIS: It still doesn't matter I don't think, but okay.

MR. MARTIN: So you have to have a probability of the cask in the pool with the fuel loaded in the cask. Then you have to have a potential for a boron dilution event to cause fuel damage and here we discuss a possibility of a slow boron dilution event due to injection from unborated water or a rapid spent fuel pool drain-down.

Following the fast dilution event, the fast drain-down event, then you would have to dilute the pool after that because if you just drain down the spent fuel pool very quickly, you had a fast drain-

down, the fuel that was the most secure in the spent fuel pool would be the fuel in the cask. The fuel that would be more vulnerable would be the fuel that was in the racks. So what you would be concerned with would be as far as the fuel in the cask itself not as much the drain-down but any subsequent dilution and operators would if there was a capability of refueling the spent fuel pool, first of all, they would choose to fill it with borated water and if they had to spray the pool, this is again a beyond-design-basis event that comes with, it's part of other considerations, but there might be a possibility of sprays being diverted to spray the fuel in the spent fuel pool and then the possibility would exist of the water, the pool, I'm sorry, the water to drain into the cask such that the water in the cask would then become dilute which if that's the only -- If you had a fast drain-down and now you have water in the cask and the water that's left in the cask would still be borated water, then you would have to have a dilution through Shetlay's Principle or some sort of osmosis of moving this material in or out of the cask that would become diluted or there are some casks that have a small drain valve on the bottom. So there is a possibility that the water would slowly drain out of the bottom of

the cask and then be refilled with fresh water, again, not a very likely event.

And then even if the water were to drain out of the pool and the water in the cask were to become diluted, there would have to be the possibility that the fuel remaining in the cask could become critical. And then even if it became critical, we could look at the consequences which might be minimal relative to the consequences of everything else that's happening around this event.

The other event that we could discuss would be a slow dilution event and with slow dilution events there is --

MEMBER APOSTOLAKIS: "Slow" means hours.

MR. MARTIN: Slow could mean hours. It could mean a hose stuck into the pool or stuck into the cask or some other -- That's probably about the only way that something like this could happen or if there was a loss of control of the equipment to monitor the fuel in the spent fuel pool and there was somehow pure fresh water injected into the spent fuel pool.

MEMBER APOSTOLAKIS: But I mean you're done with the seismic evaluation to drain-down.

MR. MARTIN: If you have any questions,

yes. Do you have any more questions on that?

MEMBER APOSTOLAKIS: So there was a study done --

MR. MARTIN: Go ahead.

MEMBER APOSTOLAKIS: There was a study done reported in Inurrich (PH) that the peak ground acceleration that would start creating damage to the spent fuel pool is 0.5 g. Right? That's pretty high. That's very high. I'm just commenting on that.

MR. MARTIN: For a ground acceleration, correct. So the order of magnitude --

MEMBER APOSTOLAKIS: So essentially what you're saying is the probability of getting that kind of BGA is so low that the whole event is unlikely.

MR. MARTIN: Well, if -- I'm looking just in round figures. The probability that the cask is going to be in the pool in a configuration that would be vulnerable is on the order of magnitude of maybe 10^{-1} to 10^{-2}, around 10^{-2} more likely, maybe a little bit greater than that. So somewhere between 10^{-1} to 10^{-2} likelihood that the cask will even be in the pool in that configuration.

MEMBER APOSTOLAKIS: Right.

MR. MARTIN: Then you would have to have for the fast drain-down a seismic event. The

probability of the seismic event would be somewhere around the order of magnitude of 10^{-5}.

MEMBER APOSTOLAKIS: Because of that acceleration which is very high.

MR. MARTIN: Yes. You would have to have beyond-design-basis seismic event that would cause a rapid drain-down in the spent fuel pool and then you would have to have -- You could have in that the probability that the fuel would even go critical were it --

CHAIRMAN WALLIS: Seismic event associated with a dam failure which would flood the pool.

MEMBER ARMIJO: No, you would be trying to reflood the pool.

CHAIRMAN WALLIS: You would try, but you might reflood with unborated water.

MEMBER ARMIJO: Right.

CHAIRMAN WALLIS: I'm saying the dam failure would if some of these pools are below grade. But again, it's a huge unlikelihood. I'm just trying to think of ways in which you could get water going into the pool, undesirable water from somewhere.

MR. MARTIN: Right.

CHAIRMAN WALLIS: And it could be from the environment.

MR. MARTIN: It could be.

CHAIRMAN WALLIS: Extreme case. Right.

MR. MARTIN: Generally speaking, plants are designed for significant environmental events and I don't know of any plant that's significantly vulnerable to a dam break that would create such a problem in the spent fuel pool.

MEMBER MAYNARD: But in any event regardless of what consequences you want to assume, the fuel that's actually in the cask during this would probably be better protected and in better shape than the fuel that you have in the rest of the spent fuel pool.

MR. MARTIN: That's correct and actually you could throw in probably another, at least, an order of magnitude that even the fuel in the cask will not go critical because it's spent fuel.

MEMBER ARMIJO: And that's where I have a problem. I think the real issue is could you have a local boron dilution separate from the pool and there are ways that might happen. I mentioned that to the staff earlier.

CHAIRMAN WALLIS: But it's hard to imagine how though. Someone would almost have to --

MEMBER ARMIJO: I don't think we want to

discuss it here.

CHAIRMAN WALLIS: -- just wilfully insert the hose.

MEMBER ARMIJO: Well, you just discussed it.

MR. MARTIN: There are certain ways that that could -- That might be one possible scenario. But even if someone decided that they wanted through sabotage do something like that the refueling deck is a controlled personnel access area as a vital area of the plant. The people that load and unload the spent fuel pool are licensed operators. The senior person in the refueling area is a senior licensed operator. There are -- While the cask is in the pool, there are measures in place to control the boron concentration. There are samples that are taken every -- They have to be taken at least every 72 hours and they are normally taken more frequently than that. So I would say every 24 to 72 hours there are two samples taken of the boron. There is a level monitoring of the spent pool fuel so that if there's any significant change of the level either up or down, there's an expectation that that would be picked up. The operators in the -- on the refueling deck are very conscious of the radiation levels and the level of the spent fuel pool and it's

very likely that they would pick up anything any more than a very minor change of the --

CHAIRMAN WALLIS: You're on the next slide really.

MEMBER MAYNARD: You also don't have faucets and hoses of fresh water sources available, laying around, in these areas either.

MEMBER ARMIJO: I think that was identified in one of those scenarios you analyzed as a potential for diluting the entire pool. It was mentioned in the analysis. I think the question I would like answered is if you have a dry storage cask in the pool with spent fuel in it and you fill that, displace the borated water locally with pure water, would it still be safe if you took credit for burn-up and the structure. Would it still be safe? And if that was the case I think then I think you're home free. Well, if it's not the case then I think it's --

MR. MARTIN: We believe in many cases that it would be safe. However, we haven't analyzed for all these cases and that becomes part of the crux of the problem which is the tie-in through the technical specifications and the license for each plant and the analysis, the additional analysis, that would have to be done.

The results that I've had and I'm sorry. I did give you one incorrect number, I should have consulted my notes, on an enrichment for an analysis that we had done to show that initial enrichment of uranium-235 with a four weight percent initial enrichment, a burn-up of about 32 gigawatt days per metric ton would be about the cutoff for an expectation for assuring subcriticality and we would expect that fuel that was enriched under normal circumstances certainly to four weight percent would be burned at a higher rate than 33 gigawatt days per metric ton.

CHAIRMAN WALLIS: Does that answer your question, Sam?

MEMBER ARMIJO: Yes, I think it does but you know you need to take credit for the burn-up for that to be subcritical.

MR. MARTIN: If we were to take credit for the burn-up fully in every case, we think it would be in almost every case we would say we would be okay. Even with no boron, it would be likely that we would maintain conditions subcritical. However, the regulations as they're written right now don't -- You know we're trying to establish separation between 71 and 72 and Part 68 so that we don't get into this gray

area where we're applying both sets of regulations.

MR. RAHIMI: Let me add that the question you asked, yes, under Part 50.68, yes, those are the assumptions that they take credit for burn-up and the reason again which I'll go into it later why we don't yet under Part 71/72 when it's outside of the pool, they don't have to quantify all the uncertainty to a great detail because they always have the boron as a backup. So given that, they always satisfy with taking into account burn-up credit in the pool. Fresh water, they are subcritical.

MEMBER ARMIJO: Do you know what's difficult to realize is that you have burn-up credit for one physical entity, a fuel bundle, and that burn-up credit isn't attached to it when it's put into a dry storage cask. You know maybe you can discount it. Maybe you can saying, I'm not going to give you full burn-up credit. I'll give you 75 percent burn-up credit." But there's still a burn-up credit. There has to be some solution where reality can go with the item.

MR. RAHIMI: You're right. I mean that's exactly what he's done. Under Part 71/72, we're saying, "You're coming to cask environment, transportation environment. We know the actonite yes

is there. Yes, you cannot quantify all the fission product, cross section. You don't have chemical assay." Those are the areas that right now that the applicants are trying, we're encouraging them, to get data for transportation and come in with the application.

But actonite only burn-up credit, yes, we have ISGA Rev 2. It tells the cask vendors to go ahead and take credit for the actonites. Those we have data we're sure. We know about the cross section of all those actonites.

MEMBER ARMIJO: And they could do it for the dry storage cask as well?

MR. RAHIMI: They could -- If they want to choose to, yes, they could do it.

MEMBER ARMIJO: Wouldn't need any more data. Right?

MR. RAHIMI: Yes, actonite only, but unfortunately with the actonite only credit they cannot make it where they put 32 assemblies in a canister. They want to put maximum amount of fuel assembly in that canister.

MEMBER ARMIJO: With actonite credit 32 assemblies in a canister and you displace the borated water with fresh water by some mechanism, it will go

critical.

MR. RAHIMI: Yes. If you take partial credit, yes, partial credit for burn-up credit in there and --

MEMBER ARMIJO: Right, but if you take full credit, it probably wouldn't if you had 32,000 megawatts.

MR. RAHIMI: It probably wouldn't -- That's right. That's why under 50.68 they've analyzed with the full burn-up credit, getting rid of all the boron in there, they are separated below one. But on the other side in the cask, our criteria is 0.95. As I will go into it because the environment is different, the cask isn't an open environment, it's not even a controlled environment, we need to be a little bit more careful.

MEMBER CORRADINI: So if I just could -- If you're going to get to this later.

MR. RAHIMI: Yes.

MEMBER CORRADINI: Because you just about got to the slide I thought would be at the beginning of the presentation, Slide 16, which essentially gives the assumptions and initial conditions. So I don't want to take you there if you're going to go there, but you kind of almost got there with all this

discussion.

MR. RAHIMI: Yes.

MEMBER CORRADINI: So shall we wait?

CHAIRMAN WALLIS: I think he's already discussed this slide.

MR. MARTIN: Well, I've already been through the slow boration and the rapid drain-down, I'm sorry, the slow boron dilution and the rapid drain-down. The attention at least from my standpoint was to go through just a very brief summary and then turn it over to Meraj for a more in-depth discussion of the differences between the analyses between Part 50 and then Part 71/72.

CHAIRMAN WALLIS: That's what we were trying to figure out all along.

MR. MARTIN: Which is what you've been trying to figure out.

MEMBER APOSTOLAKIS: I think Mike is right though. The last slide does that well, doesn't it?

MEMBER CORRADINI: So if I could --

MEMBER APOSTOLAKIS: Let's go to 16.

MEMBER CORRADINI: So if I could just ask the question with that slide in front of us.

MR. RAHIMI: Okay.

MEMBER CORRADINI: You said something in

response to Mr. Armijo that I wanted to at least have you repeat because I heard it but maybe I misheard it. You're saying that you know with some certainty what are the actonites are but you don't know what the fission product is and that's why the reason you don't give it credit. That's what I thought I heard you say.

MR. RAHIMI: That is correct. They have not -- We have not seen, you know, that the licensees have not quantified or that the cask designers have not quantified the uncertainties associated with fission product cross section in a cask environment.

MEMBER CORRADINI: So let me say it back to you because I used to -- I teach some days and I tell my students that the thing we have the highest certainty of is decay heat and all the various fission products and transuranics that are produced in decay heat and you're telling me that I have large enough uncertainty that I can't take credit for the fission. That's the reason.

I can understand if you're saying I don't take credit and that's a safety margin. That I get. But if you're saying I don't take credit because I am uncertain I don't get it. So can you explain to me what I'm missing?

MR. RAHIMI: Okay. I didn't say that you cannot take credit. You need -- I mean is the neutron cross section. There is not decay heat in the criticality that we're interested in as you well know that these istopes, solarium, cesium, rhodium, all these isotopes which they have a poisonous effect, they absorb neutrons, we want to make sure that the designer has a good handle on the cross section of these isotopes and historically --

MEMBER ARMIJO: But, Meraj, we start up reactors every day knowing the reactivity of those bundles and we can hit the reactivity point with high confidence. So we must know something.

MR. RAHIMI: You are absolutely right. You do it either --

MEMBER ARMIJO: What happens when you take the fuel out of the reactor? Does it lose fission products?

MR. RAHIMI: Right. Well, you look in the reactor core over the years, yes, all those codes have been really fine-tuned, have been confirmed, through restart and the first unreload you look at that. They're not right on the nose. You know they're off. They treat those fission products as lump fission products. They don't even go isotope by isotope.

They assign some lump --

CHAIRMAN WALLIS: Are these bundles different or so on? It's pretty complicated. Each bundle is different. Each bundle has a different history.

MR. RAHIMI: That's right. Operating history.

MR. MARTIN: Different history. Different initial --

MR. RAHIMI: Each is different. That's correct.

MR. MARTIN: Different fuel vendors.

MR. RAHIMI: So you're absolutely right. In the reactor environment over the years, you have these codes. You fine-tune it. You lump it. Yes, you have a handle. But now all of a sudden, you're taking that fuel assembly. You're putting in a cask environment that's in the cold condition, room temperature cross section which really you haven't benchmarked and suddenly you're asking the question "You need to tell me very accurately when this thing is flooded, it's out on the road, it is subcritical." I mean you have to have confidence in this.

CHAIRMAN WALLIS: Can we get -- This slide looks very good to me. I mean you have these two

different rules and you're going to say you only need one of them. So you're going to make a comparison and you're going to tell us why one is better than the other or why one is sufficient without the other. Are you going to tell us all that?

MR. RAHIMI: Yes.

CHAIRMAN WALLIS: If that's your argument, that's all you really need to do.

MR. RAHIMI: Okay.

MR. MARTIN: I think from my standpoint, from the NRR's standpoint, we've established that if we separate the requirements at the point where the assemble goes into the cask versus it's in the spent fuel pool, that the risk associated with events when the cask is inside the pool is sufficiently low that it does not warrant the additional burden on licensees to have to do this additional analysis and modify their license with all the trappings that is associated with that, both their expense and our expense.

CHAIRMAN WALLIS: So it's based on a risk analysis.

MR. MARTIN: That's become -- Well, I wouldn't --

PARTICIPANT: A probability analysis.

MR. MARTIN: A probability analysis basically of the --

CHAIRMAN WALLIS: Where is the probability analysis?

MR. MARTIN: Well, I --

MEMBER KRESS: It's qualitative.

CHAIRMAN WALLIS: I don't like qualitative probability.

PARTICIPANT: It's a mixture.

MEMBER KRESS: It's qualitative but you add a little bit of quantification. Let me ask you a question. If they did this analysis, the ones that were reducing the burden law, is there a chance that part of the pool would go critical or do we know that? That's saying that you don't but you're ruling it on probability --

MR. MARTIN: I'm not personally familiar with those analyses and I'm not personally familiar with the results of those analyses. However, in the cases where licensees have changed the license or gotten exemptions, the analyses have shown that they would not go critical with pure water. Otherwise, it would have been unacceptable.

MEMBER KRESS: So -- No matter what you're not going critical even though you don't know that for

sure unless you do the analysis.

MR. MARTIN: Well, our expectation is that you would not go critical. However, there are low probability situations --

MEMBER KRESS: Where you might.

MR. MARTIN: Pardon me?

MEMBER KRESS: Where you might go critical.

MR. MARTIN: Where you might go critical. There are situations where let's say a licensee decides, has a leaking fuel pin, a leaking fuel rod.

MEMBER KRESS: So it's fresh fuel on the rod.

MR. MARTIN: And they take a -- Maybe they have a bad batch of fresh fuel and they take two or three assemblies out and they put them in the cask in the same location right next to each other. There is a possibility that they could have a cell that would then possibly go critical.

MEMBER KRESS: Okay.

MR. MARTIN: Once again, an unlikely situation. You would have to have the bad fuel. You would have to have a couple of assemblies that were bad. You'd have to put them in the cask next to each other. You'd have to -- Pardon me?

MEMBER SIEBER: You would have to have mistakes made by people.

MR. MARTIN: You would have to have mistakes made. You would not put those next to each other in the cask. You would then have to have the low probability event.

CHAIRMAN WALLIS: What you should do then is have an event train or probabilistic analysis and have something convincing. All this talk doesn't really convince me about anything yet.

MEMBER APOSTOLAKIS: Very hard to follow.

CHAIRMAN WALLIS: Right. Very hard to follow.

MEMBER APOSTOLAKIS: I don't find anything wrong but it's very hard to follow.

MEMBER KRESS: It's a qualitative risk assessment.

MEMBER APOSTOLAKIS: Anyway --

MEMBER SIEBER: Which is the way regulations are.

MEMBER APOSTOLAKIS: You are on a path of, what do you call it, direct rule?

MR. MARTIN: Direct final.

MEMBER APOSTOLAKIS: Direct final. What is it you will publish because the public hasn't seen

this yet, has it?

(Several speaking at once.)

MR. MARTIN: It is --

MEMBER APOSTOLAKIS: No.

MR. MARTIN: It's not on the website.

MEMBER APOSTOLAKIS: So what will be -- I mean you're going after public comments soon? Is this document that says RIN3150, is this going to go to become public?

MR. TARTAL: That's going to be part of the rulemaking package that we'll submit next month if all goes as planned.

MEMBER APOSTOLAKIS: Okay, and there is still time to draw a couple of event trees and make it clear?

MR. TARTAL: Depending on your comments, we will consider your comments as part of the final package that goes out to the public.

MEMBER APOSTOLAKIS: You have been with this agency a long time, haven't you?

MR. TARTAL: Not very long but I'm a fast learner.

MEMBER APOSTOLAKIS: We'll consider it.

CHAIRMAN WALLIS: So this goes out for public comment. We have another crack at it when it

comes back again.

MR. MARTIN: Actually we are on a path with this rule such that if it goes out for public comment and we get no significant public comments the rule would go into effect. If when it goes out for public comment we get some significant public comments, then the rule would become, basically it would become, a proposed rulemaking and we would modify the rule, address the public comments and then go proceed with the final rule.

MEMBER SIEBER: Right.

MEMBER CORRADINI: So just to -- Since I started this thing to go to Slide 16, the rule though essentially in essence is on Slide 11 which essentially you define a physical boundary where if something passes one thing is applicable, Section 50, and you slide over to the other thing and Section 71 or 72 are applicable. Do I have that correct?

MR. TARTAL: Yes.

MEMBER CORRADINI: That is the rule in essence.

MR. TARTAL: Yes, that's the intent of the rule.

MEMBER CORRADINI: Or rule change or whatever?

MR. TARTAL: Yes.

MEMBER CORRADINI: All right. Thank you.

CHAIRMAN WALLIS: And your argument is that the public risk entailed by this change is small.

MR. MARTIN: Very small.

CHAIRMAN WALLIS: You haven't given us an indication of how small it is. You've just talked about it.

MEMBER KRESS: Even if they went critical in a cell, the public is not at risk. Believe me.

CHAIRMAN WALLIS: No, but it's a bad thing to have a critical event.

MEMBER KRESS: Yes, there would be all sorts of issues raised.

MEMBER SIEBER: It would get in the newspapers.

MEMBER MAYNARD: But I don't see where this has any impact on changing the risk to the public in that by making this change or not making this change. The only thing it's going to effect is paperwork and analysis.

CHAIRMAN WALLIS: Some risk to the workers in the plant.

MEMBER KRESS: Yes. There is some risk, but you're not quite -- There is some situation it may

be.

MEMBER MAYNARD: But I think what we're talking about is that the licensee is not going to go modify their pool or modify the cask. They're going to be reanalyzing, doing an analysis, and perhaps going for an exemption. But I see where the real problem is which is by trying to require compliance with two different regulations with different assumptions and things it may put you in violation of your current license, although it's not creating any real new safety issue.

MEMBER ARMIJO: But if exemptions have been granted over the past few years, this has already been going on. Right? People haven't been doing the analysis and have been doing it. So it's actually been happening. So maybe we're shutting the barn door a little late.

But I read your documents several times and it looks like you address a whole number of scenarios. Some of them are so unlikely that I didn't even know why you bothered to analyze. The only thing I asked was related to a deliberate action by someone and you answered my question. It could happen. There could be a criticality, but it's very unlikely and I think that's where George could following a more

probabilistic approach quantify where we are.

MR. MARTIN: Let me also add that if somebody deliberately did this their fingerprints would be all over it.

MEMBER ARMIJO: Yes, but it's too late.

MR. MARTIN: But it would take a long time to -- It's too late, but it would have to happen over a period of hours and it's likely that it would be detected before it would happen. It's not the kind of thing that if somebody was smart enough to want to sabotage a plant this is not something that somebody would try to do.

MEMBER APOSTOLAKIS: You said that even -- At some point I believe you said that even if an assembly goes critical, you said nothing much happens or I mean what's going to happen.

MR. MARTIN: Let's say this assembly goes critical, for those of you that are familiar with swimming pool reactors at Nico (PH) Power Plants and I went to my graduate school at University of Virginia and we had a two megawatt swimming pool reactor which was critical in water that was more shallow than what we would expect to experience in a spent fuel pool and under these conditions as you got to the point where you would dilute the water, the density would change

and it would shut down. So it would become critical over a relatively slow period of time. Once it became critical, it would heat up. The density would change and it would shut down. And then it would heat up again.

CHAIRMAN WALLIS: Density boil?

MR. MARTIN: There could be some nuclear boiling and there could be some warming up of the water and there could be some evaporation. But once it boiled and evaporated, then it would shut down.

MEMBER KRESS: And the only problem is you wouldn't want to be standing right close to it.

PARTICIPANT: That would be bad.

MR. MARTIN: And there are -- If that were to happen, the effect of the several hundred other assemblies would have already killed you long before the criticality from the --

CHAIRMAN WALLIS: I mean you have all this water level above the pool. If you're looking in, you still wouldn't be affected, would you? It's a swimming pool reactor.

MR. MARTIN: Right. That's correct.

CHAIRMAN WALLIS: You would have to go into the pool.

MR. MARTIN: You would have to go into the

pool to be --

CHAIRMAN WALLIS: That would be crazy.

MEMBER APOSTOLAKIS: Is it possibly you would have some melting?

MR. MARTIN: No. I --

MR. ROLAND: No, and we also have criticality alarms too.

MR. MARTIN: There are criticality alarms. The criticality alarms would be -- Yes, you have criticality alarms. Are there any comments from the -- I have experts, criticality experts, at the back wall there. Any other comments, Tony or Rob or Kent?

MEMBER ABDEL-KHALIK: Excuse me. Has there been a situation where a cask has been filled and then after the process has been completed they've decided that they have to drain it because something happened?

MEMBER SIEBER: Yes.

MR. MARTIN: There is a -- Well, let me turn it over to the Spent Fuel Program Office to answer that question. That would be --

MR. RAHIMI: Yes, during loading and unloading casks, you know, they routinely encounter problems.

MEMBER ABDEL-KHALIK: Okay.

MR. RAHIMI: You know, in terms of the things they did not anticipate, but are you asking the question --

MEMBER ABDEL-KHALIK: Well, I'm sort of asking a series of questions.

MR. RAHIMI: Okay.

MEMBER ABDEL-KHALIK: You load the cask and you're going through the drying process and then you find out that something is wrong and you have to refill the cask. Is it possible that you can refill the cask while it's in the pool during a situation like this after they had initiated the dry-out process that you can actually fill it with unborated water?

MR. MARTIN: In order for that to happen, let me just interject here, you have to have -- There would have to be two samples made of the boron concentration and they would both have to be faulty for that to happen.

MR. RAHIMI: Yes, the subsequent refilling, let's say, after they drain the cask, they dry the cask. They found they have to go back. They have to refill it because they have to take some fuel assemblies out. It's the same sequence. They have to take boron measurement, solvent boron measurement, as part of the operating procedure for those casks during

refilling, drawing or unloading. If you look at the unloading casks, you know, it's almost the same thing you described that they have to fill the cask. But the boron measurements will be made prior to refilling the casks with the pool water which is borated water.

MEMBER ABDEL-KHALIK: So the procedures for refilling a cask in an event of this sort, that totally precludes this possibility.

MR. RAHIMI: That's right. Under -- We go chapter -- When we're having a safety analysis report at DC there's an operating procedure if at somehow in the midstream they have to go back, they have to follow the operating procedure.

MR. MARTIN: I wouldn't -- To say totally preclude, I would be reluctant to say they would totally preclude anything. However, there would have to be two independent samples made by two and they would have to be independent and independently analyzed and they would have to both be faulty and there would have to be something, you know, you would have to be sitting in the spent fuel pool and discover "Oh, this is not borated to 2300 ppm boron. There is no boron in there. How could this have happened?" Not very likely because there is also routine requirements to sample the boron in the spent fuel

pool beyond the requirements to sample before you conduct cask activities in the spent fuel pool.

There are also situations that are out there right now in terms of my belief and the situation that we've created by having this problem with this regulation where licensees might have to do the very thing that you just mentioned. Let's say there's something they discover that there's a problem or they want to, they need to unload one of these casks for some emergency purpose and they should have the basis to do and they take one of these casks that were loaded in the year 1999, 2000, 2001 before they were doing this, before this issue came up, before we discovered that there was this overlapping requirement and they say we have to get this fuel out of here on some sort of an emergency basis. They theoretically would either have to request an exemption of the regulations or request an amendment to the regulations in order to do that under emergency basis and that wouldn't make sense and it's very unlikely, you know, under the circumstances that we would find an expeditious way for them to conduct that activity.

But the fact that we have these overlapping regulations that are not really consistent with each other in terms of providing a consistent and

appropriate reasonable assurance of safety and certainly we're expecting -- And reasonable assurance of criticality is certainly another level of assurance. When we're talking reasonable assurance and we're not going to have criticality, that has to be vert reasonable.

CHAIRMAN WALLIS: So you have two overlapping relations each of which is good, each of which is adequate and you've picked the best one or the one with the least effort or whatever. How did you pick one versus the other one? Both of them, each one of them, is adequate. I understand. Right? You're not saying that one of them is inadequate.

MR. MARTIN: Right.

CHAIRMAN WALLIS: You're saying we're going to pick one instead of two.

MR. RAHIMI: The rulemaking is --

MR. MARTIN: We picked this one because when the fuel goes inside the cask, we believe that the regulations pertaining to the control of criticality inside the cask are reasonable and adequate to assure that that fuel is protected.

CHAIRMAN WALLIS: These are the generic ones, are they?

MR. MARTIN: Correct. And we also believe

that when the fuel is the bottom of the spent fuel pool the regulations pertaining to the criticality and the spent fuel pool are also reasonable and adequate. However, when you combine those two, you then are forced to analyze the fuel in the cask as though it's it's part of the spent fuel pool. And once you analyze the fuel in the cask as though it's part of the spent fuel pool assuming that the spent fuel pool is at a density that would occur in the cask which is not realistic and you would have to assume that the same accident sequences that apply to the spent fuel pool apply to the cask which is not reasonable because the cask is only in the spent fuel pool for a very short period of time, that's not a reasonable assumption. When the licensees are forced to do the analyses that would support both 50.68 and Part 72, then it's not a reasonable situation.

CHAIRMAN WALLIS: You're saying there's something artificial about doing the Part 50 analysis, something really artificial. You said they would force an analysis which is inappropriate on this cask.

MR. MARTIN: Well, you're assuming a deboration in the cask that is much more likely to occur. A deboration inside the cask is much less likely to occur.

CHAIRMAN WALLIS: Part 50 analysis is inappropriate. Then you convince us -- Are you going to convince us that the Part 71/72 is adequate?

MR. MARTIN: Correct.

CHAIRMAN WALLIS: Is that what you're going to do?

MR. MARTIN: And the Part 71/72 has an assumption, takes credit for boron, and then once you drain the boron out --

CHAIRMAN WALLIS: It's adequate.

MR. MARTIN: Yes. There is reasonable assurance.

CHAIRMAN WALLIS: That's all we need to know if you have one which is adequate.

MR. MARTIN: There is reasonable assurance the public health and safety will be maintained through what we're proposing.

CHAIRMAN WALLIS: It hasn't been demonstrated to us by any kind of technical analysis at all.

MEMBER APOSTOLAKIS: The issue is whether to do both.

CHAIRMAN WALLIS: No, no.

MEMBER APOSTOLAKIS: Either one is acceptable.

CHAIRMAN WALLIS: All we need to know is if one is adequate.

MEMBER APOSTOLAKIS: Either one is adequate. We're not questioning that.

VICE CHAIR SHACK: We've gone through a qualitative statement of probabilities. You know you have a probability because of the time. You have the probability of the dilution event. You have the probability that even if you had the dilution event that you'd have a fuel configuration that is in fact could go critical.

MR. MARTIN: Right.

VICE CHAIR SHACK: Now we don't know any of those probabilities all that rigorously, but I think that they are 10^{-2}, 10^{-5} and 10^{-1} as a ball park kind of number and that gets you to a pretty unlikely event.

MR. MARTIN: The numbers that we were coming up with --

MEMBER KRESS: Let's couple that with the consequences of probably, no, never mind. So it's a qualitative risk assessment that looks like --

MEMBER APOSTOLAKIS: Let's not call it that. Let's accept the event and not call it that.

MEMBER KRESS: Well, it's a bit

quantitative.

MEMBER APOSTOLAKIS: -- is qualitative.

MR. MARTIN: But when we get to the distinction of the fast drain-down and the slow drain-down it's a little more difficult for us to quantify the risk on the slow drain-down because as Mr. Armijo pointed out I mean there's some -- It's more difficult to get your hands around the probability for these things to happen. However, we do know that there are controls on the refueling deck, that we have instrumentation, that we have radiation instrumentation, that we have security controls, that there's key cards and there's access controls for everybody that goes up there, that there's limited opportunity, both window of opportunity and equipment opportunity to conduct the kind of sabotage type event that might take to render this, to create this problem and even if that did happen, it's not likely it would have any consequences. So even if somebody was smart enough to beat the system and those controls, if they were smart enough to do that, they would probably be smart enough to know that there would be no consequences associated with them having done that.

VICE CHAIR SHACK: Inadvertent slow dilution is also because you're taking your samples.

MR. MARTIN: And the inadvertent slow dilution would be mitigated through the training of the operators, having the license operators conduct the activity, having the dual samples performed at 24 to 72 hour frequency, licensees conducting this activity with license operators, get the fuel cask in the pool to get it loaded and then they take it out and it happens. The operators are generally trying to do that as quickly and as safety as they can because they have other things to do besides take their time loading fuel casks. So there's a minimum window of opportunity for those kinds of problems to occur in that activity.

MEMBER SIEBER: But the cask is open and sits upright in the pool.

MR. MARTIN: Right.

MEMBER SIEBER: If you have a slow dilution in the pool, the cask is like a cup and you don't get the dilution in the cask --

MR. MARTIN: The boron, the borated water is denser than the pure water so --

MEMBER SIEBER: It's going to stay there.

MR. MARTIN: -- it's more likely that that's going to be the safest point for the fuel.

MEMBER SIEBER: And the safety in that

configuration, safety posture is improved.

MR. MARTIN: And when we looked at the impact on the industry, the impact on the NRC and the fact that there was minimal health and safety to the public involved in this activity, we decided that we ought to correct this situation as quickly as possible and that's why we went down the path of proceeding with the direct final rule.

CHAIRMAN WALLIS: What kind of letter are we going to write? I think if we state qualitative in our letter and simple said that we see no reason to stop you doing this that would be fine. But if we started to say we've seen a convincing analysis that everything is okay, I think we would be on much more shaky ground.

MEMBER SIEBER: Don't say that.

CHAIRMAN WALLIS: And we --

MEMBER KRESS: Don't say that.

CHAIRMAN WALLIS: I was wondering what we're going to say in our letter.

MEMBER APOSTOLAKIS: What is it that you're asking us to do?

MR. MARTIN: As part of our process for this kind of rulemaking activity, it was appropriate for us to bring this to your attention. Perhaps there

was something although we were quite convinced from a technical standpoint that proceeding with the direct final rulemaking was the most expeditious way to correct this problem. You know we thought it was prudent to bring to your attention so if there was anything that we hadn't considered, I know as a result of Mr. Armijo's questions --

MEMBER ARMIJO: It's Armijo.

MR. MARTIN: Armijo.

MEMBER ARMIJO: Right.

MR. MARTIN: We addressed, we provided some additional consideration for what might happen on this slow dilution event.

MEMBER APOSTOLAKIS: But basically --

MR. MARTIN: What it hasn't changed --

CHAIRMAN WALLIS: But what you want is a letter from us.

MEMBER APOSTOLAKIS: What is it that you want? You want --

CHAIRMAN WALLIS: You want us to approve your action. Right?

MR. MARTIN: That would be nice.

(Laughter.)

CHAIRMAN WALLIS: That's what you want. That's what you're asking.

MEMBER APOSTOLAKIS: But approves what?

CHAIRMAN WALLIS: Approves what?

MR. MARTIN: That you have no objection.

MEMBER KRESS: They're going to follow with rulemaking.

MR. MARTIN: That you have no objection to the rulemaking proposed.

MEMBER KRESS: They intend to make rules to do exclude this double thing.

MEMBER APOSTOLAKIS: What would you do if a member agreed with us but had a problem with the way it's presented.

MEMBER KRESS: We would write a letter.

MEMBER APOSTOLAKIS: -- next time they do better.

CHAIRMAN WALLIS: Say come back with a more convincing case.

(Several speaking at once.)

MEMBER KRESS: The question we have to ask ourselves since we haven't seen a full quantitative risk assessment for the sets of scenarios where the cask is in the pool and can have all these things, we haven't seen that. We've heard qualitative arguments about how improbable that is. The question we have to ask ourselves is would it be reasonable for us to ask

for a full risk assessment with quantitative. I don't think so because I don't even think it can be done right now.

MEMBER APOSTOLAKIS: No.

MEMBER KRESS: And then the next question is well has their qualitative argument been sufficient for us to make the judgment that they can go ahead with this rulemaking and there not be any particular change in the risk to the public. It's like a 14174. They're going to reduce burden and they're going to probably increase the risk a little bit but it's going to be so small about these qualitative arguments which I buy that we ought to be able to say go right ahead with this and we're okay with it. I don't think we're -- At least that would be my view of what the letter ought to be.

MEMBER SIEBER: This is not a risk informed --

MEMBER APOSTOLAKIS: I agree one hundred percent.

MEMBER KRESS: It is in a sense when we think about it. We risk inform all of our --

CHAIRMAN WALLIS: I think the question comes --

MEMBER SIEBER: You consider risk but it's

not risk informed.

CHAIRMAN WALLIS: The question is so what sort of standard are we going to maintain and when we have these presentations in terms of well we'll buy a farm.

MEMBER KRESS: We've always --

CHAIRMAN WALLIS: How much evidence do we need to see, what they're going to --

MEMBER KRESS: We've always said the qualitative risk assessments can be done.

CHAIRMAN WALLIS: Well, that gets you into a pretty murky area.

MEMBER KRESS: Yes. We have to make judgments then.

MEMBER APOSTOLAKIS: It has to be convincing.

MEMBER KRESS: Yes.

MEMBER APOSTOLAKIS: That's the standard.

MEMBER KRESS: And the question is are we convinced that this qualitative risk assessment is good enough.

CHAIRMAN WALLIS: I ask myself -- I may be willing to go along with this but if I sign a letter and then some Commissioner calls me up into his office and says "Well, what makes you make me of me to give

him your arguments?" Then I may have some difficulty.

MEMBER CORRADINI: So if I could ask a question. Could I ask a question though because I guess what the sense is is that there's maybe more to do? So is it fair to say that step one is you've uncovered a duplication of effort and you're going to clear it up? That's my simple interpretation of what it is. You've uncovered a duplication effort and you're going to clear it up.

MR. MARTIN: That's a fair overview assessment, yes.

MEMBER CORRADINI: But would it be fair to also go one step further and say using Slide 16 that there are some other things that would give one pause as to the consistency and overall overreaching way in which this is done that further investigation might be warranted by the staff? I mean to me, only to me, I'd like to actually unravel where some things count and where some things don't count and understand the uncertainty of why you do that.

I understand that somebody said behind us which now makes sense to me that one is plant specific and one is generic and that could be the underlying reason that you make this sort of kind of judgment call. But I do think after saying that you've

uncovered duplication that it seems reasonable to do it this way, but the staff is going to go further and kind of make things a little bit more clear, concise, risk informed would be --

MR. MARTIN: If I might add here from an NRR/NMSS standpoint, I'm looking at this from an NRR standpoint in terms of how it's being implemented and how it's impacted on licensees and how the spent fuel pool operations. He's looking at the spent fuel transportation/storage type kind of operations. I haven't chosen to really delve into the fission product burn-up credit issue because it's somewhat irrelevant from my standpoint. It does create an additional conservatism when it comes to the analysis of the criticality of the dry cask that then falls, somehow gets swept and then it does create an additional amount of conservatism.

If this fission product credit was able to be taken, there might be some overall simplification and this might even become less of a problem because you would say this stuff could never go critical. But then there would even be the situations that were brought up before where you might be taking out the fresh fuel and putting that in. So that's a red herring, the issue of the fission product credit.

From my standpoint, it's a red herring.

When I look at the likelihood of the scenarios, the possibility of the leakage drain-down, the recriticality, the deboration, that becomes significantly improbable and the issue of the fission product credit that although it might allow licensees to put higher burn-up fuel in the cask in the long run is a cask gloating issue. It's something that I think should be dealt separately in a separate context and really has no -- doesn't have a significant bearing for me on this rulemaking. I don't believe it has a significant bearing for the licensees either.

MEMBER ARMIJO: Okay. Well, I disagree. I think burn-up is there. It's real.

MEMBER CORRADINI: Yes.

MEMBER ARMIJO: So whether you take credit for it or not is -- I think you should take credit for it. I think you should be more consistent across your regulations of taking burn-up credit whether you want to discount it for one configuration or another to some extent if you don't have the detailed data that you think you need. But you can count on the burn-up because that's spent fuel and all these other procedural things that you're relying on to protect you I don't think they are as reliable as the burn-up.

So I kind of take a different view.

MR. RAHIMI: Let me then --

MEMBER ARMIJO: I think that's your protection really.

MR. RAHIMI: Let me then go and really talk about the differences. This one is -- You know there are differences in different -- and let me explain why, our position, the reason for the position.

MEMBER ARMIJO: And I believe you and I accept that. But if you had a burn-up credit for an assembly in the pool, now you put it in a cask, can't you discount it by some factor that you know based on your judgement or analysis that this is going to get 90 percent of the burn-up credit that we know is there in the pool and at least you put real data into your analysis rather than procedural controls to protect the public?

MEMBER SIEBER: And if you don't need the burn-up credit, why go to all the expense?

MEMBER ARMIJO: But the point is you do need it.

MEMBER SIEBER: I don't think so.

MR. RAHIMI: If you use burn-up credit, then you don't need to rely on boron, solvent boron,

in the pool.

MEMBER SIEBER: That's right.

MR. RAHIMI: I mean that's the --

MEMBER CORRADINI: So these dilution events become less significant?

MEMBER APOSTOLAKIS: Which brings you back to 50.68.

(Several speaking at once.)

MR. RAHIMI: Yes. It brings you back to --

MEMBER POWERS: If you have burn-up credit, you put more fuel in the cask.

MR. RAHIMI: Yes, it does bring you back.

CHAIRMAN WALLIS: Now I guess that's another consequence. I mean if you change this rule is there a probability then that the licensees will change their procedures in response which will lead them closer to --

MEMBER CORRADINI: No.

MEMBER APOSTOLAKIS: No, they are requesting it.

MEMBER CORRADINI: I guess my feeling with the uncovering of the duplication and now they've separated it by the movement of the thing from Point A into Point B they've essentially eliminated the

duplication. I'm just kind of listening to the discussion after all this time that even on top of that there is room to be understood as to why these things are different. Now if there are reasons, that's fine. I heard what you're saying. If it's a red herring, fine.

But if that's the case, is there an analysis you can point me to that will shut me up so that I would stop asking that? I mean that's what I think Mr. Armijo is asking.

MR. RAHIMI: I guess that's why that I wanted to go in addition to rulemaking. This doesn't really separate from the rulemaking.

MEMBER CORRADINI: Okay. Go ahead. That's fine.

MR. RAHIMI: The only reason that I want to go over this because some interests were expressed that they would like to hear about the burn-up credit in general, why the difference.

MR. MARTIN: This rulemaking will not affect the loading in the spent fuel pool. It will absolutely permit no additional --

MEMBER CORRADINI: Won't affect what they do.

MR. MARTIN: It won't affect what they do

and this will also not affect the licensing basis of the cask because the cask is still licensed to stay subcritical either with boron or dry and that's not going to change as a result of this. So I wouldn't anticipate that this is not the kind of thing there's a tail end of this or another part of this story that's going to create a problem.

CHAIRMAN WALLIS: Can we get to the end of it? Do you have --

MR. MARTIN: I think we've --

CHAIRMAN WALLIS: Do you have any ways to clarify things?

MR. MARTIN: No, I think we've essentially exhausted our discussion of this. I know the industry has requested a certain amount of time and I think it might be interesting for you to hear --

MEMBER ABDEL-KHALIK: Can I just ask one simple question? Would a generic analysis performed under Part 71/72 always be bounding for all plant specific scenarios?

MR. RAHIMI: No, it won't be always bounding. There is -- Also we have a site specific license. If there is something unique about the site, you know, they can apply what they call a site specific license that it was not included in that

general license for the cask and normally when there is something different it's the site. There is something unique about that site.

Like Diablo Canyon, for example, they have a site specific storage license as opposed to using a general license, you know, taking a cask with the specific compliance off the shelf and using that. Because of their seismic events, you know what that cast was designed for. The answer to your question, if there are some unique things about the site, then they would go through the site specific license route.

MEMBER ABDEL-KHALIK: Thank you.

MR. RAHIMI: I guess I do want to ask if you want me to continue and describe the differences or you believe you've heard enough. You know we can stop right here.

MEMBER ARMIJO: I think we've heard it.

MEMBER APOSTOLAKIS: Yes, we've heard.

MEMBER ARMIJO: Anybody?

MEMBER APOSTOLAKIS: Let's hear from the industry.

MEMBER ARMIJO: Yes. Thank you.

MEMBER APOSTOLAKIS: Don't go away though.

(Off the record comments.)

CHAIRMAN WALLIS: This is probably going

to say it's okay and I don't think they're going to give you this clarifying analysis that we've been asking for but maybe they will.

PARTICIPANT: Let's see what they say.

MEMBER APOSTOLAKIS: I think most of it is in Michael's presentation.

MEMBER ARMIJO: Mr. Kraft.

(Off the record comments.)

CHAIRMAN WALLIS: Please go up front. Tell us who you are and make a presentation.

MEMBER APOSTOLAKIS: Why you are here. Why do you think you want to address us?

MR. KRAFT: We don't have any slides so we're not going to want the screen here. Thanks very much. I appreciate the opportunity to be included in this discussion. My name is Steven Kraft. I'm the Senior Director of Used Field Management at NEI. I'm joined at the table here with Brian Gutherman who is a consultant to NEI and NEI members on these matters and Dr. Albert Makios well known from ***2:32:56 Research Institute and there are four individuals in the room in the back here who are representing utilities who use this technology. So if there are questions about utility site specific, we may ask one of the folks over there.

I think it was very interesting listening to the give and take with the staff. It was -- We were sitting here debating whether or not we actually wanted to come up here because you kind of covered all the issues and there's not a whole lot left to say. But anticipating you might have some questions, we of course, I have Brian and Albert along with us here.

You know I think -- I don't know who it was that said it, but I think it's fair to say that we live in a very practical application driven world and you all are going to have your conversations with the staff and you're going to grill them the way you grilled them and I think this sort of Socratic method you use improves the understanding and sharpens everyone's ability to think and do the analysis and I'm sure Tom and Meraj and George will go back and think about what you have to say and I think that it ultimately leads to improvement and that's what it's all about. So we appreciate what you're doing here.

We take a very different point of view and we're not going to sit here and try to argue with you about whether you know you have this analysis and that analysis. Our approach was is the erode of risk after we loaded 750 casks with no indication of any problems whatsoever in this area and all of a sudden we had to

make a change with the way we were doing business. And that didn't bother us a whole lot. We understood that sometimes you have overlapping regulations, but a number of our utilities who are members of NEI pointed out to us and some of them are in the room that it was costing them upwards of $0.5 million each to do this not to mention eating up valuable engineering and licensing personnel time when there are many other issues that really deserve attention.

CHAIRMAN WALLIS: Like just doing the extra analysis and presenting it to the NRC and going through all that.

MR. KRAFT: Yes, and so we approached it not by the sort of detailed, in-the-pool kind of consequence analysis that you all are talking about. We approached it on the basis of the following. It was safe then. It's safe now. What's the problem? And I think -- So we sent --

MEMBER APOSTOLAKIS: Why do you say it was safe then?

MR. KRAFT: Well, two things. First of all, NRC approves the use of these casks under Part 72. You get a certificate and it says you can use it under those circumstances. So somewhere along the way, NRC had made a determination it was safe to load

those casks in the pool (1). And then (2) our experience now over 800 casks suggests to us that there's not a problem, that we can do it. As Tom points out, the casks are not in the pool long periods of time. The goal is to load them and get them out. That sort of thing.

So we strongly support the need to change 10 CFR 50.68.

CHAIRMAN WALLIS: Safety is not based on only what happened, but on what might happen.

MR. KRAFT: We completely agree and that's what we take comfort in the fact that NRC has done an analysis that says if you meet the requirements of Part 72 and which includes loading the cask then you're going to be safe. Again to us, it's a bright line test. You either are or you aren't. We have to operate huge facilities. Okay, we're not going to sit around every day and dither over whether we got, you know, we're on the margin. We're going to operate safely. It's a bright line test. We're going to remain on the safe side of that bright line.

CHAIRMAN WALLIS: But in answer to my colleague's question about how you know it was safe before, it's safe before because it met a regulation, not because you did some analysis to show it was safe.

MEMBER APOSTOLAKIS: That's why I shut up. The fact that you have 750 loads does not mean they were safe. But you met 72, then it's okay.

MR. KRAFT: That's right. But having 750 loads having met 72 gives us gives us some measure of the fact that we're safe and we can do it safely. The sorts of analyses that you're demanding of NRC staff is appropriate if you demand that of the NRC staff.

MEMBER APOSTOLAKIS: Right. I agree. That's fine.

MEMBER MAYNARD: I don't believe that the industry just relies totally on the regulations for it being safe. They do their own analyses. The vendors for these casks and the utilities themselves do analysis and they won't be submitting something that they didn't believe was safe also. So I don't think they are just relying on the fact that if it meets the regulations it must be safe. The utilities and the vendors have also done analysis, criticality analysis, and stuff.

CHAIRMAN WALLIS: Are you going to tell us about it?

MR. MACHIELS: Yes, exactly.

MR. KRAFT: Do you want to respond to that, Albert?

MR. MACHIELS: Yes, I would like maybe just to divert just a moment but Dr. Rahimi was asked a lot of questions about burn-up credit, why it was used in one context and not in the other context. The whole issue is validation essentially. When you rely on the Part 50 and you take into account burn-up credit and the methodology that you use, you have actually a lot of validation for those methodologies. You rely on the extensive feedback from running the reactor, criticality, depletion and so on. So the method that you use that gives you a number whether it's 0.5, 0.9 or 0.95, it's actually validated by a real experience and clearly in the context of establishing a case why you can load safely is that you go through a calculation which entails not only using a methodology but having means to validate that your methodology is appropriate and giving you the right results.

Now when we go into Part 72, you notice that there's a change in philosophy there and the practice then is that you have virtually lost corporate memory about your spent fuel. You go from essentially a first principle, how much uranium-235, 238, 236, 238, plutonium-239 and so on, fission products, and you go on the one specific isotope by

one specific isotope.

MEMBER ARMIJO: But why is that? Why do you assume or why does anyone assume you've lost corporate memory and all that? I mean you still --

MR. MACHIELS: I am the wrong person to answer that. You really have to go back to the NRC and go for historical reasons why they chose that approach. You could in principle have that approach or another approach could be which is not in the regulations right now is that you could leave that to the utilities actually to the -- You have the dual purpose. But that's where the discontinuation is here and so on one case you have a true validation by looking at the way you run your reactor, the extent of the experience that you have with that.

The other one you have to go and now analyze spent fuel element from miscellaneous reactors, see how much isotopic concentration you have from a given species and then you have to look at the value of the worse of those fission products for a given spectra and these type of things. So you need a tremendous amount of good data so get the validation in order to support any burn-up credit methodology in that context. And so that's the issue there.

Now there are reasons why the industry

obviously likes burn-up credit and one of them is risk based is that if you have burn-up credit instead of shipping 24 assemblies at a time, you ship 32 assemblies at a time. You reduce the number of shipments by a factor of 25 percent. We all know that there are real risks in tracking along the highway and if you'll compare the incremental risk one way and the decrease in the risk in the highway system, you will find that burn-up credit should probably be the method that you would have to use in order to maximize the load of your shipment and minimize the number of shipments.

But anyway, I'm diverging here. Okay. But I'm saying there is a basis. This is not simply because we have 750 loadings and no accident that we deduce it's safe. But there is a systematic analysis which have been performed with appropriate benchmarking and you can see in one case why in one case we can use burn-up credit in a fairly straightforward manner and the other case because of a different selection at the start we are really, if you want to, we have to get an extensive amount of data in order to be able to validate the approach.

I believe that, you know, the weak point is really in some ways the regulations themselves. As

pointed out by the NRC, there is no distinction. You talk about fissile materials and clearly if you ship plutonium or fresh fuel, it's a different animal as if you ship spent fuel. And when you ship plutonium or fresh fuel, you deal only with a limited number of nucleids. So you can afford to go systematically through a methodology which says these are the biases of the methodology that I should take into account. These are the uncertainties I should take into account.

When you talk about spent fuel, you talk about an animal which is dead most of the time from a reactivity point of view, but there is about a gazillion isotopes it and obviously if you want to take into account not only the actonites but the minor actonites as well as up to about 15 fission products and systematically you have to come up with a bias and the uncertainties that apply to those and add those in a systematic manner so that you stay conservative. You basically eat in to your reality and that's why the reliance on reactor is so good because the reactor in a way give you change of reactivity in a more global manner. They follow some fission products individually but also they have some groupings of fission products. So you can see there the tension if

you want to between the two parts.

MEMBER SIEBER: And it's non-homogenous. Spent fuel assembly is with variations.

MR. MACHIELS: Right. There's a profile. There's an actual profile.

MEMBER SIEBER: In all directions. So the problem is not simple.

MEMBER CORRADINI: So let me ask you a different question to turn it around. So is the industry actively pursuing a conscious effort to use burn-up credit and make a proposal that that's the way to actually reduce overall risk?

MR. MACHIELS: There are two vendors which have an application in front of the NRC. The NRC is evaluating that. There is a joint research project involving DOE, NRC Research and EPRI in chance of obtaining additional data and so there is certainly an effort to get to that.

MR. KRAFT: Absolutely. I think that in the long run, I think that you're going to need to have to take the higher burn-up fuels. You're going to have to take into account burn-up credit and things like that.

MEMBER APOSTOLAKIS: So Part 72 then imposes unnecessary burden. Is that what you're

saying?

MR. MACHIELS: Well, the Part 72 takes the most simple situation. It says let's assume that your fuel is fresh and let's go from there.

MR. KRAFT: It's only two ways. As enrichments go up, I think that you're going to see that it could be that. I think initially it wasn't. The uncovering of the conflict between two regulations I think brought it really to a head in terms of current regulatory application. That burn-up credit is something that would be beneficial and I think we can project into the future that for the Yucca Mountain project. When DOE starts coming to NRC to get certificates, or the vendors are, certificates for the multi-purpose canister, there's going to probably you need to get burn-up credit for some of the criticality control requirements that they're looking for. So I think that there's going to be a need to have this develop and documented and through the research program that Albert described.

DR. RYAN: Just a question from Mike Ryan. I think that's where the ACNW's interest really is because we're tasked to look at the package performance study and some of those issues related to Yucca Mountain.

MR. ROLAND: This is Bill Roland. Just one comment. Mr. Armijo said it probably as precise as I think somebody could say it. He said how could you take the fuel credit for burn-up and I think you said some factor.

MEMBER ARMIJO: Yes, discounted if you have some uncertainty.

MR. ROLAND: And that's precisely the problem. We need to know what the technical basis for that factor is and that's why we're looking for additional data so that we just don't have some factor. We have a factor that has technical basis.

MEMBER ARMIJO: But wouldn't it be better to put a big fat factor and do something soon than study it for 50 years and never get there.

MR. ROLAND: And it's my understanding that when you make that factor big and fat it ends up not being particularly useful.

MEMBER ARMIJO: I'm talking about --

MEMBER APOSTOLAKIS: Sam, are you arguing that they should be going the other way?

MEMBER ARMIJO: No, I'm saying that they should take the burn-up credit as validated by the reactor experience, attach that number --

MR. ROLAND: He wants the modified Part

72.

MEMBER APOSTOLAKIS: That's what I'm saying. You're going the other way. You want to keep 68.

MEMBER ARMIJO: I'll give you the option of using it if you want.

MEMBER APOSTOLAKIS: Oh, option.

MEMBER ARMIJO: Yes, you don't have to use it, but you know it's there to some extent. Right? So it's just the issue of how much it's physically there, the burn-up is there.

MEMBER APOSTOLAKIS: But the industry doesn't care. Why do you care? I mean I'm serious.

MR. KRAFT: We do care though.

MEMBER APOSTOLAKIS: So you say you have studies going on.

MR. KRAFT: Wait. Hang on a second. 50.68 applies only to loading in a pool. Okay. Then that's what's on point for discussion here. But in many other areas, the need for burn-up credit is going to become very important as we get to higher burn-up, higher enrichment, higher burn-up fuels.

PARTICIPANT: George, it's reality.

MR. KRAFT: As we get the disposal at Yucca Mountain.

MEMBER APOSTOLAKIS: I understand that, but --

CHAIRMAN WALLIS: Isn't there a --

MEMBER APOSTOLAKIS: No, the reality today is the proposal by the staff to modify 50.68.

MR. KRAFT: I don't disagree with that.

MEMBER APOSTOLAKIS: And there is a reality out there which is another reality. So the question is do we disagree with the staff. Are we going to agree, disagree, whatever? Now what you're addressing it seems to me, Sam, is a broader issue.

MR. KRAFT: Right.

MEMBER APOSTOLAKIS: Which probably belongs to another meeting.

MR. KRAFT: Yes, there is a very broad -- There is a much broader issue that that.

MEMBER APOSTOLAKIS: Yes and these gentlemen, I think you told us that the industry is already looking into this.

MR. KRAFT: Yes we are.

MEMBER APOSTOLAKIS: So probably you will come back with some sort of request of the staff at some point. I don't know.

MR. KRAFT: Yes.

MEMBER APOSTOLAKIS: I mean whatever you

do that's in the future.

MR. KRAFT: You're exactly right. We have again not really on point to this discussion, but we have an inventory of issues on dry cask and transportation casks that we maintain with the staff that we meet periodically and we work to resolve. Our goal is to close issues so the regulatory uncertainty, if that's the right word I could use, gets closed up. One of them is burn-up credit. There are any number of others. Monetary exclusion is another big one and we are working with the staff and the industry to get those issues dealt with and this is one of them.

MEMBER APOSTOLAKIS: We'll probably have a chance to address this at some time in the future.

MR. KRAFT: The future, you will certainly.

MEMBER APOSTOLAKIS: But I think Mr. Michiels' views have been noted.

CHAIRMAN WALLIS: We are simply to revise on this decision to pick one of them and not have duplication.

MEMBER APOSTOLAKIS: It's a very limited decision.

MR. KRAFT: And I agree with that.

CHAIRMAN WALLIS: It's very simple in

essence decision.

MR. KRAFT: While you're thinking about whether you're going to agree or disagree with the staff, there's one more point from a regulatory implementation standpoint. We read the proposal. It was made available to the public about 3:00 p.m. yesterday afternoon and so we've kind of been reading it and we haven't exactly studied all the details of it and general counsel still wants to read this thing in great detail. It is not clear to us what happens to those handful of licensees who have already modified their licenses. Where having borne the burden, they are now being required to go back and rebear the burden to undo what they have done and that make absolutely no sense and whether or not the current language that was made available to the public --

CHAIRMAN WALLIS: They've done it twice. They've done it with both. Do they now have to go back and forget that they've done it?

MR. KRAFT: That's exactly the question, Dr. Wallis.

CHAIRMAN WALLIS: But if they've done both, it doesn't matter.

MEMBER APOSTOLAKIS: They should tear up

the pages.

MR. KRAFT: We don't really know, but what is intended by, it's not described very clearly, but you know it's a confused situation. When we read the words, we're not exactly certain how they get applied. We think NRC is going to be smart about it but it's not clear.

MEMBER APOSTOLAKIS: Can we have the staff tell us?

CHAIRMAN WALLIS: And we have the public comments to come back. We'll have the public comments.

MR. MARTIN: This is Tom Martin. I am just now finding out that there might be some degree of unfairness associated with licensees that have already taken the steps before and modified their regulations, not modified the regulations, modified their technical specifications to provide consideration of this. I'll have to -- You know we'll have to discuss this with NEI and if we can make a minor adjustment in the rulemaking that would be appropriate that could be considered. This has not been released as a direct final rule and it's still on the table.

MR. MIZUNO: This is Gary Mizuno, Office

of General Counsel for NRC. If I understand the industry correctly, they are saying that they have modified, some licensees have modified, their analyses and provided perhaps an exemption.

MR. KRAFT: No, these are people who have actually submitted LARs, got them approved and now have modified tech specs.

MR. MIZUNO: Okay. They have modified tech specs. Okay. The tech specs I believe are consistent with the proposed rule were it to go final or if it becomes a direct final rule, if it becomes final.

MR. KRAFT: That would require your having a conversation with our general counsels to convince them that that's the case because at the moment they're not convinced.

MR. MIZUNO: Okay, but I've certainly thought about and the concept was that this was not going to impose any kind of backfitting upon licensees because it was basically one that permitted licensees to either stay with their existing system, whatever it may be but this was a relaxation, a voluntary relaxation. So licensees had their freedom even if they were approved for something else to revert back to something else. But there was nothing in

particular about the rule that required them to change from where they were.

CHAIRMAN WALLIS: Are we about ready to wrap this up?

MEMBER ARMIJO: I think we are. Are you finished?

MR. KRAFT: Yes we are. Thank you.

CHAIRMAN WALLIS: Ready to wrap it up?

MEMBER ARMIJO: We're ready.

CHAIRMAN WALLIS: If you're ready, then can we do it? May we do it?

MEMBER ARMIJO: Do it, yes. Just I think --

CHAIRMAN WALLIS: Thank you very much.

MEMBER ARMIJO: Thank you.

CHAIRMAN WALLIS: I thank the NRC. Now, Sam, I think you need some input from the Committee but would you be happy to take it when we meet to discuss things at the end of the day rather than now.

MEMBER ARMIJO: If you want to move the schedule. Are we still --

CHAIRMAN WALLIS: I think we may need to mull it over. Yes, I would like to take a break. I'd like to take a break.

MEMBER ARMIJO: Let's take a break.

CHAIRMAN WALLIS: Okay. We'll take a break for 15 minutes or actually -- Yes, we'll take a break for 15 minutes to -- It's seven minutes past. Can you remember seven minutes past? Ten minutes past. Ten past three. Off the record.

(Whereupon, at 2:53 p.m., the above entitled matter recessed and reconvened at 3:12 p.m. the same day.)

CHAIRMAN WALLIS: On the record. Please come back into session. In case there's any doubt this is an open meeting and the subject is the State of the Art Consequence Analysis and I'll turn it over to Mario Bonaca.

MEMBER POWERS: Mr. Bonaca, before you start, I believe that Sandia National Laboratories has some involvement in this of an indeterminant nature and because of that, I am going to seriously recuse myself from commenting, participating or otherwise engaging on this subject.

MEMBER BONACA: Recusing yourself. Very good.

CHAIRMAN WALLIS: Are we going to lose a quorum because of that?

(Laughter.)

MEMBER BONACA: That said, just let me say

the purpose of the meeting is to discuss the staff's plan for performing state-of-the-art reactor consequence analysis. Just for the purpose of background, the 1992 NRC and Sandia National Lab NUREG CR22.38 more commonly known as the Sandia Offsite Study, used several known conservative assumptions and bounding analysis to demonstrate results that met overall risk goals. At the time this analyses were sufficient to meet the purposes.

But the results in terms of predicted offsite early fatalities latent cancer for severe accident scenarios have often been quoted. And despite widely accepted arguments that these results rely on conservative inputs and bounding analysis the results continue to be quoted and circulated in public forums.

The Commission has directed the staff to develop a plan and then has approved a plan to evaluate and update as appropriate analytical methods and models for a realistic evaluation of severe accident progression and offsite consequences, (2) to develop state-of-the-art reactor consequence assessments and (3) to develop an integrated and predictive computer based tool to assist decision making in the event of severe reactor accident.

The Commission also directed the staff to work with the CRS on technical issues and therefore it's important to us to listen to our role, perspective role. During the meeting, the staff will discuss their plans with us to establish a basis for our ongoing interaction on these topics. We are not expected to write a letter I believe out of this meeting and so at this point, I will turn over the presentation to you.

MS. LAUR: Thank you. Thank you for your time this afternoon. I'm Michele Laur with the Office of Research. We have Chris Hunter and Jason Schaperow who will also present and answer questions today. We want to thank you for the time to talk about this particular project in a public venue. This afternoon we're going to cover a number of topics. We want to give you a general overview of the project, but more importantly we would like to give you some progress to date and some of the activities that we're going to be pursuing as our next step.

As Mario mentioned, there have been some studies done in the past that did serve their purpose at that time, but there have been changes at the plants. We've learned a great deal of good information with regard to accident progression and

core melt phenomenology. So the Commission determined that there was a need to kind of revisit the subject if you will. So in December of 2005, a SECY was written that included the staff's plan to conduct this analysis and then in April of this year, the Commission SRM was released that directed the staff to perform this more realistic evaluation of severe accident progression and offsite consequences.

Now the focus of this study is to look at a spectrum of scenarios that are most likely to happen and produce subsequent offsite consequences using a risk informed rather than a risk based approach.

MEMBER KRESS: Can I ask a question about that one?

MS. LAUR: Surely.

MEMBER KRESS: You know when we do a full PRA analysis, Level 3, we add up the endpoints.

MS. LAUR: Yes.

MEMBER KRESS: Which includes basically all of the sequences that we stick in there that have endpoints that are important. Now what you're saying is that you're going to somehow curtail those endpoints and pick out only certain ones and not add in the others.

MS. LAUR: We are going to address that in

a slide and if we could hold that question until then.

MEMBER KRESS: Okay.

MS. LAUR: Because we'll step through it very carefully for you.

MEMBER KRESS: Okay. Thank you.

MS. LAUR: All right. Thank you very much.

CHAIRMAN WALLIS: My question is risk informed usually applies to regulation. You make risk informed regulation.

MS. LAUR: That's correct.

CHAIRMAN WALLIS: And the evaluation of an action of progression is a technical analysis. It has nothing to do with risk informed or not. And as my colleague points out, you only bring in risk when you perhaps exclude certain things that you decide not to look at.

MS. LAUR: We will step through the process we're using and discuss it in greater detail for you.

CHAIRMAN WALLIS: Maybe using this risk informed approach is just some kind of litany you go through to try to get a blessing.

(Laugher.)

MS. LAUR: You're very intuitive, aren't

you?

MEMBER KRESS: You can't believe the numbers. Right?

MS. LAUR: As we all know, numbers should be looked at as trends, but we'll get into it in detail. Thanks. As you may know, this project really has two major parts to it. The first is the consequence analysis and for the consequence analysis we will be using the most realistic modeling software that we have to look at the systems and transport and eventually the release pathways. We will incorporate the most up-to-date emergency preparedness modeling assumptions. So we are working very closely with folks in NSER so that we factor that in appropriately. We're going to try to account for plant improvements that have come about because of recent studies that have been ongoing here at NRC and elsewhere.

We want to account for recent mitigation strategies that might either delay core damage or at least reduce the impacts of the offsite consequences and then that second part of this project is this faster than real time decision making tool that we're not going to focus on today but I will tell you again we're working with folks in NSER and also people in our OPS Center who are the ultimate endusers of that

product so that when it is developed it will be useful to the folks that need it.

CHAIRMAN WALLIS: Real time tool, you mean a computer simulation which goes faster than the event?

MS. LAUR: Yes.

MEMBER KRESS: When you do this assessment, have you got up-to-date data on the meteorological conditions and the population around these areas and the changes in the general types of land that are around there? Do you have up-to-date data on that?

MS. LAUR: We are going to be using the most up-to-date data we can get. In fact, we're holding a public meeting tomorrow where we're going to focus primarily on the data needs for this particular project, met data, precipitation data, emergency preparedness information, evacuation, sheltering. All of these are important bits of information that we want to incorporate that really makes this the state-of-the-art type project because we hope to wrap that information in as well as the information that's been gained over the last 20 years on how cores actually melt. So that's really where the state-of-the-art part comes into this analysis.

You may ask yourself why bother to do this project. What could be the end uses of it? This is a list of some --

MEMBER KRESS: I'm not going to ask myself that.

MS. LAUR: You might not?

MEMBER KRESS: No.

MS. LAUR: I ask myself.

MEMBER KRESS: I've been calling for it for ever since I've been on this committee.

MS. LAUR: Thank you.

CHAIRMAN WALLIS: What do you use it for?

MEMBER KRESS: I have lots of things I use it for.

MEMBER APOSTOLAKIS: Is this a Level 3 PRA?

MEMBER KRESS: Yes sir.

MEMBER APOSTOLAKIS: Obviously you don't like what they're doing.

MEMBER KRESS: You can tell. I don't like this program at all.

MEMBER APOSTOLAKIS: Why did you decide to do this? Has the question been asked?

MEMBER KRESS: Yes.

MS. LAUR: Yes. It was --

MEMBER APOSTOLAKIS: Because he does a good --

MS. LAUR: He got one vote. So some of the potential uses that have been identified in the SECY for this particular project are listed here. I'd like to highlight that for example we hope to gain some insights that might be useful in the licensing and site reviews for new reactors that are on new sites. While we won't use this information to supercede the regulations for siting, they can help us to make better decisions in that process.

We also hope that the analysis will help us to test our emergency preparedness plans to make sure that what we have in place does make sense and is of the greatest benefit.

CHAIRMAN WALLIS: Can I ask you a question?

MS. LAUR: Surely.

CHAIRMAN WALLIS: What you're doing here is all plant specific.

MS. LAUR: Yes it is.

CHAIRMAN WALLIS: So are you going to provide a tool for doing it or are you going to do it for each plant?

MS. LAUR: What we plan to do is that the

Melcor part of the analysis which will give us the actual source terms we don't actually have a plant deck for every plant. So we will be using the plant decks we have and making some changes to them as necessary, also doing some sensitivity analysis to see which of the parameters are more important to more accurately model. When we get to the consequence analysis which is the MACCS analysis, that will be done on a plant specific basis for every plant.

CHAIRMAN WALLIS: For every plant?

MS. LAUR: For every plant.

CHAIRMAN WALLIS: Are you going to publish a document which gives us for every plant, gives the results for every plant?

MS. LAUR: We will be publishing a document to cover the entire analysis. There could be the potential that some insights gained through this would not be something that would be put out publicly and we'll determine that at --

MEMBER CORRADINI: So if I remember back `82 wasn't this -- I'm trying to think of Dave Aldridge. There was a study done, a NUREG, that had it on a plant specific basis essentially a source stream analysis. Am I remembering correctly?

MS. LAUR: The 1982 --

MEMBER KRESS: Sandia Siting Study.

MS. LAUR: Sandia Siting Study, that's correct.

MEMBER CORRADINI: So it's essentially an update to the Sandia Study of `82?

MR. SCHAPEROW: Actually the Sandia Siting Study had only one source term, well it had five source terms, but one was really the severe accident source term with early containment failure.

MEMBER CORRADINI: But then they placed it at all the reactor sites.

MR. SCHAPEROW: That's correct.

MEMBER CORRADINI: That's what I remember to be the case.

MS. LAUR: Right, but this will --

MR. SCHAPEROW: They did crack calculations for each site.

MEMBER CORRADINI: Right.

COURT REPORTER: Sir, would you identify yourself please?

MR. SCHAPEROW: Jason Schaperow of the NRC staff.

MEMBER APOSTOLAKIS: So is it possible then at some point in the future your results will be part of the SPAR models if you are doing it on a site

specific basis?

MS. LAUR: We're actually using the SPAR models that we have in-house right now to help us determine which scenarios to select and as we move beyond looking at internal events to inform us in our scenario selection we will be trying to use the external event SPAR models that have been developed here to help inform us on that decision.

MEMBER APOSTOLAKIS: Yes, but then when you get your results, are you going to feed back into the SPAR model your Level 3 results?

MR. ELTAWILA: Professor Farouk Eltawila from the staff. We are developing a model from the SPAR right now, a simplified model that can be used the resident inspector. Where this type of analysis that Michele is talking about and using the Melcor code and things like that might be a very complicated analysis. We are going to decide on whether we are going to incorporate the insight that's coming from that study into the SPAR model. But right now, there is a plan to develop a Level 4 SPAR model.

MEMBER KRESS: Let me ask you a technical question. I don't know if you get to it or not. When you do the consequence analysis, let's talk about latent effects. Are you going to truncate somewhere

like 50 miles or 100 miles or 150 miles and are you going to use the linear no-threshold? I don't know if -- I just want to get the basis.

MR. SCHAPEROW: Yes, our initial thinking was to present both results with a linear no-threshold going out to great distances and also to present results with a series of different threshold doses up to 5 rem per year.

MEMBER KRESS: Okay. So you'll do sort of a sensitivity.

MR. SCHAPEROW: Yes, that was our initial thinking. Now we had an expert review meeting two weeks ago out in Albuquerque to go over the modeling and the MACCS code and some of the main assumptions we're going to use in it and this issue of course came up and we had different views from different people on the panel as to what might be an appropriate distance for truncating. So I guess it's fair to say you're right. That's a tough issue.

CHAIRMAN WALLIS: Are you going to truncate the distance and if you have a very hot plume of the Chernobyl type, as you know, it goes a long way.

MEMBER KRESS: But that will get put in the distance traveled. But you know you can either do

something about the threshold or you can do something about the distance and they are equivalent to each other. But it's hard to say which is which. But I would just make it easy. Don't mess with the threshold. Mess with the distance.

MEMBER APOSTOLAKIS: I thought it was 50 miles, isn't it?

MEMBER KRESS: They used to stop at 50.

MR. SCHAPEROW: Sometimes 150.

MEMBER KRESS: That's arbitrary. Sometimes they go to 150.

MEMBER CORRADINI: Can I ask, Tom, why do it on distance and not dose?

MEMBER KRESS: You would do the dose but I would say just if you're using the linear no-threshold theory on the dose consequences.

MEMBER CORRADINI: Yes.

MEMBER KRESS: You're essentially truncated it if you truncate the distance. So it's easier to truncate a distance than it is to try to figure out what the threshold is.

MEMBER CORRADINI: You're just saying from a practical matter.

MEMBER KRESS: From a practical sense. But that can go either way.

CHAIRMAN WALLIS: But you're saying that Chernobyl had no effects beyond 150 miles.

MEMBER KRESS: We're not going to have Chernobyl in our sequences.

CHAIRMAN WALLIS: But presumably at Chernobyl like sequences are a possibility. It's been analyzed --

MEMBER KRESS: No, that's not even going to be in the PRA.

CHAIRMAN WALLIS: It's not going to be in the PRA.

MEMBER KRESS: No.

CHAIRMAN WALLIS: It's impossible.

MEMBER KRESS: Yes.

CHAIRMAN WALLIS: All right. Thank you.

MEMBER KRESS: It's one of the truncated sequences and we don't --

MEMBER SIEBER: Very reassuring.

CHAIRMAN WALLIS: It's truncated. That's why it's impossible.

MEMBER BONACA: Okay. Let's -- Go ahead, Ms. Laur.

(Off the record comments.)

MS. LAUR: Thank you. Some of the other reasons why we want to move forward with this study

that one might ask themselves even though Tom might not ask himself is that there have been some improvements in PRA modeling. As we know plants have evolved and improved over time. We've had some plant design changes based on a number of initiatives. It started here at NRC such as the station blackout rule. One of the things that came out of that was an improved alternative AC power source.

Some of the things in the Level 2/Level 3 area that have improved and give us a reason for doing this study is that since 1982 there have been a number of international and national studies that have been done on phenomenology that give us a much better idea of how core melt will progress. Also there have been improvements in the Melcor software product that we have that we're going to take advantage of during this study. Computing speeds have given us the opportunity to look at more sequences than we might have done in the past. The net effect is that we hope to have a much more realistic study for ourselves and for our stakeholders.

We have a lot to do. We have three years to do it. This gives you a little idea of the plan as far as what sites we plan to look at first. In the first year, we hope to evaluate the Westinghouse large

dry, the GE Mark I and the GE Mark III plants. We will follow up with the Mark IIs, the Ice Condenser and the sub-atmospheric in year two and in year three we hope to look at BMW and CE plants. We also plan to use year three to go back and refine different parts of the study if we find that is necessary.

This is, and I'd like to point this out, a joint effort between Research NSER and NRR and we are using Sandia as our contractor for assisting us with this analysis.

MEMBER APOSTOLAKIS: Is the industry doing anything? Are they helping you? Opposing you? Don't care?

MS. LAUR: I've had some conversations with industry. We will have a public meeting tomorrow where we will have members of industry attending. We hope to engage them on a frequent basis throughout this project. So far in the conversations I've had they are very interested in being a part of this project. We hope that they will help us to get some of the information that we need that we don't have in-house.

We've already kind of talked about some of that information already. The MET data, we have some of that already. Some of that data is available to us

because of license renewals, but data such as the precipitation data is not something that is required by the NRC. So we hope that we will get assistance from the industry to get that kind of information. There are some recent procedures that are being developed by EPRI and others to help deal with post accident activity and we hope to tie into that source as well to get that kind of information so that we can update our HRA to the extent necessary on this project. So, yes, we are engaging industry.

MEMBER CORRADINI: Now let me ask -- Can I ask a different question along the same lines? Have they done the equivalent of a Level 3 on one of these sorts of plants that you could actually do a one-to-one comparison based on tool as well as assumptions?

MS. LAUR: I don't think so. That's certainly something that we can investigate.

MEMBER KRESS: There have been some Level 3s in the environmental impact statements.

MEMBER APOSTOLAKIS: Level 3 is Indian Point. There is a full Level 3.

MEMBER KRESS: Yes.

MEMBER APOSTOLAKIS: Seabrook.

MEMBER KRESS: Seabrook has one.

MEMBER APOSTOLAKIS: The other one, the

big one. South Texas project. So there are four or five. The Indian Point is very old, but the others --

MS. LAUR: There are some.

MEMBER CORRADINI: All done by their consultants.

MEMBER APOSTOLAKIS: Yes. Well, the utility process.

MEMBER CORRADINI: I'm getting the point which I'm guessing what their tool is in relation to this and I'm also curious about many times you don't want to roll it too much, but I'm curious about the modeling assumptions as well as the net result and so I would expect they're using what they use in their IPEs.

MS. LAUR: I would guess that.

MEMBER CORRADINI: So it would be an interesting comparison if you had some sort of connection at a couple of places. That's just what I was wondering.

MS. LAUR: That's a good point.

MEMBER KRESS: Let me ask you another question. When you get around to doing the site specific evaluations, what are you going to about sites that have three plants on it, three different units? Or two? Multiple sites? Multiple units?

MR. SCHAPEROW: We'll have to consider those separate consequence calculations.

MEMBER KRESS: Then add them up. Add up the risks.

MR. SCHAPEROW: The assumption that they would both be having --

MEMBER KRESS: You're going to get a site risk rather than a plant risk is what I'm asking because you have to add up the risks of each plant on the site to get the total risk for that site.

MEMBER CORRADINI: But would it be additive? Why would it be additive?

MEMBER KRESS: It's additive.

MR. SCHAPEROW: If your metric is risk. I think our metric here is going to be offsite prompt fatalities, offsite latent fatalities.

MEMBER APOSTOLAKIS: And some probability of distribution. You're not going to just say --

MEMBER KRESS: You're definitely going to go to a risk.

MEMBER APOSTOLAKIS: You have to have a probability distribution.

MEMBER KRESS: Yes. I mean it's useless without it. I mean you're going to go back to 740 if you just use the consequences. You're going to add

the probabilities in.

MEMBER APOSTOLAKIS: Are you producing risk curves? That's really the question. You know like the reactor safety study. Frequency versus acute fatality.

MEMBER KRESS: Yes.

MEMBER APOSTOLAKIS: I mean how else can you do it. Otherwise, you go back to 740.

MEMBER KRESS: Complimentary. Yesm, otherwise you're doing 740. You don't want to do that. That was a mistake.

MEMBER APOSTOLAKIS: What will your result look like?

MEMBER CORRADINI: They're not really talking to you. They're talking to each other.

MS. LAUR: Okay. Go right ahead.

MEMBER APOSTOLAKIS: No, I'm asking you.

MEMBER KRESS: Cumulative complimentary distribution functions.

MEMBER APOSTOLAKIS: Yes.

MEMBER KRESS: For things like fatalities and --

CHAIRMAN WALLIS: Frequency consequences curves.

MEMBER APOSTOLAKIS: Yes, exactly. FM

curves.

MEMBER KRESS: That's what PRAs put out.

CHAIRMAN WALLIS: Is that what you're going to produce? They're talking --

MEMBER KRESS: No, that's what PRAs put out.

MR. ELTAWILA: We are not going to produce frequency consequence curves. We are going to produce results for the dominant scenario. We're going to identify the number of early fatalities and the number of cancer fatalities. So this RD will be the product our work.

MEMBER APOSTOLAKIS: Farouk, what do you mean by the number of early fatalities? I mean there will be a distribution for those. Right? You can't just say it's five. There's a probability for --

MR. ELTAWILA: You're going to have to add for all the scenarios. Yes.

CHAIRMAN WALLIS: So integrate.

MEMBER APOSTOLAKIS: So you will not deal with uncertainty at all?

MR. ELTAWILA: Do you want to take this?

MR. TANKLER: Yes. Let me -- I'll just jump in here. A different kind of risk. Charles Tankler from the NRC staff. The current thinking is

that the complimentary cumulative distribution function curves don't really add a lot to this portrayal because we end up then focusing on 99.9th percentile for 10^{-6} events. So we end on focusing all our energy and attention on what then becomes a 10^{-9} outcome. So the focus of the study is to focus on the more probable but dominant events. So repeating that same process that was done in the `82 study which -

MEMBER CORRADINI: Is that how they portrayed it too?

MR. TANKLER: Yes.

MEMBER CORRADINI: I remember the curves.

MR. TANKLER: So we generate lots of numbers and the only number that gets a lot of attention is the 99.9th percentile for a 10^{-6} or so event and there's a serious concern how well we examine the tales of some of those distributions was not clear. Now we are proposing to look at the uncertainty in the predictions of consequences.

MEMBER CORRADINI: So there will be, if I might just clarify, so there will be a point estimate for a particular scenario and with that point estimate would be an uncertainty in the consequence direction and an uncertainty in the probability direction.

MR. TANKLER: There would be an

uncertainty in the consequence direction. Okay. Now whether or not we consider 75th percentiles or even go to 90th percentiles that's still something that's under discussion. But there's very little appetite for looking at 99.9th percentiles on --

MEMBER APOSTOLAKIS: But nobody is saying you should do that.

MR. TANKLER: But that was the nature of the CCDF curves from the `82 study.

MEMBER APOSTOLAKIS: No.

MEMBER KRESS: Well, they can be means.

MR. TANKLER: I mean that may not have been what learned members of this committee focused on. But it was what many people thought --

MEMBER CORRADINI: Maybe we weren't that learned.

MR. TANKLER: Well, it was many people ended on focusing on. So there is -- The thrust of this is to look at the likely outcomes from the more probable events. We will, we intend, to look at uncertainty in an integrated way. We intend to use our tools in a manner in which we have some experience to integrate the uncertainty through the calculation, both the MACCS calculation and the Melcor calculation so we can capture the uncertainty of both the source

term and the consequence calculation. But we have not yet determined as yet whether or not how far out on the distribution the portrayal of results, how far out we think that portrayal is meaningful is the best way of saying it.

CHAIRMAN WALLIS: I think it would help -- If you make this presentation again, it would help to give us a sketch of the kind of outputs you expect to get out of this thing and how you would present them. It would be very helpful.

VICE CHAIR SHACK: Why not a mean output if you're going to put out a number?

MR. TANKLER: Yes. A mean, if you look at the 1982 study, one of the companion documents had a compilation of tables where they list the mean value. Now the summary document also had CCDF curves. So we would reasonably expect that we would report mean values and those mean values will be influenced by the tails of the distributions. But the extent to which we attach significance to the tail and out far out on the tail the distribution that remains to be seen and how far we are confident that that number deserves that sort of attention.

MEMBER APOSTOLAKIS: What is the purpose of the meeting today?

CHAIRMAN WALLIS: Informative.

MEMBER KRESS: We're getting briefed I think.

MEMBER APOSTOLAKIS: So we're not writing anything.

CHAIRMAN WALLIS: No.

MEMBER KRESS: We can always write one.

MEMBER CORRADINI: We can always write one.

CHAIRMAN WALLIS: It's informative. Let us --

MEMBER APOSTOLAKIS: But the thing is what I'm trying to avoid is sometime in the future the committee is asked to express or to state its views on the finished product under this program we have of research quality. We may surprise the staff then. So I would rather have a detailed subcommittee meeting where you guys will tell what you plan to do and you hear from us what we think you should be doing and come up to some sort of understanding.

MR. ELTAWILA: That's very high -- This meeting is intended to be at a very high level just to introduce the subject. We are planning to have frequent and more-than-you-need meetings to discuss all the aspects of the program at a subcommittee

meeting. We want everybody to go out with us that we are all in it together.

MEMBER APOSTOLAKIS: I am serious because this is very important. I mean you keep referring to this `82 study which I don't think I have seen but I have seen the 11.50 studies which are from `89 and they report frequency consequence curves. So this would be nice to update those.

CHAIRMAN WALLIS: Which subcommittee is it that's going to do this?

MEMBER APOSTOLAKIS: I think it's Tom's, the Joint.

MEMBER KRESS: I think it's a Joint because of PRA and --

CHAIRMAN WALLIS: So you probably have several meetings throughout the year to get updates.

MEMBER KRESS: This is a PRA subcommittee I think.

MEMBER APOSTOLAKIS: Which subcommittee is today yours? You are not running today's.

(Several conversations at once.)

MEMBER BONACA: We have done this under the Security and Safeguard Subcommittee because we got the first briefing in the subcommittee and then we decided to make it public. So therefore, this is a

summary of what we've heard already before in Security and Safeguard. Now you're probably unaware in the SRM, the Commission specifically directed the staff to work with the ACRS on this issue. So we have a role to play and so your comments certainly are important.

MEMBER APOSTOLAKIS: All I'm saying is that it would be nice for the committee to express its views on what you plan to do before you actually spend a lot of time trying to do it and Mr. Eltawila agreed. Okay. I think.

MR. ELTAWILA: Yes.

MEMBER BONACA: But I think it's important -- The locale for that is to have a subcommittee meeting soon enough where we get to the working level.

MEMBER APOSTOLAKIS: And the subcommittee meeting is not part of the security thing.

CHAIRMAN WALLIS: We'll schedule it for the near future.

MEMBER APOSTOLAKIS: Is that okay with you?

MR. ELTAWILA: We already and I think Michele is going to provide you with a plan of what we are planning to do and then you can ask for the meeting what topics you want us to cover in the next meeting and we'll be here definitely.

MEMBER APOSTOLAKIS: Very good.

MS. LAUR: Thank you.

MEMBER APOSTOLAKIS: Exciting.

MR. ELTAWILA: It's an exciting time.

MEMBER APOSTOLAKIS: At both levels. Right?

MS. LAUR: Okay. As I alluded to the first step in this process is to identify the proper scenarios that we're going to look at and Chris is going to step through this for you.

MR. HUNTER: Hi. I'm Chris Hunter, Office of Research. This slide is just a basic flow diagram for how we're going to pick our scenarios and just to go over a definition of scenario in terms of this project it's either an individual sequence or a group of sequences that have some similar system unavailabilities or availabilities and similar times to core damage.

CHAIRMAN WALLIS: I'd pick the first item, screen initiating events. Do you mean events with a probability of less than 10^{-7}?

MR. HUNTER: Initiating events with a --

CHAIRMAN WALLIS: Just don't have a CDF by themselves. Initiating events don't have a CDF.

MEMBER APOSTOLAKIS: Do you mean

sequences?

MR. HUNTER: No, that would be the cumulative sum of initiating sequences, the sum. So for example, say a medium loca, all the medium loca sequences, have a core damage frequency.

CHAIRMAN WALLIS: With the same initiating event.

MR. HUNTER: Correct.

CHAIRMAN WALLIS: Okay. I see.

MR. HUNTER: So for the lower frequency initiating events a lot of them scream out and it depends on the type of plant we're looking what scenarios we're going to see.

MEMBER APOSTOLAKIS: Because you expect the CDF to be on the order of 10^{-5} or so.

MR. HUNTER: Actually a lot of our core damage frequencies you get a lot of E^{-6}, some lower to mid E^{-5} for overall core damage frequency, correct, for in the SPAR models.

MEMBER APOSTOLAKIS: For existing reactors. Right?

MR. HUNTER: Correct.

MEMBER CORRADINI: Can you remind me what a SPAR model is?

MR. HUNTER: A SPAR model is an internal

PRA. It's simplified. It stands for Standardized Plan Analysis Risk Model, but it's essentially the NRC's internal model for internal events and we have them per site or per plant. Sometimes if the plants are mirror images of each other it will be just be, say it's Byron, Byron 1 and 2 will have one SPAR model. But plants that have a little bit differences like Indian Point 2 and 3 they will have separate models.

MEMBER CORRADINI: So if I might just ask in a follow-on question. So then I assume, so I'll pick one in my states. So Kewanee has a SPAR model.

MR. HUNTER: Correct.

MEMBER CORRADINI: And they probably have their own internal PRA too for internal events.

MR. HUNTER: Correct.

MEMBER CORRADINI: So how do these things compare? That's what would be my first question about before I start throwing things out and keeping things in. How does the one calculation compare to the other calculation?

MR. HUNTER: Right now, we're actually going through a secondary enhancement of the SPAR models where we're actually comparing the top, the dominant, cuts between a licensee PRA and the SPAR

model. Now are we finished with that? No, but the licensees' PRAs have been benchmarked before previous. As the SPAR models have matured over the past decade, there has been comparisons because that's how initially started up the SPAR models. So are they matched identically? Absolutely not. However they are in order of magnitude and they definitely are similar and just to remind you this is for internal events only.

CHAIRMAN WALLIS: Don.

MR. DUBE: Yes, if I could answer that question directly. We compared the current CDF for internal events SPAR model versus the licensee's PRA and at present time 80 percent of the plants are within a factor of two plus or minus, up or down.

MEMBER CORRADINI: In terms of the cumulative.

MR. DUBE: Internal events core damage frequency.

MEMBER CORRADINI: Okay.

MR. DUBE: So they are pretty close and they are converging.

CHAIRMAN WALLIS: It doesn't mean to say that the screening works out if the integral works out. I know that plants often which look almost

identical have different dominant sequences.

MR. DUBE: Well, I'm getting a high level comparison, but we do do --

CHAIRMAN WALLIS: Are you matching the dominant sequences success rate as you go along?

MR. DUBE: Yes, as we enhance the models we are comparing cut set by cut set level and we have criteria if the cut sets differ by a certain amount then we kind of flag them out.

MEMBER APOSTOLAKIS: Okay. We've had a presentation by the Idaho people.

CHAIRMAN WALLIS: There's far more is pretty good as the answer.

MR. HUNTER: Especially for the purposes of this when we're looking at the dominant core damage frequency contributors. But basically the first block is really just to screen out some of the lower core damage frequency initiating events and sequences so we can look at the more dominant contributors and we purposefully are dropping at least an order of magnitude or two below just to prevent because at the end we are actually grouping sequences together to form a scenario and we don't want to cut anything out prematurely before we actually group them together.

The second thing is --

CHAIRMAN WALLIS: Does this tend to screen out large break locas?

MR. HUNTER: Yes, it does. For all plants, large break locas.

MEMBER APOSTOLAKIS: This has already been done. You're not going to do that. I mean the SPAR model tells you what the dominant sequences are.

MR. HUNTER: Correct, but we're also going in them and we're also grouping sequences together to form a scenario because sometimes you get similar sequences. Maybe they're different initiators because they break transients a little bit differently, whether it's a loss of main feed water or just a general transient or a small loca. Sometimes you get similar sequences that essentially would provide essentially the same accident scenario. So we're grouping those together essentially just summing up the core damage frequencies after we look into the cut sets to figure out exactly what's actually unavailable and the times of core damage.

MEMBER APOSTOLAKIS: I don't want to belabor the point, but it seems to me they have already done it. But anyway --

MR. HUNTER: They have done it, but it's not pieced together with how we need it. So you have

to go in to do this. It takes a couple hours each model just to go in to do this. Okay. Next we do is we go into the dominant cut sets. So we have a sequence list basically after the first block of the dominant sequences. Typically it's between 20 and 30 and then we look at the dominant cut sets and we look at what --

CHAIRMAN WALLIS: I'm sorry. I have a fundamental question. If you're screening out everything based on CDF, CDF has nothing to do with release to the public and it's LERF (PH) that releases to the public. So it may be that the biggest things are the biggest influence on release from containment, things screened out.

MR. HUNTER: Right. We are basing this off of frequency and that was the guidance provided by the Commission. However, in saying that, we are an order of magnitude below the actual threshold based on core damage frequency instead of release frequency.

CHAIRMAN WALLIS: All these core damage frequencies seem unlikely. Not very important core damage doesn't lead to failure of containment and there's no hurt to the public. Whereas, the things you're screening out are the ones which are likely to lead to containment failure.

MEMBER CORRADINI: Just to become a positive sort, if you get much below 10^{-8} you're starting to approach geological events.

MEMBER KRESS: And when you screen out on CDF you are also screening our LERF because LERF has CDF as part of it.

MEMBER APOSTOLAKIS: No, I think --

CHAIRMAN WALLIS: But it's certain events, certain kinds of CDFs which lead to LERF. Right?

MEMBER APOSTOLAKIS: Graham is right. The screening should be made on the basis of LERF, large release.

MEMBER SIEBER: Yes.

MEMBER KRESS: I can do that by making the CDF screen lower.

MEMBER APOSTOLAKIS: Yes.

MEMBER KRESS: But your screening, you're basically screening on LERF at that level.

(Several speaking at once.)

MEMBER CORRADINI: At 10^{-8}.

MEMBER KRESS: Yes.

CHAIRMAN WALLIS: Location should be based on LERF not on CDF.

MEMBER APOSTOLAKIS: It principally should be based on LERF.

VICE CHAIR SHACK: If you assume that the conditional probability is one and you're 10^{-8}.

MEMBER KRESS: That's what I was saying. Yes. Then you're screening on LERF.

VICE CHAIR SHACK: You're screening on LERF.

MEMBER KRESS: Yes.

CHAIRMAN WALLIS: But not necessarily. It seems to me that the things that you put in may not lead to containment failure.

MEMBER CORRADINI: But I think what they're saying though is at level of frequency it's so bad that the probability of failure is one.

CHAIRMAN WALLIS: But then you end up with an answer which is zero which doesn't really tell the public anything.

MR. HUNTER: We're not going to do offsite consequences for scenarios that don't produce a release.

CHAIRMAN WALLIS: It might be a good idea to make the connection with LERF at this point when you're doing this and explain why this is okay.

MEMBER KRESS: That's almost obvious but go ahead.

CHAIRMAN WALLIS: Well it's not obvious to

me.

MEMBER KRESS: Okay.

(Several speaking at once.)

MEMBER CORRADINI: But your worry is a probability of one. Just assume that. It ain't going to get any higher than one.

MEMBER KRESS: It could get close to one for BWRs.

MEMBER CORRADINI: But what your worry is is that above a sum probability what they might have thrown out there is some sheltering by the containment and you might have some ordering that would be different than you would have it just on probability if I understood your question because the containment -- is some sort of filter where Bill's point is it's not there anymore.

MEMBER APOSTOLAKIS: The dominant contributors as to LERF are not necessarily the same dominant contributors you see here.

CHAIRMAN WALLIS: Right. That's the point.

MEMBER APOSTOLAKIS: That's really what it is.

CHAIRMAN WALLIS: The dominant contributors to individual risk are not necessarily

the same.

CHAIRMAN WALLIS: But the whole point of the study is to look at the consequences to the public.

MEMBER APOSTOLAKIS: And this is conceptual, so you should really be doing it on LERF.

MR. HUNTER: Right. Our original guidance was actually to look at all releases, to not base the actual frequency on LERF. Now we're trying to lower the thresholds of where we screen at.

CHAIRMAN WALLIS: But my message, the question might be asked again.

MR. HUNTER: Understood.

CHAIRMAN WALLIS: Next time it might be more serious.

MR. HUNTER: Understood. A threat.

MEMBER BONACA: We have need to move on.

MR. HUNTER: Let me just go over quickly here. Once we have these sequences we're going to group them together like I discussed earlier and then basically what we're going to do is we're actually going to evaluate the scenarios that either have a core damage frequency cumulative based on whether they are a group of scenarios or individual sequence. We're going to look at the status of containment

cooling systems especially for the PWRs. We're going to look at equipment recovery because station blackout is a heavy contributor, the potential to recover the diesels after core damage but prior to release and other mitigation measures and we're also going to, we actually lower the screen threshold an order of magnitude on the containment bypass scenarios just because they're going to have higher consequence type things. So this just covers internal events.

We also want to look at the IPEEEs to look at what the dominant external scenarios are. We're also looking at there's 11 completed external event SPAR models that we're also looking and we're also going to look at the IPEs when we don't have enhanced SPAR models that are not available and the enhanced SPAR models are the ones that have undergone the recent benchmarking as the licensee PRA that Don just talked about. Then from that, we're going to actually pick our scenarios that we're going to look at for this study.

MEMBER CORRADINI: So just to summarize, then the final boxes you're not going to have 1,000 or maybe even 100. You may have a handful.

MR. HUNTER: Correct.

MEMBER CORRADINI: Okay.

MEMBER APOSTOLAKIS: Hold on. You are moving. Wait.

MR. HUNTER: I'm sorry.

MEMBER APOSTOLAKIS: Now the scenario evaluation you say equipment, recovery and other mitigation measures.

MR. HUNTER: Right.

MEMBER APOSTOLAKIS: Aren't these inherently time dependent events?

MR. HUNTER: Correct. We're going to have to look at each scenario differently.

MEMBER APOSTOLAKIS: Yes, and I'm sorry. Go ahead.

MR. HUNTER: And in each plant differently depending on whether we use a plant specific or group specific approach when we're looking at them.

MEMBER APOSTOLAKIS: Right, and you will need some probability that certain recovery actions will be completed by a certain time.

MR. HUNTER: Correct. We're going to have heavy HRA implications --

MEMBER APOSTOLAKIS: And the agency HRA's model does not consider time explicitly. You're in trouble. You will have to switch to the EPRI HCR ORE which you don't have.

MR. HUNTER: Well, the current SPAR HRA model does use time as a -- factor.

MEMBER APOSTOLAKIS: No. You'd better not say that.

MR. HUNTER: No.

CHAIRMAN WALLIS: Do we want to get into SPAR HRA now?

MEMBER APOSTOLAKIS: We are trying to review it and nobody comes here to talk to us about it. You will have a big problem there because the available model to the agency does not consider time explicitly.

MR. HUNTER: I don't know all the factors into the HRA.

MEMBER APOSTOLAKIS: I do.

MR. HUNTER: I understand.

MEMBER APOSTOLAKIS: ATHENA does not. SPAR HRA does not.

CHAIRMAN WALLIS: That's a take-away for you.

MR. HUNTER: I will communicate that to the folks that need to know that.

MEMBER APOSTOLAKIS: Good. The HRA folks.

MR. HUNTER: But yes. Correct. We have HRA tasked to look at how we're going to go about

this. We're actually going into a couple pilot plants and actually look at their SAMGs and EDMGs to look at what's proceduralized to try to determine what kind of credit is appropriate for these type of actions.

MEMBER APOSTOLAKIS: We looked at the, we not here, it was some other we, EPRI calculator. It's actually not as bad as people say it is. It's actually pretty good.

MEMBER BONACA: What people say it? I thought it was good.

MEMBER APOSTOLAKIS: It's actually pretty good. So something needs to happen there because I don't think the agency has access to it.

MR. HUNTER: All right. This slide just shows a couple technical issues that we're dealing with as we speak. The first is the external event scenarios. As you may be well aware, the IPEEE, they're not full. They're not to the IPE quality. Most of it is screening analysis. At least, 60 to 70 percent of the plants don't have seismic PRAs. They are just screenings. So we're just trying to determine how we're going to deal with the data conservatisms and the limitations of the IPEEEs because we don't want to just -- because our SPAR models are relatively mature and the data has been

updated throughout the years where we have 15 year old data.

CHAIRMAN WALLIS: Now does fire come into this?

MR. HUNTER: Excuse me?

CHAIRMAN WALLIS: Does fire?

MR. HUNTER: Correct. Fire, seismic, severe weather, flooding.

CHAIRMAN WALLIS: We know that fire apparently with the assumptions that go into it can be as significant as the internal event.

MR. HUNTER: Yes, and that's what we're trying to deal with is we have some plants with internal events overall core damage frequency in the EMIS6 but fire is in the EMIS5 range. So we're just trying to determine is that EMIS5 number really accurate because they weren't originally designed to do this. It was a screening methodology that they did that and you're talking about old data and there's been plant improvement since then. So the numbers aren't probably accurate as of now.

But also just and the second bullet is an aside bullet, just how we're going to treat the external event numbers compared to --

CHAIRMAN WALLIS: I'm trying to be

realistic. The whole point of this point is to be more realistic than previous studies.

MR. HUNTER: Correct.

CHAIRMAN WALLIS: And then you need to be more realistic about fires.

MEMBER APOSTOLAKIS: There is this major EPRI/NRC project on fires.

MS. LAUR: That's right. 805.

MEMBER APOSTOLAKIS: You'll probably use it.

MR. HUNTER: The last bullet just has to do with the mitigation of release frequency calculations and when we're talking about the HRAs, the evaluation, the mitigation recovery actions for scenario screening and to the Melcor but because of the timing. And that sort of thing is going to be a very important input to the Melcor calculations.

MEMBER APOSTOLAKIS: So when you are discussing all this you are planning to do things here, do you have other groups within the agency participate? Like the HRA people, are they aware you are doing this?

MR. HUNTER: Yes. The HRA, we have HR people with Sandia and inside the NRC are aiding us. So they're actually starting to get involved into our

scenario section. We're not exactly right there yet, but we're almost there for our first group of plants. So they are heavily involved now and we're going to moving forward working together to determine these type of things because it's going to affect both the Melcor calculations and the actual, because we're going to have to eventually calculate the release frequency of these scenarios because we only have the core damage frequency.

MEMBER APOSTOLAKIS: So you plan to do this in three years for all the units? This is incredible to me.

MR. HUNTER: Right.

MEMBER BONACA: This is just one piece of it because there is additional work that they haven't described yet like development of the tool.

CHAIRMAN WALLIS: George, if you can graduate a student in three years, they can do this work in three years.

MEMBER APOSTOLAKIS: No really. I mean you are revisiting the PRA, Level 3 PRA, and you're saying in three years not only are we going to implement the new tools but we're going to apply it to every unit and I think that's just not realistic.

MR. SCHAPEROW: The source term estimates

are going to be made -- I guess first of all, from the Level 1 work we're going to basically pick a, we're going to end up with a couple of scenarios for each plant design which we've identified about seven or eight plant designs. For each of those plant designs, we're going to be doing a source term estimate for those designs.

MEMBER APOSTOLAKIS: Are you going to use 11.50 at all?

MR. SCHAPEROW: No.

MEMBER APOSTOLAKIS: Why not?

MR. HUNTER: What we plan to do as part of 1150 is we're actually going to look at the scenarios that 1150 analyzed and determined why aren't those scenarios above our threshold and we would either determine if we should be including them or we have a solid basis for not including them. For example, that ATLAS is not really showing up as a high dominant contributor in the SPAR models. So that would be one example of a scenario where we'd either determine that it wasn't -- the frequency of the ATLAS event is a lot lower since NUREG 1150 or we would determine that maybe our calculations are off or something to go back or maybe our modeling of those type of events are wrong. And we're going to use NUREG 1150 as a guide

for our scenarios, but it's also for the reporting to justify why we don't analyze certain scenarios.

MEMBER BONACA: Now NUREG CR 2239, the Siting Study, used a different approach and goal just to certain scenarios. You know one of the clear objectives is the one of encouraging the use of this new information for the public rather than the Sandia Site Study. But if the results are comparable, how you may state your case, I mean, these are just individual scenarios you're addressing. You're saying they are dominant.

MR. ELTAWILA: I think that part of our job and we would like your help in that about how to communicate this information to the public. One of our jobs is to try to, as Chris indicated, we look at NUREG 1150 and we are going to look at the Sandia Siting Study and we have excluded any scenario. We have to provide the basis why we exclude that scenario, scientific basis, improvement in plant performance, improvement in emergency management, improvement of the tools and data and so on. So we will have to provide this information and that will be part of our deliverable to the Commission.

MEMBER BONACA: That's what I was thinking. I mean this is a significant task that you

have to fulfill for all these plants.

MEMBER APOSTOLAKIS: Yes, I don't think it can be done in three years.

CHAIRMAN WALLIS: Ask them to show us. We all know. We're going to have subcommittee meetings. We're going to see the progress and we'll be able to tell whether it's realistic or not after six months or so.

MR. ELTAWILA: Okay.

CHAIRMAN WALLIS: At least it's a good thing to try to do.

MEMBER SIEBER: Are you going to do anything with shutdown operations?

MR. HUNTER: Currently, no. The maturity of our low power shutdown SPAR models is pretty -- They are being created as we speak. We don't have a lot of information on it. Right now, we are just looking at at-power conditions.

MR. SCHAPEROW: This slide lists a few of the accident progression issues that we will be handling in this project. We'll be dealing with. There are other ones. I just picked a couple to just kind of give an overview of what kinds of issues we'll be handling.

CHAIRMAN WALLIS: Haven't they improved

seals to the point where this is much less likely now?

MR. SCHAPEROW: My understanding is that the Westinghouse plants basically all have the newer seal packages in them maybe with the exception of one pump at one plant. But this issue involves very high temperatures. I mean during core melt you get extremely high gas temperatures in the RCS. So I think there still is an open issue on that and we're going to have to look into that.

And again the issue deals with very high temperatures, maybe a high seal leak rate at some point on the order of 100/200 GMP type of leak rates. This is important because if you were in a boil off scenario you're now at a loca and you're starting to lose inventory quickly. It can also affect the timing of lower head failure and as well as the challenge to the hot leg, the high temperature challenge to the hot leg, surge line and steam generator tubes.

For the BWR scenarios that don't have DC power so that the relief valve is basically operating on the spring, the relief valves will open and close to relieve pressure. If the relief valve does stick open at some point possibly due to very high temperatures during the core melt, very high temperature gases, then it can seize in the open

position and depressurize the RCS.

And this would turn high pressure scenario again into a low pressure scenario. The problem with this is though is the low pressure in the RCS you basically would lose a lot of your convective heat transfer away from the core, the melting core. So you would make a quicker lower head failure. It may speed it up by a couple of hours.

And the third point I have here is we were going to be --

VICE CHAIR SHACK: What scenarios wouldn't a BWR depressurize and be dumping water in?

MR. SCHAPEROW: I'm sorry. Can you --

VICE CHAIR SHACK: Wouldn't the BWR always be depressurized unless the depressurization system fails?

MR. SCHAPEROW: Yes. The idea here is you don't have DC power. In some of the sequences we've examined, we don't have power. We don't have DC power. So we don't have -- We can't operate that valve. It just opens when the pressure gets high and the spring opens it.

Finally on containment failure, we are going to consider the data from the Sandia tests on containment failure to try to get a better handle on

the size and the location of the containment failure because this is of course a direct impact on source term. If the containment fails a lot earlier, then your release is going to be a lot earlier. If the containment happens to start leaking in the aux building, then the release is going to start later and it's going to have to go through the aux building before it gets out which is a potential reduction in the release.

MEMBER CORRADINI: Can I ask a question here?

MR. SCHAPEROW: Sure.

MEMBER CORRADINI: So do you have any indication that if you carried this out as an experiment on one type of reactor containment location set compared to what was done 25 years there is a significant difference? Do you have any empirical data that you would actually find a difference?

MR. ELTAWILA: Professor Eltawila. The answer is yes. We have an information. We have done analysis which shows that for the type of plants that you are talking about and the containment there have been significant improvement in the consequences of some of the severe accidents. To give you an example, to cite you an example, you know that we took

advantage for the work that was done about steam explosion. You don't have alpha mode (PH) explosion which was a major contributor to the early fatalities in the 1980s. Right now, we can take advantage of that and say containment will not fail as a result of alpha mode failure of containment. So you can see a difference and we can quantify that difference.

MEMBER KRESS: Along that same line with all your screening and truncations and the picking grouping scenarios and ending up with a small number and leaving out parts like IPEEE and not seeing HR correctly, you're going to end up with all sorts of questions. One way to address those would be to take one of the plants and do a full PRA, put everything in it and see what difference you get. Is that part of the plan? It wouldn't take too much effort to do at least one or maybe four. It depends on what kind of --

VICE CHAIR SHACK: Maybe five.

MEMBER CORRADINI: I think what Tom is asking is kind of where I was going to is that then -- What I'm worried about is because I think what you're doing, personally I think what you're doing is important, but you could open yourself up from criticism because they say you selectively picked the

things that make it look better than it really is and what Tom is asking is have you done something like an orthogonal analysis that says "No, when I did a complete analysis, then I got still some sort of improvement." I think that's what you're after.

MEMBER KRESS: Yes, that's exactly it.

CHAIRMAN WALLIS: Then you might also see the LERF contributors.

MEMBER KRESS: Yes.

MEMBER APOSTOLAKIS: Or at least identify the main contributors.

MS. LAUR: Now we are going to keep the information as we progress through and look at the scenarios. That information isn't lost and as we go through and starting doing the first number of plants there could be insights that we gain that cause us to go back and rethink the approach. But we have to get it started and see what is the information telling us.

VICE CHAIR SHACK: I mean you do have 1150, too. I mean if you're not directly using 1150 it's certainly a much better basis of comparison than the siting study.

MS. LAUR: That's correct.

MR. NOUBRAKHSH: Just for your information, PNL did limited studies using insights

from NUREG 1150 and did some sensitivity of important sighting parameters.

CHAIRMAN WALLIS: And would you please give your name?

MR. NOUBRAKHSH: And this is NUREG CR 6295 and actually we looked at dominant accident progression beings and we looked at the timing, not CDF because sometimes -- And then we compared the release frequency actually a dominant sequence at different frequencies, dominant sequences matched the frequency sequence curve scale blindly. We picked up the scenarios and then later it was matched, kind of very similar to --

MEMBER APOSTOLAKIS: What did you conclude, Hossein?

MR. NOUBRAKHSH: The conclusion was first of all the sourcing as Farouk said the things have changed as far as frequency of releases so that the risk is going to be changed essentially compared to Sandia Siting Studies. But what I wanted to say is in order to add this to uncertainties we picked up the mean values of the source and from NUREG 1150 because some of these source terms are seven order of magnitude and using a Melcor justification for single value may be difficult.

MEMBER KRESS: What was that NUREG number again?

MR. NOUBRAKHSH: 6295.

MEMBER APOSTOLAKIS: Is the motivation behind --

CHAIRMAN WALLIS: Hossein, you have to give your name when you speak.

MR. NOUBRAKHSH: Hossein Noubrakhsh, ACRS staff.

CHAIRMAN WALLIS: Hossein Noubrakhsh, did you get that?

MEMBER APOSTOLAKIS: So is the motivation behind the SRM the fact as I recall the Sandia study of `82 has been misused and abused by outside groups?

MS. LAUR: That's part of the motivation and so that's why the focus is what it is. The `82 study had a value at that time. One could view it as kind of a bounding analysis, worst case kind of analysis.

MEMBER APOSTOLAKIS: Okay.

MS. LAUR: What we hope to achieve here is to give ourselves and the public a better understanding of what their offsite consequences would be for realistic type scenarios.

MEMBER APOSTOLAKIS: So motivation was not

to improve on the PRA or getting the Level 3 results.

MS. LAUR: No.

MEMBER APOSTOLAKIS: Although you are, you will.

MS. LAUR: Right. That's the correct understanding of the motivation.

MEMBER APOSTOLAKIS: Because after all, Dr. Kress was right. That's what really matters to the public. Right? The results of the Level 3.

CHAIRMAN WALLIS: Of course.

MEMBER APOSTOLAKIS: Not the core damage frequency.

CHAIRMAN WALLIS: Of course.

MEMBER APOSTOLAKIS: This gentleman wants to say something.

MR. CANAVAN: Ken Canavan, EPRI. Just two quick comments. The first one is HRA calculator is an excellent tool.

(Laughter.)

MR. CANAVAN: If you have any questions, come see us.

MEMBER APOSTOLAKIS: Why don't you give it to the agency?

MR. CANAVAN: I believe that we were discussing how to do that at some point.

MEMBER APOSTOLAKIS: I am convinced that the HRA people, they don't know what the other side is doing. In other words, you have people here working on HRA models and they really don't know the details of what you guys are doing and vice versa. We had a subcommittee meeting in December and it was confirmed.

MEMBER BONACA: Reached that conclusion by now.

MEMBER APOSTOLAKIS: And I reached that conclusion because I spent time learning what they are doing and I'm now very positive.

CHAIRMAN WALLIS: While you can have a subcommittee, George --

MEMBER APOSTOLAKIS: I am wrong. I admit it.

(Laughter.)

MEMBER APOSTOLAKIS: What do you do?

CHAIRMAN WALLIS: You can have a subcommittee meeting where they're both in the same room and they have to talk to each other.

MEMBER APOSTOLAKIS: They talk but they don't listen.

(Laughter.)

MEMBER BONACA: This poor gentleman here is trying to tell us something and it --

MEMBER APOSTOLAKIS: Well, why should we let him? If he wants to.

MR. CANAVAN: My second comment was along the same lines as perhaps the HRA which was a lot of this information for example from the Level 1 current PRAs of the existing units have plant damage dates which are binned accident classes. So a lot of this screening work that you're talking already sort of exists, at least at the sites and I know we're meeting tomorrow. So maybe we'll be discussing some more of this.

But the other part, scenario grouping, so much of this is probably already available from a willing site if they are willing to donate it and the second part, so boxes on the left-hand side of your diagram are probably complete at many sites and then the next part was on the containment of failure modes and characteristic size and locations. A lot of sites, almost all, have a Level 2 or at least a LERF analysis which would indicate for those plant damage dates what failure modes and locations were analyzed. So that information is available as well again from a willing site.

MEMBER APOSTOLAKIS: So maybe it can be done in three years. That's what you're saying.

MR. CANAVAN: So maybe it can be done in three years if you don't redo it.

MEMBER APOSTOLAKIS: You mean if the ACRS doesn't redo it?

MR. CANAVAN: No, I mean if the staff doesn't redo it into independently.

MS. LAUR: As I indicated in the beginning, we are very interested in engaging with to work together and get the information that's necessary so that we can move this project successfully forward.

CHAIRMAN WALLIS: I'm really waiting to -- I've heard this presentation before. This is what you're going to do.

MS. LAUR: Right.

CHAIRMAN WALLIS: What would really be the test is when you start to get results and can show them.

MS. LAUR: That's right.

CHAIRMAN WALLIS: So we're really looking forward to that.

MS. LAUR: We actually have --

MEMBER APOSTOLAKIS: Same thing on the methodology. That's when we should give you more.

MS. LAUR: We actually have some progress that we'll share with you shortly.

MEMBER APOSTOLAKIS: Good. You have what?

MS. LAUR: Progress that -- a little bit of progress, not results, just some progress.

MEMBER APOSTOLAKIS: Great.

MR. SCHAPEROW: To form the consequence analysis, we are going to use the source terms that we're going to generate through Melcor analysis. We use source terms for each plant group. Again this is a departure from the earlier Sandia Siting Study. They had one source term for everybody. So for example, for the Westinghouse four-loop and three-loop plants, we're probably going to consider that one plant group and we'll analyze that. We'll pick one plant. We'll model that in lots of detail and we'll estimate source terms for the dominant sequences.

To do the consequence analysis we need to consider site specific factors because we're going to be doing an analysis for each plant. So we're going to do an evaluation for each plant and what the emergency response is going to be.

MEMBER CORRADINI: Can I ask about it? You just said something that sounds like a little thing but you're going to scale it on thermal power I assume at least.

MR. SCHAPEROW: Correct.

MEMBER CORRADINI: Okay. Fine.

MR. SCHAPEROW: -- thermal power, actually some plants have much lower. I think some of the older Mark 1s have only half the thermal power of the newer ones. So that's important.

MEMBER SIEBER: That's today.

MR. SCHAPEROW: Also we need to consider burn-up. Are we going to do one halfway through the fuel cycle, the beginning of the cycle and so on? We'll consider these issues certainly.

CHAIRMAN WALLIS: So they are all scaled by the same CDF although some of them have many more inventory. Right?

MEMBER SIEBER: Right.

MEMBER KRESS: I don't know how you scale the thermal power because you're actually looking for a source term to be a fraction of the inventory and you can't just say the inventory's ratio to the power and you can't say this fraction is ratio to the power. I don't know exactly how you -- I understand that the smaller reactor have different inventories and will have different source terms, but it would be tough to make that scaling definitive I think.

MEMBER SIEBER: They ought to really be scaling by core volume.

MR. SCHAPEROW: The site specific factors that we're going to be considering include emergency response. We'll be looking at each site to see what we feel, to estimate what their evacuation time and speed is going to be. We're going to be using the latest population distribution numbers we have which is 2000 Census data.

CHAIRMAN WALLIS: What do you do about how well the emergency response actually works? I know how it's supposed to work.

MS. LAUR: We have folks --

CHAIRMAN WALLIS: Do you have any good idea about how well it's going to work?

MR. SCHAPEROW: Yes. One of the members of our team is an emergency preparedness specialist. He's probably better to address that than I can and unfortunately he's not here today. So I would like to punt on that for now.

MEMBER APOSTOLAKIS: But PRAs in general, my impression is that failure to evacuate is not taken into account. It's an outside input. Right?

MEMBER SIEBER: Every plant has an evacuation --

MEMBER APOSTOLAKIS: It's an input to the analysis and so in so much time so many people have

been evacuated. There is no uncertainty.

MEMBER KRESS: And that's site specific.

MEMBER APOSTOLAKIS: Yes, but I mean it's deterministic.

MEMBER KRESS: Yes.

MR. SCHAPEROW: I can tell you what I read recently. There was some analysis published for Indian Point which showed that after an hour people started evacuating and then after like nine hours everybody is going to be out of the zone and it's kind of curve.

CHAIRMAN WALLIS: This is one of the biggest public concerns.

(Several speaking at once.)

MR. SCHAPEROW: Yes.

CHAIRMAN WALLIS: This is one of the biggest public concerns you hear at public meetings is that the emergency response plan isn't very reflective of what will actually happen. I think that if you're going to respond to public concerns you may need to put some effort into making emergency response evaluation realistic. I don't know how you're going to do it but it is a public concern that we hear about.

MEMBER APOSTOLAKIS: I don't know what it

means to make it realistic. I mean it's intended to be realistic. You can do some sensitivity analysis what if we don't evaluate 1,000 and we evaluate 900.

MEMBER KRESS: I think the results you're going to get for the consequences will be very sensitive to the assumptions on evaluation. I mean that's one of the more sensitive.

CHAIRMAN WALLIS: We went to Vermont Yankee and there were people who stood up in the audience and said "I'm not going to leave."

MEMBER SIEBER: Yes.

MEMBER CORRADINI: Sounds like somebody from Vermont.

MS. LAUR: And we recognize --

MEMBER APOSTOLAKIS: I'm not going to leave. Protect me.

MS. LAUR: We recognize this is a very important part of this analysis and that's why we do have an expert both on our side of the house and on the Sandia so that we try to accurately model evacuation.

MR. SCHAPEROW: The other two other site specific factors we're going to including are weather data and shielding factors and that's about it.

VICE CHAIR SHACK: And you're going to

compute all sorts of consequences. Right? Land contamination, everything that comes out of MACCS. Right?

MEMBER SIEBER: No.

MR. SCHAPEROW: Well, we do intend to look at prompt fatalities. We're going to compute latent and cancer fatalities. The issue of land contamination is one we're going to have to look into a little more.

MR. ELTAWILA: We are not planning at this time to look at land contamination.

MEMBER KRESS: But that's the dominant consequence.

CHAIRMAN WALLIS: You're just following the QHOs, aren't you?

MR. ELTAWILA: Following the QHOs.

VICE CHAIR SHACK: It's part of your reg analysis we look at all these costs. I mean when I do a SAMA I look at everything. Why not do it here?

MEMBER KRESS: But you're going to use MACCS for this thing. It's just like a little tiny increment to get these land consequence and the total number of deaths out of it. I mean I don't understand why you don't go ahead and get that because the extra effort is just minuscule.

MEMBER APOSTOLAKIS: Maybe the Commission is not interested.

MEMBER KRESS: I understand.

MEMBER BONACA: I guess the focus is the siting study and there was no equivalent calculation done for that. I agree that they could pull out the data, but I think it probably would focus the results of the study totally in a different direction than what is intended by the Commission.

MEMBER KRESS: I don't know what they intended.

MS. LAUR: Just in case there's any concern that there won't be a lot of interaction between ourselves and you and others this slide just lets you know that there is lots of opportunity to help us along the way. We are having frequent meetings with our steering committee. We have representatives from all three.

MEMBER APOSTOLAKIS: Steering committee is internal?

MS. LAUR: The steering committee is internal. We have a representative from Research, ENSER and NRR. It's Jim Wiggins. Let's see. It was Bill Orchard, but Bill Deal will be replacing him and Gary Hollahan.

MEMBER APOSTOLAKIS: How will you be getting industry input throughout the meetings?

MS. LAUR: The industry input will be through public meetings that we're going to start with tomorrow, workshops as well. So there's going to be a lot of interaction both internally and externally to get the information we need.

MR. SCHAPEROW: We've already had a little bit of initial input as we've had some meetings to look at the code modeling. We've had both laboratory and in industry experts there to go through the modeling.

MEMBER APOSTOLAKIS: But as you progress and you derive results for individual units, are you going to go back to the licensee and see whether they agree or disagree or whatever? That's what the SPAR models did. Right? They went back and they said "Okay, here is the model we have for your unit. What do you guys think?" And they pulled out their PRA and there was some give and take and there was some consensus at the end.

MS. LAUR: You know we haven't really thought through exactly what point in the project we're going to engage all the stakeholders. But we do plan through the process to engage all the

stakeholders, not just industry, but any public that's interested in this project.

MEMBER APOSTOLAKIS: I understand the public meetings. I mean somebody comes in there and listens and expressed views. What I'm talking about is a much more serious interaction where you tell the guy "Look. This is what we're getting for your plant. What do you think?" And you give those people some time to review what you have done so that they will pass judgment. I mean I have participated in numerous review committees and some they send you three volumes the day before and others you have plenty of time to review them and do a good job.

MS. LAUR: I mean we envision that we will have that level of interaction.

MEMBER APOSTOLAKIS: You will. It's inevitable because the industry will be up in arms if you start surprising them.

MS. LAUR: It's always better to include people up front.

MEMBER APOSTOLAKIS: There you are. That's a truism.

CHAIRMAN WALLIS: While you're planning all these meetings make sure you leave time to do the work.

(Laughter.)

MS. LAUR: Tell me about it.

MEMBER APOSTOLAKIS: No, I'm sure the industry will be very much interested in this and you certainly don't want to surprise anybody.

MS. LAUR: I know we're running out of time here. Just to give you a flavor of where we are on the project some of this is pre-decisional. That's why you don't see the sub-bullets. But we have picked the first six plants that we're going to analyze. That information is being sent up through our management chain to make sure that it's acceptable and as soon as that has occurred, we will be glad to share that information with you.

We have identified what we believe to be the scenarios of interest for the initial runs for the GE 4, BWR, Mark 1s and the Westinghouse four-loop large drives and as Jason shared with you, we had a week long meeting in Albuquerque where we had experts come and talk to us regarding the use of the Melcore and MACCS codes as to the appropriateness for this project and what enhancements might be useful.

MEMBER APOSTOLAKIS: So you actually have something to show us.

MS. LAUR: Yes. As far as next steps,

clearly we want to get started on the analysis and so we are moving forward to try to begin the Melcore runs on those first six plants. While we have chosen the scenarios for those plants, it was based on the internal events SPAR model. So we are quickly investigating what the external events, what the impacts would be on the selection for the scenarios. We're also looking at those post accident operator actions and determining how they will impact the scenario selection.

Also any credit that might be given for available equipment that could be used to delay core melt and offsite consequences, we're investigating that and how it will influence the analysis and we're taking those recommendations that came out of that week long meeting in Albuquerque and trying to look at how we might revise the Melcor analysis.

We're going to continue on in the process. While we're starting the Melcor runs on those first six plants, we will then begin looking at the SPAR models for the other plants to try to determine what scenarios would be appropriate for those plants and then hopefully we will begin the MACCS runs on the first six plants shortly thereafter.

As George has pointed out, we have a lot

to do in three years and we will be engaging you and others as we go through this process.

MEMBER APOSTOLAKIS: It seems to me we should have a subcommittee meeting soon.

CHAIRMAN WALLIS: Yes. Thank you very much.

MS. LAUR: Thank you.

MEMBER KRESS: Very good, Michele.

MEMBER APOSTOLAKIS: Very good.

MEMBER BONACA: Any more questions? If not, then --

MEMBER APOSTOLAKIS: In ten years, everybody will be doing Level 3 PRAs.

CHAIRMAN WALLIS: I would like to move onto the next item on the agenda. The next part of the meeting is going to be closed. I want to make sure that those who have no business being here are not here. Discuss security matters. I'm afraid the new members have to leave, the four new members we have this year. Off the record to go to a closed session.

(Whereupon, at 4:29 p.m., the above entitled matter recessed.)