UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMISSION

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BRIEFING ON RESOLUTION OF GENERIC SAFETY ISSUE-191, ASSESSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE

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THURSDAY

APRIL 15, 2010

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The Commission convened at 9:30 a.m., the Honorable Gregory B. Jaczko, Chairman, presiding

NUCLEAR REGULATORY COMMISSION

GREGORY B. JACZKO, CHAIRMAN

KRISTINE L. SVINICKI, COMMISSIONER

WILLIAM D. MAGWOOD, IV, COMMISSIONER

WILLIAM C. OSTENDORFF, COMMISSIONER

STAKEHOLDER PANEL

AMIR SHAHKARAMI, CHAIRMAN, PWR OWNER GROUP EXECUTIVE COMMITTEE, SENIOR VP EXELON AND SITE VP BRAIDWOOD, EXELON NUCLEAR

DAVID HEACOCK, PRESIDENT AND CHIEF NUCLEAR OFFICER, DOMINION NUCLEAR

JEFFRY GASSER, EXECUTIVE VP AND CHIEF NUCLEAR OFFICER, SOUTHERN

NRC STAFF

BILL BORCHARDT, EXECUTIVE DIRECTOR FOR OPERATIONS

JOHN GROBE, DEPUTY DIRECTOR FOR ENGINEERING AND CORPORATE SUPPORT, NRR

WILLIAM RULAND, DIRECTOR, DIVISION OF SAFETY SYSTEMS, NRR

MCHAEL SCOTT, CHIEF, SAFETY ISSUE RESOLUTION BRANCH, DIVISION OF SAFETY SYSTEMS, NRR

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

CHAIRMAN JACZKO: Good morning everyone.

It is a little warm in here, so I will not be offended if anyone wants to take off their jacket or anything like that.

Feel free, if it gets a little hot.

They are working on it.

I think today is a very good opportunity to really have an in-depth briefing and discussion on one of the canonical long-standing safety issues that this Commission has been dealing with.

When I first came to the Commission in 2005, I learned a little bit about GSI-191.

One of the things I quickly learned was that what I was learning wasn't particularly new.

This is an issue that has been around for some time, we have been working for a long time to get resolution, really culminating in a generic letter that was issued in 2004.

That generic letter had put a response time for submittals at the end of 2007, and so we are in that period now where we are working through the

submittals and working to get closure, which I think is a very important point for this issue.

One way or another, I think we have an opportunity today to have the Commission shed some light on their thoughts on what appears to be a reasonable approach by the staff to work to closure with the issuance of a series of 50.54(f) letters, with a plan to have licensees perform additional modifications in the next two outages that they are planning.

I think the fundamental question for the staff today is, or I think for the Commission, is to really look and see if there is really a technical reason why we shouldn't be moving forward in that direction.

I hope as we go through the presentations, we will hear from the industry and from the staff, what the technical underpinnings are for the various views that we have about whether or not we have resolved all of the safety issues here with GSI-191.

I look forward to a very informative

meeting and keeping in mind that this is certainly one of the most important and fundamental safety issues that we deal with.

Recirculation and loss of coolant accidents is one of the most fundamental design basis accidents that we deal with.

That system, in our regulations, is required to function for long periods of time to allow for long-term cooling, and that is our recirculation system and it's a fundamental system and it is clearly one of those we got wrong a couple of decades ago.

The initial assumptions we made were 50% sump blockage, and we had very small sump screens. That was clearly something that turned out to be an incorrect assumption, a non-conservative assumption, and that led I think to where we are today to try to resolve this issue and deal with all of the phenomenon associated with it.

I look forward to a very interesting discussion, and we will hear first from an industry panel and then from the staff.

I will ask if any of my colleagues would like to make any comments.

COMMISSIONER SVINICKI: Thank you Mr. Chairman, I appreciate you giving some background.

I know this isn't the first meeting of our new colleagues, but I have to say since I reside on the same floor that they do, I will tell you that I think this is -- they may be two weeks, less than two weeks into the job now.

I think it is evidence of the fact that we show no mercy, whatsoever.

We have caused them to kind of dive in to all of the background.

I have seen staff up on the 18th floor carrying around boxes of samples of insulation, and pipes, and things like that.

I know that they spent a lot of time looking at this, but it's a lot to absorb.

I guess I am saying we are not showing much mercy, but I do at least feel for them because it is a lot of information.

They've been leaning into it.

COMMISSIONER MAGWOOD: Thank you, Chairman.

It has been a lot of information, but it has been very interesting.

This is an issue that has been going on for about a decade now I guess, and I know that the staff has been wrestling with it for quite some time.

Yet, it's conspicuous among a lot of the issues we deal with in that, conceptually, it's quite easy to understand and explain to people, but when it comes to actually analyzing the effect, it is very difficult and has proven to be quite allusive in that manner.

As a result of the complexity of the issue, the agency's guidance has evolved, clearly, and we are going to hear a lot from our industry witnesses today about the actions they've taken over the last few years.

It is never desirable to see regulatory actions as a moving target, but I think we all recognize as our knowledge about these events and phenomena change, our response has to change as

well.

Hopefully, you'll take that into consideration as you're going forward.

I'd really like to see this issue brought to closure.

I hate seeing safety issues left hanging for long periods of time, but I think it is also very important that when we bring this to conclusion, we do it with some finality so we don't have questions that are still remaining in the future.

I want to see this brought to a closure, but I also want to see this brought to a final closure.

Thank you, Mr. Chairman.

COMMISSIONER OSTENDORFF: Thank you, Mr. Chairman.

I echo my colleagues' comments I know this is a very complex set of issues.

Commissioner Magwood and I had the chance to get briefed by NRC staff I guess last Friday on this, and that was very helpful.

I appreciate that opportunity.

Yesterday I was at Watts Bar Unit II. I had a chance to crawl down there in the sump and see what the strainers looked like, to get a better appreciation for what an in-state, at least on the strainer piece, looks like.

I still have a number of questions.

I will ask some of these today, but a lot of information to process and I look forward to continuing my education process.

Thank you.

CHAIRMAN JACZKO: Thank you.

We will begin our meeting with Amir Shahkarami who is here representing the PWR Owners Group. Amir.

MR. SHAHKARAMI: Thank you very much.

Good morning, Chairman and Commissioners.

I'm Amir Shahkarami. I am the Chairman for PWR Owners Group Executive Committee. I'm also Exelon Senior VP, on-site VP at Braidwood Station.

I appreciate the opportunity to provide you with the PWR Owners Group perspective to adequately resolve the GSI-191 and Generic Letter 2004-02

based on what really the NRC and industry have been able to accomplish up to this point.

Slide number two.

You are looking at the timeline, I think. Mr. Chairman talked about that, prior to PWR we had the BWR strainer issues so it has been really there for a long time.

Both NRC and industry have been addressing this issue as a new concern has added to the GSI-191.

First, was the concern of the debris catch on the existing sump.

Industry installed larger sump and I'm going to talk about that.

Then the chemical effects on long-term cooling for the fuel.

Each of these issues have added and required testing analysis for acceptance criteria and acceptance criteria for long-term cooling is just coming to closure.

Next slide.

Resolution actions.

This was developed to address GSI-191 based on highly conservative and deterministic approach.

We have made plant modifications based on application of conservative testing and methods.

Methods were developed in full recognition of inherent conservatism.

All PWR licensees have replaced their strainers and implemented numerous other changes and improved operational enhancements.

To us, GSI-191 is no longer a safety issue for PWRs.

Next slide.

Let me just touch on summary of actions.

The median size of new screens are about 4000 square foot, compared with what we had installed previously at 150 square foot, I'm sorry, square foot.

On average, you are looking at 32 times larger than original screen size that had been installed.

We also have done other modifications, replacement of fibrous insulation with reflective metallic. We changed to alternate buffering agent from what would have made a chemical interaction more severe, so we have changed the buffering at some of our units.

We have installed flow diversions and debris interceptors and also made modifications on the downstream effect.

As I indicated before, we have also enhanced operational and emergency procedures.

Current status.

Action in the last 24 months focused on attempts to respond to the NRC review questions.

We have had over 1000 RAIs that we have been asked on test and analysis packages that generally are about 300 to 400 pages.

Efforts to remove overly conservative assumption and view holistically have been unsuccessful.

NRC has allowed limited credit for key phenomenon that significantly reduced potential for the blockage.

The industry has been unsuccessful in attempts to obtain NRC staff acceptance of level of realism in the design analysis, thus minimizing the impact of compounding conservatism.

Efforts to risk-inform the analysis have been continually sidetracked, pending completion of effort to risk informed ECCS LOCA regulation which is 10 CFR 50.46(a).

Let me just touch on some of the issues that I will discuss as far as conservatism.

As an example, debris generation modeling calls for combination of a break size with vanishing a small frequency somewhere around E to E-10. A physical impossible break opening time considered instantaneous break.

Treatment of break location based solely on minimizing the regeneration without consideration of likelihood.

Use of a conservative all encompassing a spherical zone of destruction surrounding the break.

The result, combined with similar conservatism from other phenomenon involving this issue such as debris transport, chemical participation, and containment sump head losses.

This is a very complex scenario.

From the time that the pipe breaks, to dislodgement of insulation, to transport to the screen and bypassing the screens to the fuel.

It looks like every step that we have taken, we use a deterministic conservative approach to analyze that.

A determination of reasonable assurance of compliance with current regulation is possible now.

We don't think further plant modification would improve plant safety.

On the last slide, slide number six, what actions we recommend as PWR Owners Group.

As noted before, the actions already taken by industry have addressed the safety concerns associated with GSI-191.

The review issues that remain reflect the difficulties associated with demonstrating deterministic compliance

for a postulated event as complex as ECCS recirculation.

Those estimates to further reduce insulations on large components such as the steam generator and some of the piping is estimated in hundreds of man rem

In average, we are looking about 200 rem per plant to go remove additional insulation.

This course of action is unnecessary given the plant modification already completed, the margin of safety employed, and analysis, and the adverse impact on worker safety of removing fiber insulation.

We are asking to permit application of GDC-4, which is exclusion of leak-before-break qualified piping to local debris generation.

As you know this request has been made in the past, and you look at some of the big factors that were not considered has changed today and we can talk about those changes.

Current regulation GDC-4 permit exclusion of local dynamic effects for leak-before-break qualified piping.

This exclusion is applicable to local debris generation.

Path forward, NRC should allow use of GDC-4 exclusion for local dynamic effects and as means to close remaining plant issues applicable to GSI would enable conclusion of reasonable assurance for all PWRs.

Industry will continue to gain margin as we change large components to make sure we don't put bad insulation back in place as we go forward.

PWR Owners Group also has developed a project scope to gain additional margin in reduction of zone of influence, and there are two issues open with the staff that we are working on.

One is the scaling factor and one is the ANSI non-conservative modeling that we are working on, and we also have another action on the fuel for the long-term cooling that needs to be resolved, and I'm personally involved with that with the staff.

That concludes my presentation.

CHAIRMAN JACZKO: Thank you.

We will now turn to David Heacock who is the President and Chief Nuclear Officer at

Dominion.

MR. HEACOCK: Thank you very much, Chairman, I appreciate the opportunity to be here this morning and address the Commission on this important issue.

I think we agree 100% as to the goal to close this issue out as soon as possible to get it resolved.

I will address Dominion's perspective on resolving the containment sump issues, generic safety issue 191, and generic letter 2004-02, as well some of the challenges and obstacles that we have faced along the way.

Slide two, please.

Basically, at North Anna we are essentially complete right now.

We resolved all the issues except for the downstream issues in the reactor vessel, and we're on the way. Surry is a very similar plant, we made a commitment to install a continuous vent and once that's done we'll match Anna's approach, and I will go into a little more detail on that; the other two units still have issues

pending.

As evidenced by the timeline that Amir pointed to a few minutes ago, this had been going on for some time.

We do have a few remaining issues, but we firmly believe that with the modifications and analysis completed today and committed to already for our units, that our plants are fully capable of responding to and recovering from a design basis accident today.

From that perspective we believe we provide a reasonable assurance already.

Next slide, please.

Dominion was faced with a number of plants that had large amounts of fibrous insulation.

Really had to pick one of the two paths.

You can see from the timeline here the decision initially was to pursue an active strainer.

If we had done so, we'd be the only people in the universe with an active strainer.

We chose not to later on because of the

maintenance problems with something that is, basically, a big grinder that would grind up anything that came into its path to allow for a much smaller area.

Instead, we chose to put a large surface area strainer in, in lieu of removing insulation because the dose consequences were so large for insulation removal.

Particularly North Anna and Surry, and some other plants have very, very large quantities of fibrous insulation.

We chose the large surface area approach.

In the aggressive schedule also complicated things.

The problem we had is there is just a handful of vendors that can do this kind of work, and we all descended upon these vendors simultaneously.

As a result, once the music stopped, all the chairs were full.

We had to pick some different vendors.

We fortuitously chose AECL for our vendor

for North Anna and Surry, and it turns out that was a good choice ultimately because of their R&D experience.

Next slide, please.

There is a significant amount of R&D effort required to resolve this issue, and Amir touched on many of the issues that we talked about already.

One thing I think that was unforeseen was a substantial amount of containment analysis that had to be done, and then licensing amendment request that had to be prepared, and both of those had to be reviewed and approved by the NRC before we could get this issue resolved.

We're designing modifications and doing containment reanalysis simultaneously.

The extensive chemical testing that needed to be done was also something that took a lot of R&D efforts, and the timeline didn't allow for us to do what we normally would've done, which would be to do those in sequence.

We would have built a test rig, tested the chemical and debris affects for one unit, and then

gone on to the next unit and take the lessons learned from the first test and apply it to the next one and NRC review along the way.

Instead, we had to do those in parallel.

The bottom line is, we are doing all the testing at the same time to build a huge rig and do that.

By the time you're done with that, acceptance criteria is unknown.

We're building the modifications, we're doing the testing before the acceptance criteria is really known.

Next slide, please.

This will illustrate North Anna and Surry, I picked North Anna Unit II simply because the drawing is a little clearer on that even though it's a busy drawing.

The whole point of this, is that you can see the big circle there is the containment basement.

This basically takes about 180 degrees, the rest of the containment has stuff in it and can't

be consumed with the sump.

We had the head stand and so forth.

This is pretty much as big as you can make it.

We went from about 168 square feet, I will show in the next slide the actual dimensions, to over 6000 square feet of surface area.

Slide six, please.

This kind of illustrates where we were previously, had a combined total for all of our systems of 168 square feet of sump area, we were well over 6000, a 38 fold increase.

You can see from Amir's numbers for industry average is we’re on the high-end of that.

The reason for that is quite simple, we're also on the high-end of the amount of fibrous material in our containments.

So by adding additional surface area we are able to overcome additional fiber loading.

Clearly we are better off than we were before, this is a huge increase in the amount of sump area.

The velocities are way down, the reloading is way down. As you mentioned, Chairman, the 50% load was an unrealistic assumption to begin with.

Now we have realistic assumptions in layers of conservatism that give us great assurance that this is acceptable today.

Slide seven, please.

One thing that became apparent to us almost immediately was a one-size-fits-all solution wasn't going to work, not fleet wide not even within Dominion's fleet. Even North Anna and Surry had some differences in the layout and how you can physically install this piping.

So, we found that it was a continuous R&D effort to figure out how to install the equipment and how to test the equipment. Since they are all unique, you can't use one test rig to test all the different devices simultaneously, you had to do different assumptions and get the different test rigs.

We were manufacturing and installing the strainer prior to confirming testing analysis.

The bottom line is we put the biggest strainer we could put in the building and then went about testing and analyzing to ensure ourselves and assure the NRC that that was sufficient.

I'll also mention the parallel multi-loop, multi-station testing. We couldn't do an incremental series approach. We had to do it in parallel.

Next slide, please.

North Anna's essentially closed out for the containment portion; the downstream effects are still open.

Surry is basically there; once we install the small modification we will be in the same location.

So, how'd we get there?

How'd we have success on these plants?

Strong personnel commitment on both the utility and NRC side was very evident and very important for closure.

We had open and frank interactions with the NRC during audits, which was very, very helpful for us.

Since we were selected for two of our plants to have audits, that was a phenomenal process to allow us to have early engagement with the NRC and come to some resolution on issues so that we knew what the acceptance criteria was likely to be while we were doing the testing and design work.

We were fortuitous in the selection of our vendor that was good with R&D work.

Some vendors are less developed at this than others, and as it happened since all of the chairs were full, we picked someone else, and this particular vendor did a really good job of doing the R&D effort.

Then, the last element was happenstance, I would say, and that's that we had sufficient open floor space to install a strainer large enough to accommodate all the conservatism that were compiled.

The last slide is just the conclusions slide here.

I think I've already said it that we have made significant improvements that resulted in a

reasonable assurance that the sumps will perform their design basis function.

That's already been done, including the commitments we have made for future modifications.

Removing additional insulation results in significant person REM of radiation exposure without a commensurate improvement in the margin of safety.

I think Amir said that quite well.

The range is quite large. If you have asbestos in containment, for example, the exposure is very, very high.

We don't have any asbestos in ours, that's not a problem for us, but we do have a large amount of insulation so if we have to go back in and take steam generator insulation off our loop pipe insulation, the dose levels are very high in those areas.

The industry and NRC can close our this generic letter of this year by allowing the application of General Design Criteria-4, as Amir has mentioned.

This methodology is already approved for use in local dynamic effects and this would fall in the category we believe that insulation, debris generation is a local dynamic effect and could be covered by General Design Criteria-4.

That will allow for prompt close out and resolve all of the remaining issues including the downstream effects on the fuel.

That is the end of my prepared remarks.

CHAIRMAN JACZKO: Thank you.

I will now turn to Jeff Gasser who is the Executive Vice President and Chief Nuclear Officer at Southern.

MR. GASSER: Thank you and good morning.

On the first slide -- the first slide there is a picture of our new screens.

The original screen design was very basic, it was a box with a four sides -- four screen sides.

The new design much more complex of stacked disc towers that provide significant additional safety margin.

Go to the next slide.

It shows -- it gives a perspective of the significant safety margin improvement that we have seen at our two PWR sites, Farley and Vogtle, since we have added these new screens.

On the next slide is a timeline similar to Amir's timeline.

When the generic letter was approved in late 2004, the staff set about their work of developing the guidance, in parallel, we set about the job of designing the screens, manufacturing them, and testing them, and ultimately, installing them.

The first two red diamonds to the -- starting from the left, those are the times that we installed the screens at Vogtle, the end of 2006 and spring of 2007 outages we installed those screens.

So, it shows that because we had to do all of that before the guidance came out, much like Dominion, we installed the largest screens that would physically fit in the containment that we had.

We were able to extract the largest safety margin network that was physically possible in our containment buildings.

Next slide.

Where we stand today, we significantly improved over safety margin with the new sump screens.

We added new -- we replaced the injection needle valves and added flow orifices in the injection lines in order to open up those lines and resolve the downstream effects issue of clogging in those lines.

We've removed the most problematic of the insulation, micro porous insulation, from our containment buildings.

Today, we have reasonable assurance of public safety when it comes to ECCS sump performance.

Next slide.

Again, we were required to design, build, test, and install all in parallel with the staff developing the guidance.

The major unresolved issue today that prevents closure is this issue of debris generation at the time of the loss of coolant accidents.

As Amir and Dave have stated, the analysis currently being used by the staff assumes the worst case scenario in every step of that analysis.

The worst-case location reactor coolant system piping is picked, the largest field of zone of influence or damage is selected, no credit is given for the steel jacketing on the insulation.

It's assumed that 100% of the insulation is destroyed into small pieces, no credit is taken for any kind of settling or collection of any of that material in corners in the building.

It's assumed that 100% of that material is transported to one sump, and that it is evenly distributed over the entire surface area.

At every point, the worst case scenario is assumed, which gives this cumulative effect of these assumptions that currently prevents us from closing this issue in the near term.

As I said today, reasonable assurance does

exist. Public safety and compliance with 10 CFR 50.46(b)5, that exists today.

Further modifications, specifically requiring licensees to remove the remaining insulation, fibrous insulation, off of the reactor cooling systems will result in significant dose to workers.

Mainly, these workers, we're talking about thousands of journeyman, carpenters, sheet metal workers, insulators will pick up significant dose with very little safety improvement at any of the sites.

As my two colleagues stated previously, General Design Criteria-4 is an NRC approved methodology that is in use today that allows closure of the GSI-191, and maintains consistency with current design assumptions and regulation.

Next slide, my last slide.

So, the industry actions -- the actions by the NRC staff, the great work by the staff to this point, and the work by the licensees have resolved the Generic Safety Implications that was the root

of GSI-191.

Commission action is needed to obtain closure with no further undue worker radiation exposure.

The current regulations, General Design Criteria-4, provides the means for resolving this issue without further delay.

Commission action is necessary. I would urge the Commission to consider providing the direction to the staff to allow use of General Design Criteria-4 as an acceptable means of closing out finally and in the near term GSI-191.

That concludes my prepared remarks.

CHAIRMAN JACZKO: Thank you.

I appreciate all of your presentations.

We will start with Commissioner Ostendorff for questions.

COMMISSIONER OSTENDORFF: Thank you, Mr. Chairman.

I appreciate your briefs, very helpful.

I've got a couple questions here, we will see how much time permits.

Let me start, Jeff, back with you on the

conservative assumptions, but it's also a theme both Amir and David had.

I've been around modeling and simulation techniques in different capacities in prior work, I've been involved in.

I'm not an expert in any event, but I'm aware of the challenges of having a set of assumptions and methodologies in place that can lead to an appropriate rational outcome that people can say that makes sense as to how you did it.

I know the criticism of the conservative assumptions. Is it your sense that that's been done by the staff because there's not been a well-established pattern of how you model this phenomenon, as far as the zone of influence and the debris spreading and transport?

I'd be interested in any other comments you have on this topic from the other panelists.

MR. GASSER: Yes. It is my belief that this is a very difficult phenomenon to model.

With that -- without other guidance for the staff, they are using the assumptions that they

believe are the best assumptions for that piece and any one of those assumptions may be reasonable, but it's the stack up of all of them that results in the problem -- the final answer of loading on the sump screens that exceeds what the current design.

I'll ask my colleagues to jump in.

MR. HEACOCK: I think that's exactly right.

I mean, when you are forced to look at this incrementally in each piece one at a time, the deterministic approach was taken.

For example, the instantaneous pipe break creates a pressure wave, and then you have to deal with the pressure wave once you do that, then you have a spherical zone of influence rather than being directional.

It then increases again the amount of impact, and then Jeff mentioned other previous conservatisms in that line all the way down.

I think that is exactly right, that in order – it's a complex modeling issue and it was broken down into pieces and each of those pieces deterministic very conservative assumption set was

made for that piece.

There is no credit given for the compilation of all of those pieces.

Like you would with the root sum of the squares, or a PRA type of approach where you would say, look, these all things can't happen at the same time.

Another example is all of the debris generation, the coatings are believed to come off in the calculation instantaneously at the very beginning when you're delta P requirements are the most significant.

We've taken all those things and compounded them, again in time as well as in space.

We've compressed all of the bad effects to the first instant of the event.

COMMISSIONER OSTENDORFF: Amir?

MR. SHAHKARAMI: I just want to give you some examples, real examples.

For the new con type of insulation with a 22 gauge 340 extended steel jacket.

Based on that, some of that analysis that was done, a plant had used seven diameter as a basis

for its what you call its zone of influence.

Whereas, it is required by NRC because of deterministic and understanding, and it needs to be 17 diameter.

So, the difference between using 7 versus 17, it goes from conservatism translated to 500 cubic feet versus 2200 cubic feet.

It is not the linear way to look at it.

Then, what gets transported to the sump is about 320 cubic feet versus 1100 cubic feet.

You can see with the small change in the zone of influence, you can gain a lot of margin.

Again, I think review has been performed in a piece wise fashion.

Each with its own level of conservatism.

I know we have metrics that shows under everyone of these scenarios, several conservatism that we capture.

I think about 28, if I'm correct, type of conservatism built on top of each other.

COMMISSIONER OSTENDORFF: That's helpful, I know

personally I look forward to Commissioner Apostolakis joining this group to help us with his background in risk assessments and PRA principles.

Let me turn to a question -- I went through and the staff's done a great job of providing us with background information here, and again a very complex topic. And I'm still trying to wade through some critical issues, but if I can turn to the question of the in-vessel effects.

I know that it's been -- there's been some discussion debate based on what kind of fuel is loaded in the core as to how that analysis comes out.

I appreciate anybody's comments who wants to speak here about your assessments of the in-vessel effects, and any comments you may have as to whether or not those effects were considered as part of your license for your current plants.

MR. SHAHKARAMI: We have worked with both Westinghouse and AREVA fuel at a test facility for both of those, and basically what we have done -- we have used a ratio of particulate vessel fiber in a liquid and try to

simulate what happens with the entrance of the fuel assembly.

All the work that is being done on Westinghouse has been reviewed and in good shape, as far as acceptance.

There was a one-to-one ratio on AREVA fuel that I am personally involved with the staff to resolve that.

We are looking for alternatives either to do the test at another facility or Westinghouse, or do some kind of testing to really validate it's not the apparatus and the test results are valid.

That is the piece that I indicated in my last slide that I am working through, so we are going to resolve that issue for the in-vessel scenario.

Is that what your question was?

COMMISSIONER OSTENDORFF: Yes. Any comments on that?

MR. GASSER: No further comments.

MR. HEACOCK: The only comments, we have both Westinghouse and AREVA fuel in our units, so it's important to resolve both vendors.

COMMISSIONER OSTENDORFF: Turning quickly to

man rem exposure.

I saw estimates in there and I know it's plant specific and types of insulation specific.

I know I had been exposed to asbestos years ago during some sea repairs -- in the late 1970s on a submarine at sea, and I'm sensitive to the issues associated with that.

I've seen ranges of 100 to 600 person rem per plant, and I'm hearing an estimate from one of you gentlemen about 200 rem per plant for insulation removal as being a reasonable average. Is that a good number for us to be thinking about?

MR. SHAHKARAMI: I think we got the information from the units that still have a significant amount of insulation installed.

It did range within that 100 to 600, but when we narrowed down really based on our experience that it is going to reside -- I would say somewhere around 200 would be an average for the remaining units to go to remove the insulation.

MR. GASSER: The key with the installation is that first, it's the area or taking it off the reactor coolant system

piping and loops and equipment it's some of the highest dose rates in the plant.

It is a very crowded area, very hard to move around so it requires scaffolding to be erected, rigging for some of these pieces.

It's very complex.

Getting it off, as you have heard some of the older plants, the higher ranges of the estimates are mainly from the plants with asbestos insulation and all the safety requirements that go into removing the asbestos material significantly increased the time that it takes and then putting the new insulation back on again is an art.

Every piece has to be cut specifically for that location and fitted up around bends and elbows and other pipes attached to the reactor coolant system piping.

The numbers are so high. I was fairly surprised when I started hearing the estimates myself, but as I dug into them, there is a sound basis for those numbers because it is a very, very labor-intensive effort to remove and replace the

insulation.

COMMISSIONER OSTENDORFF: Is there any type of technology, not necessarily robots, but some remote operating devices, hot cells that the Department of Energy had remote handling arms and so forth; is that practical for any kind of a lagging removal from your experience, or has that been used in industry at all?

MR. HEACOCK: Not in the loop rooms. I think Jeff described it very well. They're very cramped spaces, sometimes humans have a hard time getting in between the pipes, the accoutrements, attachments, and so forth; so it is very difficult.

It's an art to fit the new pieces back up as well.

We haven't seen robotics used in this area.

MR. SHAHKARAMI: It really makes sense, we have seen the units that have changed the large components such as the steam generator recently at TMI and other places.

They have the right kind of insulation as part of that modification.

That is really what we are looking at.

This is large enough impact to the craft,

not only from dose safety, but this is not a simple activity in the field.

And really, we build margin as we go forward as we change large component rather than wholesale replacement.

MR. HEACOCK: I want to clarify one more point.

We're talking about average for those that have to remove large amount of insulation might be 200 rem, other units that don't have to do that of course would be anywhere near that.

COMMISSIONER OSTENDORFF: I understand, thanks for the clarification.

Thank you, and thank you, Mr. Chairman.

CHAIRMAN JACZKO: Commissioner Svinicki?

COMMISSIONER SVINICKI: You were mentioning some of the tight spaces, and I was thinking to myself maybe the room is so warm so that we are all projecting ourselves back in for these workers that have had to be in there crawling between those pipes.

I know we all tour plants, or those of us who tour, and it's frequently uncomfortably warm so that's the environment we have and I know they are working on it.

It's interesting to sit here and think

about what it would take to remove that insulation.

Commissioner Ostendorff has covered that. Again I noted it was a rather significant range you've talked about and he's asked you about, what is that sensitive to in terms of the dose.

You've given us an understanding of some of the considerations there.

I was also going to ask about how sensitive the zone of influence was to the overall analysis, and Amir, you've talked about that.

So maybe I will just move into some other areas.

Mr. Heacock, you gave kind of a unit by unit assessment and that was very helpful.

I think for Millstone and Kewaunee you said that the status there of issue resolution is that RAI response is ongoing; is that correct?

MR. HEACOCK: That is correct.

COMMISSIONER SVINICKI: So that was on your slide.

I think all of you gave a slightly

different perspective, not inconsistent, but a slightly different representation of what you think the issues are.

Mr. Gasser you said, "the major unresolved issue is the amount of debris generation."

I'm trying to get a sense here, because the staff has indicated, and I know they'll state explicitly when they are presenting, that they -- their proposal they would move to the issuance of a 50.54(f) letters, and I have to laugh -- I told myself I would never talk like that, but two years into the job I said people don't talk these numbers and these acronyms, but there I go.

I'm trying to understand where we are in terms of issue resolution and your responding to RAI's, and I'm trying to understand our practice.

I guess I'm like an engineer, I think really linearly so I think that we generate questions, we get responses, we analyze that and we move through.

Is there anything that you all would react to in terms of if you received the 50.54(f) letter

that caused you to commit to a resolution right now; are you kind of in the process of trying to resolve other issues right now, and you get this letter and that would tell you to commit to an issue resolution?

Can any of you react to the notion of receipt of a 50.54(f) letter right now?

Or maybe not.

MR. GASSER: For Southern Company, the issue that's open is this debris generation, and my reaction to a 50.54(f) would be great disappointment because we would be subjecting hundreds of workers to radiation exposure without any real measurable safety benefit.

That would be my reaction, is that we would comply and we would set forth, then we would go remove the insulation and replace it with --

COMMISSIONER SVINICKI: I didn't mean to indicate that you would not comply.

MR. GASSER: I understand that, but it would a very great disappointment because I believe that there is precedence here, prior NRC action.

We're using GDC-4 now on reactor coolant system piping design and so there is precedent here with the NRC to be an appropriate application.

COMMISSIONER SVINICKI: Can I ask you and I wanted to give the others an opportunity to react but let me say, you were most explicit in your prepared remarks about the fact that the Commission needs to make a policy decision here, and I would tell you, I know we received from NEI on behalf of licensees, a proposal, I guess it was Friday of

last week.

I have tried to pour through that. Now I'm a degreed nuclear engineer and I've done my best, I have one reactor expert on my staff and so we've tried to look at that.

I have asked the staff when we might receive their assessment of that proposal.

I don't want to put words in their mouth, I'll ask them when they're up here, but the answer I think I got was that's a policy question in that proposal and again it is extensive.

It's not just a letter, there are two attachments and other things.

I'm doing my best, NRR has almost 600 employees, I've got one -- we do what we can.

You talked about the need for a policy decision, can you help me understand what is in that proposal?

There's a lot of attachments about alloys and behavior and phenomenology, again I'm not a person off the street and I'm not try to ask for sympathy like I am, but what's the heart of the

issue there?

Is there anything technical in that proposal?

MR. GASSER: I'm not prepared right now to speak to the technical details of the proposal in the NEI letter.

It is my understanding that the staff believes that the previous guidance that they've been given from the Commission precludes them from using GDC-4.

COMMISSIONER SVINICKI: Okay, but Amir said the the history is -- that things are different now and I guess that's another thing I don't understand.

I don't know what the difference is.

MR. SHAHKARAMI: Let me just touch maybe on a couple of those issues in the past that were brought up.

One had to do with the defense in depth, in respect to usage of that policy.

At that time, we didn't have the larger strainer, we didn't have a lot of modification that we have implemented.

We haven't improved our operational and emergency procedure.

When I look at 2004, when this issue was brought up, and I look at today, today the configuration is much different.

I would disposition it that way.

Then there was also a concern about the primary water and stress corrosion crack not being a phenomenon that we can take credit for that policy.

As you know, there is MRP 139, the material reliability program, that required inspection and mitigation of all alloy 600 issues.

We are required by 2013 to mitigate and inspect the hot leg and cold leg, we've already done pressurizer.

All of the concern about that phenomenon, I would say, is behind us.

We are talking about to refuel it now takes to change insulation by that time we have mitigated pretty much the concern with PWSC.

Those are just a couple of the items in the past that I think today is different.

COMMISSIONER SVINICKI: Mr. Heacock, did you want to make any comment on this --

MR. HEACOCK: I could say ditto here, but I think I reflect Jeff's comments on 50.54(f) letter, I'd be disappointed receiving that because our only course of action would be to take action to remove insulation, that would be the only thing left for the utilities to do and of course we would do that.

I think that is the wrong course of action, I think you have heard that clearly from us today.

The right course of action is to go back and remove some of the conservatisms, and the simplest ways to do that is to apply GDC-4.

We believe that can resolve all the remaining issues in that fashion, rather than radiation exposure in the field.

COMMISSIONER SVINICKI: I guess what I take away from your answers is that I have some more work to do.

I've been here more than two weeks so I don't have the same excuse, but there is a lot of information here.

Amir, in your answer, although maybe I'm not familiar with all the issues you raised, it was clear to me that there is more than just a policy

up or down here.

I think there is some more technical work, clearly that I need to understand and again I will lean into that and do the best I can, and where the Commission needs to a0lter a policy of the past then that is ours to do.

I accept that.

I don't know that I feel equipped at this moment.

Again, it falls to me to equip myself to be able to do what we need to do.

I think I've covered things thematically, thank you Mr. Chairman.

CHAIRMAN JACZKO: Commissioner Magwood?

COMMISSIONER MAGWOOD: Thank you, Mr. Chairman.

First, let me say I appreciate what the industry has done so far to respond to the guidance from the Commission regarding this issue over the last several years.

I think there's been a lot of progress made and we recognize that.

I also wanted to emphasize very strongly on

behalf of Commissioner Svinicki and Commissioner Ostendorff and I have had some exchanges over the last week or so about the doses associated with this, and we're very concerned about that.

We take this very, very seriously.

I think whatever decision this Commission makes, will be made in light of the recognition that we are talking about significant exposures to many workers.

Please be assured we are thinking about that.

All of you have focused on General Design Criteria-4 as the way out of this situation.

I wanted to talk about that a little bit.

Just yesterday we received a letter from Union of Concerned Scientists, and I don't know if you've seen this yet or not, if you have not seen it we can certainly provide you copies, but let me quote from part of the letter.

The letter in referring to the use of leak-before-break to address this issue says, "…the reality demonstrated over and over at PWRs is that

warning flags raised by reactor coolant pressure boundary leaks are not heeded.-- PWRs with leaks are simply not being shut down and depressurized."

The letter goes on to say, "The leak before break notion only becomes leak-before-break protective barrier when pressure boundary leaks are responded to responsibly and timely."

That's a criticism I've heard before, and I wanted to give you a chance to respond to it.

Particularly, I wanted to focus on Mr. Heacock, because the letter we received points out one of your plants, Oconee Unit I, and reports that an event that took place in 2005 found boric acid around nine control drive mechanism nozzles ultimately signified the reactor coolant pressure boundary system has occurred.

So, I just want to give you a chance to respond to that and give us your thoughts.

MR. HEACOCK: First, Oconee is not mine, but I will respond.

The interesting thing about the letter is

all the examples given never broke.

In fact, no pipes have ever broken on an operating plant.

I think it validates the point that it leaks, and it leaks for a very long time before it breaks, is the reality of it.

The piping is very tough, doesn't tear easily, if you will.

So, leak-before-break is a valid assumption and I think it is validated by David Lochbaum's letter in all reality.

MR. GASSER: I respectively disagree with the conclusions of the letter also.

The reality and the facts are that our instrumentation for detecting any type of leakage is extremely sensitive, and we have numerous examples of units detecting changes on the orders of hundreds of gallons per minute, .01, .03 kind of changes in that.

I believe that the body of evidence shows that our instrumentation is extremely sensitive and capable, and that licensees take the appropriate

action.

As Dave said, the letter also supports the idea that these pipes have extremely high safety margins, and in every single case in the history of reactor operation they have leaked before -- and they have never broken.

MR. SHAHKARAMI: Several years ago due to some of the alloy 600 concerns, the industry took on improving detection of leakage.

Our diverse set of indications that we have -- that we watch, and we could definitely detect a small amount of leakage into our containment.

I known in the letter it also mentions about if the water that leaks is not contaminated the radiation monitor are not going to pick it up, and that is only one aspect of all the instrumentation that is used to detect leaks.

So, I just wanted to state that industry has gone and changed the way we used to measure that several years ago through coordination with NEI.

COMMISSIONER MAGWOOD: Thank you.

That is very helpful.

And let the record show that Duke Power has not transferred responsibility for Oconee despite rumors.

One of the things you did say, Mr. Heacock, though was that we have an unrealistic regulatory schedule, unrealistic regulatory resource impact impacts; could you elaborate on what you meant by that?

MR. HEACOCK: Yes.

You know, being in management myself, I quite often establish unrealistic management expectations that people strive to get to the point I'm trying to get them to, and I think that's what happened here.

I think the dates were established before the entire scope of the project was well known.

I think once people got into the mechanism of having to achieve the project and realize it takes re-analysis to the containment sumps, the different elevations and so forth, and then you have to get that approved because now you've changed your design basis.

So, just that element alone took several years to get resolved.

That wasn't contemplated on, I don't believe, in the original schedule for the generic letter.

That was really my point in talking about that.

There was a number of activities that had to occur in parallel that should have occurred in series.

COMMISSIONER MAGWOOD: One issue I've asked the staff about, and we've had some discussion about this, is whether there are some other approaches to dealing with this issue.

Mr. Shahkarami, you mentioned that there should be a holistic view of GSI-191.

With that perspective, is there another approach that you've thought about, an out-of-the-box solution to addressing this issue?

MR. SHAHKARAMI: I think if you look at the number of conservatisms that has been built at every step of this process and look at it really independently, you can

come up with an order of magnitude of conservatism that has been built into the evaluation.

That is one way you can sit back and really look at holistically what all of that as an aggregate is going to give you.

That is one approach.

Are you talking about physical?

COMMISSIONER MAGWOOD: I was thinking physical, yes.

MR. SHAHKARAMI: We have gone through -- I'm sure there are exotic approaches you can use, but I know we have exhausted what we could have looked at, and I'm not saying there are no another solutions out there, we have not been on that path.

Additional modification we did, for example, changing a buffer was really outside of the box type of thinking.

If we have some kind of chemical that would aggregate and mix many materials to cover the sump, maybe the solution is to go to different type of buffer -- or diversion of the flow.

I know one utility actually drilled a hole

in the area that water had to go up and then come down.

There are other ways that people have dealt with this.

MR. GASSER: My staff has spent a good bit of time trying to think of any type of change that we could do to address this issue, some physical change.

They've explored modifying the screens that they were flushable, back-washed to get anything off that built up on them.

I mean, there's just nothing feasible that is left.

We have done all the physical modifications, we believe, that would actually work in order to reach the safety margin we've got today.

COMMISSIONER MAGWOOD: Okay, thank you.

One last question.

One of the factors in this that is interesting is about half the PWRs have already gone forward and met what the staff believes is sufficient changes by making changes to the

insulation and of course adding the larger screens, and about half have not.

Obviously, it's a little more difficult for the ones that still remain to make these changes.

I wonder if you could talk a little bit about that and what the differences are between the plants that have gone forward and replaced insulation, and the ones that have not.

MR. GASSER: For me, the main difference -- I've got one plant that has mirror insulation, the other does not.

It has mirror insulation because that was part of the original design.

They didn't change it.

Also that plant when they replaced steam generators that they came back with steam generators that had mirror insulation, and to my knowledge most of the plants that are in that category, they've already replaced their steam generators and removed a significant amount of the fibrous material and that change out is why -- is my understanding of why they're in the position

they're in today.

MR. HEACOCK: I think the same is true for us.

We have plants like North Anna and Surry that have large amounts of fibrous insulation, we had to go with a very large sump design for those, and others like Kewaunee that have reflective metal insulation almost entirely in containment.

Even the containments are much smaller, you have a very, very small sump at Kewaunee that's acceptable versus a huge sump at North Anna and Surry that's acceptable.

MR. SHAHKARAMI: At TMI, as you know, we just replaced the steam generator, put in the new insulation. We also have insulation on the pressurizer, but the pressurizer has a skirt and recently there has been an agreement that if you have a skirt over the pressurizer you don't get the transport that originally was thought.

That issue may go away for TMI.

COMMISSIONER MAGWOOD: All right, thank you very much.

Thank you, Mr. Chairman.

CHAIRMAN JACZKO: Thank you.

I thought I would -- it's interesting, I think sometimes we have all these discussions and we sometimes get away from our roots.

As I was preparing for this meeting, I went back and looked at, fundamentally, what is driving what we are doing right now and that is the 50.46 regulation which is our regulation for emergency core cooling system.

It's fundamentally 50.46(b)5 that requires performance -- long-term cooling performance.

I just wanted to read a piece of that because there's been a lot of talk about conservatisms, and I think that's an interesting discussion.

I think it's important to understand the context in which that discussion is being held.

I think if I could just, bear with me as I read some of this complicated rule language.

This is the fundamental requirement in 50.46 that "ECCS cooling performance must be calculated in accordance with an acceptable

evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations, and other properties sufficient to provide assurance…"

I think this is probably the most important piece, or one of the most important pieces, "the most severe postulated loss-of-coolant accidents are calculated."

“Except as provided in paragraph (a)(1)(ii) of this section, the evaluation model must include sufficient supporting justification to show that the analytical technique realistically describes the behavior the reactor system during a loss-of-coolant accident.

“Comparisons to applicable experimental data must be made, and uncertainties in the analysis method and inputs must be identified and assessed so that the uncertainty in the calculated results can be estimated.

“This uncertainty must be accounted for,” and this is another important piece, "so that, when the calculated ECCS cooling performance is compared to

the criteria set forth in paragraph (b)", and one of those criteria in paragraph (b is the long-term cooling requirement of the section, "there is a high level of probability that the criteria would not be exceeded."

That is the regulatory underpinning for what we are trying to look at here and trying to analyze.

I think it's important as we talk about these conservatisms to keep that in mind that there's an opportunity to reduce those conservatisms, to demonstrate that through testing and analysis.

Maybe we can talk about that a little bit.

The other piece I wanted to touch on is the use of the GDC-4. I think maybe there's been a misperception created.

The staff does allow the use of GDC-4.

That was a regulatory change that the Commission made that said you can look at local dynamic effects when you are dealing with loss of coolant accidents.

That's, in many ways, already been incorporated.

That's why we don't have pipe restraints, we removed those in many cases, that's why we don't have to have impingement shields and other kinds of things.

We've actually built that in, in many ways, to the analysis already.

What the issue here is, is at some point we kind of shift, there is a line where we go from the direct dynamic effects to kind of the global phenomenon of ECCS recirculation.

The fundamental -- I think the policy question -- and it is arguably a policy question, I don't think anybody really -- there is no technical answer to say where you draw the line.

But the issue is, if you have a loss of coolant accident, which is the required design basis accident, do you assume -- or what amount of debris generation do you assume from the jet?

I mean, that's what this fundamentally comes down to.

If we were to apply GDC-4 here, the Commission policy fundamentally says, we do not believe that's inconsistent with GDC-4 that you need to include the effect of jet -- essentially of the jet on debris generation.

And that is fundamentally the application of GDC-4, I think that could perhaps help the Commission -- as I see it and certainly welcome if you have any thoughts about -- but that's how I see where GDC-4 would play in; I don't know if you want to comment on that.

Do you think that's an accurate assessment of how that would be used?

MR. GASSER: My comment would be that much as you said that GDC-4 has been used with pipe restraints and its been used with impingement shields, it's also been used with fuel design, and of course another one of the criteria is cool before geometry and the effects of the fuel now in the fuel design on a LOCA uses GDC-4.

It is my belief that the direct impact and damage to local insulation in the area of a break, is a dynamic local effect which is exactly

what GDC-4 was created to do.

CHAIRMAN JACZKO: I think that's a debatable point exactly, and I appreciate that.

I think where I come out on that is I think at some point, if we get to them we don't have debris.

If we don't -- if we assume and make these assumptions that eventually, if we assume through GDC-4, all of these local dynamic effects are excluded, then we are never generating debris.

I'm not sure in the end, if that's I think what the Commission was trying to accomplish when it did GDC-4.

MR. HEACOCK: -- less debris.

CHAIRMAN JACZKO: Or less debris.

MR. GASSER: I do not believe that the staff or the licensees should conclude that no debris is generated.

I do not agree that that is the answer.

CHAIRMAN JACZKO: That is helpful.

The issue then really is to what degree of debris generation are we talking about?

If we look at that -- that to some extent, seems like that's a technical issue.

Where is the technical issue here in which what you are saying disagrees with what the staff is saying?

Where -- have there been experiments that were done to demonstrate how much debris would be generated? Do we run various jets at different pressures?

It seems like that's a solvable issue we can agree on a specific set of technical facts about, even without even going to GDC-4, but simply to agree, what is technically the right answer for debris generation? Has that testing been done?

MR. SHAHKARAMI: As I said, the way PWR Owners Group works, we can add this issue generically, or we can add this issue generically, or we can add this issue selected utility funds to do experiments.

We are working on the zone of influence and we had seven RAI on those, five have been answered and two remain, and one had to do with a scaling factor and the ANSI non-conservative, and if you recall in my slide I said we were going to continue to pursue really put our arms around

what's the realistic zone of influence that we can use to really get more realistic.

CHAIRMAN JACZKO: I can ask the same question to the staff, does the staff disagree with your experimental results to date?

I mean, have there been experiments done to determine what the appropriate zone of influence should be so we can all agree?

It seems like if we can just answer that question, we're done.

If everybody would agree what the zone of influence is, then the final issue, and I think Jeff you said it, that's the last issue is debris generation and it comes down to the zone of influence.

I think, Amir, you said somebody had 7, somebody, in the staff's original SER, they looked at what I think comes out to give you the 17 answer. I don't know if it's a generic or a plant specific calculation, but I think you mentioned one plant was looking at 7 and the staff was at 17.

MR. SHAHKARAMI: The seven diameter spherical was

based on plant specific analysis that was done, but was not accepted.

CHAIRMAN JACZKO: Why -- what was it that wasn't accepted about that?

MR. SHAHKARAMI: What I would like to do, the person that has been all over this is in the audience. I would ask Mo if you want to explain.

CHAIRMAN JACZKO: We can we narrow down the issues we might be up to figure out what -- so, I guess maybe that's a specific question -- why did the staff not agree with the seven pipe diameters and was --

MR. DINGLER: Right now, as Amir says, we combined all the RAI's the plant got on the zone of influence testing to seven major issues.

We reserve -- resolved five of them, two of them are still -- we need to provide some additional data to the staff to do.

CHAIRMAN JACZKO: What are those?

SPEAKER: Those are scaling for larger components from what we tested with a 14-inch pipe, or a 6-inch or 8-inch pipe, scale it up to the steam generator, larger components, larger pipes.

The other one there is the discussion that is the ANSI standard 58.2 conservative in all cases, and the staff wanted some additional information to do that.

And that's what Amir is talking about, to do some additional testing.

CHAIRMAN JACZKO: So, if we get that additional information -- the staff is either going to agree or disagree, and why does that not resolve this issue and when are you going to provide that additional information I should say?

MR. DINGLER: We are working on that right now, the schedules and exactly what we need to do to answer those two questions, and we are working on that now.

What it doesn't do is the double guillotine break.

In other words, do we have to assume in our testing the double guillotine break that you got right now for the loop piping?

The leak-before-break will reduce that double guillotine to a single, smaller opening that we have to consider.

That's where some of the differences of how big your ZOI goes is based on the double guillotine break complete shear, at times zero to a slower opening, let's say half the diameter of loop piping.

That will have a ZOI of someone different and that's where --

CHAIRMAN JACZKO: So, let me ask you on this point, and again, it seems like -- these are very specific technical issues which my experience with the staff is that they are able to work through these issues in a reasonable way.

I guess the fundamental concern is why are these issues coming up now?

This is an issue -- the generic letter was originally issued in 2004.

The staff at that time in the safety evaluation they did to accompany that, and they made -- they had a discussion about zone of influence, they had a discussion about, in fact, the safety evaluation, they talked about GDC-4, and about whether or not GDC-4 would be applicable.

I think at that time they said that for

debris generation, it's not really appropriate, it's not consistent with the Commission direction.

Why today are we kind of now, you are getting the testing and the results to the staff to document the positions that have been taken. Why wasn't this done earlier?

MR. DINGLER: We've been working on this for about two to three years and resolved the RAI's.

I think some of the timelines that you have from Amir, Dave, and Jeff, I think the staff has time lines, in responding to the RAIs of the individual plant submittals, we've been working on this -- the plants did individual testing for a reduction in ZOI.

So based upon the RAIs your staff has generated, we've been working with that as an Owners Group to generically answer those.

We've been working on that for probably a year and a half to two years right now to do that.

Then, your timeline is starting to, to be honest, squeeze us in to what we want to do.

CHAIRMAN JACZKO: One other thing as I was going

through the material the staff gave a briefing to our technical assistance here, and sometimes I like to pretend I'm a technical assistant so I read some of those things.

One of the things they talk about is some of the zone of influence testing.

There is an ANSI standard which I think establishes what the calculated pressures need to be when you do the testing, or in order to do the calculation, what the zone of influence is.

When you did the testing that some of the testing you did to measure the zone of influence, were the pressures in the jets that were actually used, were they at the same level as the calculated ANSI standard?

MR. DINGLER: I'm thinking.

There were some that were the same as calculated, some were slightly different --

CHAIRMAN JACZKO: Were they larger or smaller and, I think smaller being non-conservative?

SPEAKER: I can't remember.

In some cases it might be slightly non-conservative and that is why the question of

resolving the differences of the ANSI standard is still remaining.

CHAIRMAN JACZKO: That's helpful.

Again, just so we try to narrow down what the issues are here.

The other issue, then, is the reason that we have a disagreement with the staff right now is that the testing that was done was non-conservative to the ANSI standard, I think that's what I heard you say.

Those are the areas in which the staff has additional questions.

MR. DINGLER: We believe the testing was done conservative, there is some inherent non -- the staff believes there is inherent non-conservative in that ANSI standard that we have to apply and we need some additional testing to provide data to show that that is not an issue or a sensitivity to show that doesn't affect the ZOI.

CHAIRMAN JACZKO: So, those tests in which the pressures and the jet characteristics were consistent with ANSI standards, did the staff have questions about those test results?

MR. DINGLER: All I can remember is where we had the discussion of the differences, I can't remember --

CHAIRMAN JACZKO: I can ask the staff too, because they may have that.

I appreciate, and again I'm just trying to get to kind of what the core issues are.

It seems like there's a path forward, right now, with additional testing and data to demonstrate some of these lower zones of influence, which it seems, if we had the lower zones of influence -- let's say we wound up with the seven that was in the original submittal, and I can't remember which plant that was, if that were done would you be comfortable moving forward based on that technical information?

MR. SHAHKARAMI: I know the reduction if the generation -- I just don't know what the end product will be.

We are going to go look at that to see how -- this utility that used the 7d definitely concluded that a strainer remained functional.

The difference is definitely within 7d and

17d.

MR. HEACOCK: That won't solve all the issues. That is not a generic solution. That is just one utility, a couple plants and that's it.

CHAIRMAN JACZKO: So, what are the remaining specific issues that need to be resolved?

Jeff, you said it's debris generation.

MR. GASSER: That's right.

Except, I want to -- from everything I've seen with the testing, the testing does not show 100% destruction.

The testing shows that the jacketed material does provide defense, defense against the debris generation.

So there's assumptions being made that are extremely more conservative than the test results show.

Where we have been -- the staff has worked -- NRC staff has worked very hard to try to bring closure to this and do their technical review, licensee staffs have been working very hard to supply those answers, and as we prepared for

this, what it came down to is when different highly technical, dedicated, committed people are working on this and there is differences of opinions on what assumptions should be used, that is why our conclusion is the path forward is to use a different analysis methodology which is already approved by the Nuclear Regulatory Commission which is a GDC-4.

CHAIRMAN JACZKO: Well, I will close here, I've taken far too much time.

If other Commissioners want another opportunity I will open that up.

I appreciate that.

What that looks to me is we are just avoiding the problem.

It seems like the issues are, we need to come to an agreement on what the appropriate assumptions are in the analysis.

Moving us into GDC-4 space seems to just be completely avoiding that difficult question.

I've had this argument with the staff in the past a lot on containment overpressure, or

containment accident pressure. Whether that's a policy issue in there about whether or not -- I know Bill Ruland is looking funny because he deals with that too.

It fundamentally, comes down to an issue about whether or not at that point is that an issue for the Commission to decide.

Should the Commission be in the middle of answering those assumptions?

I, personally, think that's the right way for us to go forward.

There's a technical issue here and it's coming to an agreement and understanding what the assumptions are to do the calculations, the calculations are done, you make the mods that the calculations say you need to make, I mean I think that's the preferred path forward.

Throwing in GDC-4, Jeff as you characterized, is to avoid having to do that.

But at some point I think we need to do that, and I don't know, maybe it's the Commission that needs to weigh in and approve or disapprove

certain assumptions the staff's using.

That, to me, is a preferable path forward and maybe in the end we wind up with assumptions that aren't what the staff wanted to use, but it seems like a better approach than throwing in a whole other analysis that says, oh by the way, there's not a problem here.

MR. GASSER: I think that's mischaracterizing it because using GDC-4 does exactly what you said, it gets to doing the calculations and answering -- getting the answer to the problem.

It just has more realistic assumptions built into the methodology for getting to the calculation of the debris that is generated, running it through the calculation, seeing what the effect on the ECCS is, and whatever that answer is -- that drives the staff and the licensees actions from that point.

CHAIRMAN JACZKO: Thank you, that is very helpful and I appreciate your willingness to answer my questions this long a time, because it seems like we are narrowing what the issues are here and maybe we do -- can work on a

path forward to do this.

It will probably require additional information briefing from the Commission and we will hear from the staff now.

Now, I took more than enough time. If the other Commissioners would like to offer some other comments.

COMMISSIONER SVINICKI: If I could, because you are allowing this and I appreciate that very much.

I just want to compliment you, Mr. Chairman, I think this has been really helpful because what I heard in the opening, I think unanimously on this side of the table is that we want to get this issue closed.

You've got people with you that have the most time here, so you have the most background on this.

I found your commentary very helpful. I need to go back and study the history of the Commission's positions they've taken on the application or possible expansion of GDC-4.

I think it is important that we just drive to narrowing it down somewhat and then, I'm

hearing, I don't know on GDC-4, I need to acquaint myself with that history.

It sounds like you have a view. I haven't yet formed a view of that, but on some of these I just think we look at it and say, this is overwhelming, there is so much here, but we've got to push down if we need to get some testing done, we have to define it.

I think we are going through this in some design certifications right now.

We come to early agreement on the test -- the test methodology, get the data, and if there are narrow things that the Commission is truly a policy matter, and I didn't mean to express any reluctance on that, but we need to have enough in front of us and to get the staff to present that to us in an informed way with alternatives so we can weigh the pros and cons of that.

I don’t feel like I’m. at that point today.

So, that was very helpful, thank you.

COMMISSIONER MAGWOOD: Let me echo that.

I think your verbiage was actually quite helpful.

I think one of the issues I want to spend some time on is looking at these tests, because that is something we haven't really been briefed on yet.

I would like to understand how helpful these tests really are in understanding the phenomenon we are looking into.

It may well be, and I want to address this with the staff, it may well be that something Mr. Shahkarami mentioned -- I will get it right eventually, Amir -- something Amir said that actually may be most helpful for me is the idea that what we're missing here is really the application PRA to understanding this phenomenon.

I know the staff is giving a lot of thought to you applying PRA to these sorts of things.

I think we will want to have a dialogue with them about that.

I am sensitive to the concern that we are applying conservatism on top of conservatism, on

top of conservatism in doing conservatism.

I've been through experiments like that before, and they do skew sometimes where you come out.

So I do want to make sure, as I said earlier, I want to make sure we get this right and the next time the Commission rules on this, I would like to think that everyone believes that that will be the final time we have to take this up.

COMMISSIONER OSTENDORFF: Quickly, thank you, Mr. Chairman.

I'm glad I'm not the only one that has questions.

I'll thank -- I really learned a lot from your exchange, you're getting to the technical issues on the pressure of the jet and where that falls, and the range of conservatism above and below the line for various ANSI criteria.

So, I thought that was very informative.

I think we have a great opportunity here as the Secretary of the Commission works on the staff requirements memorandum upcoming from this meeting

to look at those specific issues that will help us bore down to a small list, hopefully, of issues that will provide for further briefing topics in the very near future to come to closure.

CHAIRMAN JACZKO: Thank you.

With that, thank you for your comments and turn to the staff.

Thank you.

Now we will turn to the staff for their comments and perhaps you heard some discussion here that may help you focus your discussions as we go forward, and I think certainly there's keen interest on the part of the Commission about understanding some of this information further.

I will turn it over to Bill for your presentation.

MR. BORCHARDT: Thank you.

What we will try to do with the presentation is really go very quickly over a few slides, but focus on some of the ones that respond to the discussion and the status of some of the current technical issues.

As was mentioned earlier, this issue was initiated in 1996.

At the beginning, neither the NRC nor the industry had a full understanding of all of the related issues, or all that would need to be done to resolve it.

However, the staff and the agency as a whole determined at that time, that it was

important that some action be taken to promptly address some of the safety issues.

That's why this is not the model for how we would like to address generic issues, but it was important at that time because there was a clear recognition that there was a significant safety issue that needed to be addressed, and we didn't feel that it was appropriate to wait five years, six years to do all of the testing so that we could have all of the definitive acceptance criteria established.

It is not the optimum situation, but I think it was the right decision at the time.

Nonetheless, plants today have made important design improvements and are safer today than they were in the nineties.

More than 30 units have resolved the issue completely.

As has been said, we are highly motivated to bring this issue to closure.

The industry submittal that was -- NEI submittal from last week deserves some serious

consideration, we are going to do that and expect that we are going to be preparing some communication to the Commission that will document our assessment of what they submitted.

Now, I will turn over to Jack Grobe who will begin our discussion of the progress that we have had to date, the remaining issues, and our plans to get to closure.

MR. GROBE: Thank you, Bill.

Good morning, Mr. Chairman and Commissioners.

I've just been shortening this, taking out the vegetables and the potatoes, so hopefully just have the meat.

Clearly, this is much more complex than we anticipated in 2004.

We have had many surprises in the testing and the research that has been done.

The approach -- let me introduce Bill Ruland, Bill is the Director of the Division of Safety Systems in NRR, and Mike Scott. Mike is the Chief of the Safety Issues

Resolution Branch. He only has one, not that we only have one safety issue, but PWR sumps is enough to keep Mike busy.

Mike has done an exceptional job of bringing together a team of experts, literally the best in the world, that are balancing the uncertainties.

I think you heard some discussion of non-conservatisms and conservatisms.

He calls it the integrated review team and these are very highly experienced senior people that listen to all of the various staff in roughly over a dozen different technical areas that comprise these reviews and try to bring some balancing to what we know and what we don't know, and whether or not the questions we are asking need to be asked.

We have remained flexible and adjusted to all of these new things we have learned over the years.

Mike will get into that in a little bit more detail.

Well over half of the PWRs are either closed or on a clear path to closure.

In considering 50.54(f) letters, that is simply a tool, it's simply a letter to collect information much like a generic letter.

We anticipate that likely fewer than 20 plants will receive those letters.

There is fewer than a quarter of the plants, the PWRs, that have significant fiber problems.

To be able to estimate the dose that it might cost to take the modifications that are necessary, is highly premature.

I would anticipate that all of those plants would do additional testing to try to refine at a further level what insulation needs to be taken out and what doesn't.

Then, you start doing the design mods and start doing the ALARA planning and estimating the dose.

It will be substantial.

There's been, unfortunately, several

occasions -- PWR had replacements, steam generator replacements, BWR intergranular stress corrosion cracking on large pipes, PWR primary water-stressed corrosion cracking where we didn't fully understand what we thought we understood when we originally designed these plants, and we had to go back into containment and make major modifications.

This is not the first time, and hopefully it will be the last.

We will continue to be responding to the operating experience.

We've received extensive support from the Office of Research.

They've done exceptional work supporting the staff, as well as close cooperation with the Office of New Reactors, in considering questions that we should be asking, not only for this specific designs we're dealing with, but making sure we are asking the right questions for the new designs.

NEI submitted a letter, there's a very

large attachment called expected behaviors, we've been working on this for a long time.

There is nothing in that letter that we haven't already explored.

There aren't technical bases for those expected behaviors.

We've already exercised those issues, there is nothing new in that letter.

It is necessary to set time limits on how much more time we will spend on this.

Our approach to date has been a generic approach to establish generic criteria, and what we've concluded at this point is we've gone as far as we can with that and it's time to move in for those few remaining plants to a plant-specific approach.

We will remain flexible, it is likely going to require two refueling outage cycles to finish the job, so that's a nontrivial amount of time, three to four years, after completion of the testing.

In our view, there is no more value, we

can't see any path forward with further generic work.

It is time to move to a plant-specific discussion and get these issues resolved and move on with it.

Absent Commission direction, our approach will be to issue those 50.54(f) letters to a small number of plants to continue working with the remaining plants, and by the end of 2010, have a clear path forward for what additional testing needs to be done and what modifications will need to be done in the next two outage cycles to bring those few remaining plants back into a position where you can have a technically defensible design basis and a technically defensible safety margin.

At this point, let me kick it over to Mike and he is going to try to simplify the remarks that he's been practicing for weeks and go forth it, Mike.

MR. SCOTT: Thanks for that, Jack.

Good morning Chairman and Commissioners.

As Jack said, I am going to kind of move lightly over the first couple of slides here.

First of all, they speak in a fair amount of detail to some of the information you've already heard from the industry presenters.

Slight two, of course we're going to talk about the status of completion of the issue, our path forward, we are going to briefly talk about BWR strainer activities because it naturally comes up as a question.

Well, you are spending all of this time, resource effort on PWRs, what is going on with BWRs?

We will talk briefly about that subject and then we will wrap up.

Slide three, please.

Of course, as the Chairman referred to, the purpose of the exercise here is to demonstrate compliance with a deterministic rule, which is 10 CFR 50.46(b)5.

We acknowledge and we have said several times that the industry has made major strides in addressing the issue.

We're clearly in a better place than we were in 2004.

Installation replacements, much larger strainers, there've been plants that have implemented changes to automatic initiation of containment spray to reduce the amount of debris that is generated and washes down to the sump.

A whole variety of different activities have been taken, and they have made progress.

There have been some challenges along the way, as well.

We have frequently been surprised by the research that has been going on, as the speaker stated earlier, in parallel with the work being done to try to bring the issue to closure.

Those surprises have caused us to be where we are today, almost but not completely, resolved.

Moving to the next slide, please.

We did have a plan in 2004, we still have a plan.

We have had to revise it a number of times to deal with the surprises that I mentioned and to

deal with the fact that we found that there are various sensitivities of this issue associated with how the vendors do the testing.

As the Commission is aware, it is not possible to test these strainers with debris in the actual plant.

So, vendor testing needs to be done to show that the issue has been resolved.

As we have also talked about, it's an extraordinarily complex phenomenon with many tentacles to it and to try to model in a vendor facility what is going on actually in the plant, is a very complex exercise.

We discovered that in reviewing the vendor testing that we had a lot of questions about the way the tests were being run, and that has caused some of the discussions that have occurred since.

However, substantial progress has been made in resolving those, as one of the slides says here, we generally accept at this point the strainer test protocols that the vendors have developed.

That was based on extensive discussions

with the staff, REI's to the various plants, their responses, we've largely worked through that with a couple of exceptions.

We mentioned that we've resolved the strainer issue for over half of PWRs, and when you consider that over half are done with the exception of the in-vessel issue and another half of those that remain are approaching issue closure, then as a Jack Grobe said a minute ago, the number of plants that are really struggling with this issue is a relatively small fraction of all the licensees, but nevertheless, there are very several plants that fall into that category.

Next slide.

So, what's left?

The slide says that our goal is issue closure in 2010.

It being a sump issue sort of thing, we've experienced a lot of changes, and the in-vessel issue that we have talked about with you and that the industry talked about earlier this morning has led us to conclude that we probably won't quite get

to the finish line in 2010, because of the questions that have come out about the differing behaviors between the two vendor fuel types.

We are still working through that, as Amir Shahkarami indicated, we are attempting to get to a point where the vendors involved agree to run a cross-test so we can remove the question from the table as to whether the apparent difference in behavior for the two fuel types is a test issue.

Because if it behaves the same way in the other test rig, then probably the testing is not what's on the table.

There are some issues involved with trying to manage one vendor's fuel being tested in another vendor's facility, as you can imagine.

That's caused us some delays, and we believe that that will end up pushing the final resolution of that in-vessel issue out into 2011.

Nevertheless, we are continuing to push hard to resolve the issues, including that one.

We do have issues with the zone of influence testing that the Chairman was talking

about.

As was mentioned by the industry, we have asked RAIs of basically the owners group as a surrogate for the licensees on the issue -- the ZOI testing issue.

The way that the test was done was with a jet impingement test, and the staff asked a number of questions about that jet impingement testing and the questions led the owners group ultimately to conclude that there was a misunderstanding of the configuration of the test rig that caused a non-conservative result in the reports that were ultimately issued that were intended to justify the zone of influence reductions.

As was discussed earlier, those changes in zone of influence make a big difference in how much debris is assumed to get to the sump.

It is important, from the staff's perspective, that if we are going to agree to a zone of influence reduction, it needs to be well supported.

We did not find that the reports that were

developed by the owners group provided that adequate assurance.

We sent a letter to the owners group early this year that basically concluded that we did not accept the test results from that testing.

There was an alternate plan that has been put forward to measure the test, pressure at the test article and use the ANSI standard that was referred to, to calculate the zone of influence.

The staff would accept that.

However, that standard is conservative to varying degrees, depending on how far from the test article -- how far from the pipe the test article is located, and the industry was reluctant to accept that as a path forward so they have proposed an alternate analytical approach.

Our history with alternate analytical approaches is that they take a lot of time and discussion, and may or may not succeed.

With that history in mind, we believe, as Jack Grobe talked about, that it is important that we have a backup plan if the new analytical

approach, like the one before it, does not work out.

That is why we talk in terms of if we don't succeed with this analytical approach, let's have made the changes to the plant within two refueling cycles.

Next slide, please.

So, what is our path forward here?

Test the strainer performance using an approach acceptable to staff.

Again, we believe the industry knows what that approach looks like.

There are issues for plants that have a large amount of fibrous insulation with being able to make the tests in the way that the staff has accepted, recognizing that's conservative, and still show successful performance.

We do expect that the plants will do what the testing tells them to do over the next two cycles.

It is important to emphasize here that we are not stating that the plant should remove all of

their insulation. As Mr. Heacock talked about. he has a plant that has substantial fibrous insulation, and the staff has considered his plant done, with the exception of in-vessel effects.

It is an oversimplification to say that where this naturally leads you is to remove all of your fibrous insulation.

It may well not.

It may be a portion of that.

Maybe none at all.

Although for plants that have a lot of fibrous insulation there may be a significant amount of reduction needed.

So, where we are with that is expecting that to occur.

Where we have a plant with significant unresolved issues that the staff does not appear to be coming to closure with, then we are contemplating and planning for and have drafted 10 CFR 50.54(f) letters to bring about actions I talked about.

Run a test with a method acceptable to the

staff, and do what the test tells you to do to your plant.

We remain open to proposed alternatives as long as we have that fallback plan.

Next slide, please.

MR. GROBE: Mike, I think -- in looking through the remaining slides, it talks a lot about the enhanced approaches we have been taking and also addresses BWR implications.

I think, seeing the time, it might be best at this point just to transition to responding to your questions.

MR. SCOTT: Would the Commissioners be okay with that, or do they want to hear about the BWR issue as well?

MR. GROBE: If necessary, we've already done TA briefs on the BWR approach and we'd be glad to do another one.

CHAIRMAN JACZKO: I would be fine with that, unless there's any objection.

I think the BWR issue will probably --

COMMISSIONER SVINICKI: Is it possible to summarize it, I know that's hard to do, but could you just

summarize the BWR approach?

MR. SCOTT: Surely.

The BWRs were resolved in the 1990s through efforts by the industry and the staff, and the questions that arose during that process led us to ask the questions of the PWRs, and now the process with the PWRs has caused us to have additional questions for the BWRs.

So, we are going back and looking at that.

It's way premature to say that we're going to have significant issues with the BWR performance, and as was mentioned, they've already made their strainers larger so they're in a better starting place than the PWRs were.

Nevertheless, we worked with the BWR Owners Group to bring about a proactive look at the issues and the questions that were raised for the BWRs, the owners group is doing that now.

We are evaluating their work and overseeing what is going on with them and their schedule, and we will base whatever actions we need to take on our evaluation of their work, and that is ongoing.

MR. GROBE: And we have briefed the TAs in the past, and we will continue to keep them abreast of how that's progressing.

MR. RULAND: And I would just like to add that the BWR Owners Group schedule has been slipping, but we are keeping a close watch on that.

If the schedule continues to slip, we need to take additional regulatory action.

MR. SCOTT: Can I ask just for one minor thing here?

Can I do my conclusion slide before we start?

CHAIRMAN JACZKO: Sure, of course.

MR. SCOTT: I am all dressed --

CHAIRMAN JACZKO: And I'm the one that took up a lot of extra time, so I think I got us off course.

MR. SCOTT: I would like to conclude by again acknowledging that the PWR licensees have taken major actions to address the issue.

We in the industry have methodically executed plans to resolve the issues and the questions involved.

We are on the cusp of resolution and many plants effectively are resolved.

But challenges remain, which reflect the difficulty of this issue and the surprises that we have encountered all along the way and those surprises, of course, each one of them that occurs leads us to more caution and care about making sure that we really have addressed these issues technically before we conclude or are ready to move on.

Some licensees would have us, as you heard, declare the issue resolved now.

They've done enough.

We, the staff, however, do not believe that course of action is appropriate or defensible.

As we've said, we've taken effective steps to ensure, and I had to skip some of this, but we talked about the RIT process, the statement was made that we are piling conservatisms on conservatisms.

We have put a process in place that is intended to overcome that and for many plants,

including, for example, North Anna, Mr. Heacock's plant.

We have concluded that that process works.

It struggles if there are numerous, and we talked about 1000 RAIs.

If there were 30 or 40 RAI's for a plant, each one of which is potentially significant, it is difficult for the RIT to balance those conservatisms against and the potential non-conservatisms, or uncertainties.

I think it is a mischaracterization to state that the process that we put in place does not deal with that situation of piling conservatisms on conservatisms.

We do not expect excessive conservatism, we do expect each licensee to provide a sound technical basis for their methods to show adequate strainer performance, coupled with an end date for making any mods found necessary.

Then and only then, does the staff believe we can close the sump performance issue for all of the licensees.

When we've closed it, we will attempt to close it in 2010, I believe that we will not quite meet that date because of the in-vessel issue that we talked about, but we're continuing to push hard, subject to your direction, to try to get to that point.

Others believe we should not establish a firm end date, they note expense and exposure associated with major insulation replacements and, they want more time to propose analytical refinements to avoid the necessity of doing modifications.

I talked about -- I think there's a little bit of an overstatement here about the implication is you are going to have to remove all of your insulation, that may or may not be true.

We believe that -- they believe we are pushing harder than the risk of the issue warrants.

We acknowledge that the modifications have real costs, and we have been very patient with the licensees in working through these issues.

We have not been prescriptive regarding

doing particular modifications.

Our expectation of near-term closure is based on our technical understanding of the issue and its inherent uncertainties.

It is also informed by our past experience with refinements, which is the discussions regarding them go on for months or years, often without a successful result.

When one eventually fails, another is brought forward.

The credit that the industry now seeks for leak-before-break, as you know, has been submitted several times in the past and found inconsistent with Commission intent.

We do not know what its state would be if that is looked at again.

As I previously noted, given the large uncertainties, the remaining performance questions, and the potential consequences of sump recirculation failure, the staff does not believe it is prudent to allow the performance questions to persist without a defined endpoint.

Further, 10 CFR 50.46 calls for assurance that the most severe postulated LOCAS are calculated, as the Chairman discussed, and a high-level probability that the criteria will not be exceeded.

We will continue to listen, we will be as pleased as the licensees if they can make a successful argument, but we believe that the right action is to move now towards near-term finality in resolving this issue and showing compliance with 50.46(b)5.

We also believe it is appropriate to link that endpoint to the upcoming Commission decision on the proposed 10 CFR 50.46(a) to allow for the possibility that licensees strainer evaluations can benefit from that rule if issued.

Thank you very much.

MR. BORCHARDT: I would just like to thank Mike for adjusting his presentation, and staff is complete.

CHAIRMAN JACZKO: Thank you, I appreciate that.

I think we will start with Commissioner Ostendorff.

COMMISSIONER OSTENDORFF: Thank you, Mr. Chairman.

I appreciate very much the briefings today and the briefing we had last week with you at the table, that was very helpful.

I can appreciate you've been involved in these issues for many years as, as industry and got a couple of people here at the table that are new to this just in the last two weeks.

Please, bear with me if you will.

I have a couple questions, but I want to maybe -- I know time could get away from me I want to make sure that I will tell my colleagues.

I have open questions here that I think -- I am mindful of Mr. Grobe's comment about absent Commission direction the plan is to issue 50.54(f) letters, and I think that was your statement.

I'm trying to figure out because I'm new to this process a little bit, but I have reservations about doing so based on where we are today.

I'm mindful in support of the need to get to closure and certainly do not want to be an obstacle or burden to getting to closure on this vital issue, but I personally do not have a good

enough grasp.

I do acknowledge that there are open questions here that I think some other people have acknowledged.

I see the zone of influence testing as being an open issue that is of -- that directly affects the amount of debris and Mr. Borchardt had commented on the staff just got a few days ago a letter from NEI dealing with the leak-before-break GDC-4 application.

I acknowledge the statement that these issues are not new for you and your team, and I respect that, but it is new for me and I would like to learn a little bit more about the staff's assessment on this letter before coming to any decision on 50.54(f) letter, if that's being proposed today.

The in-vessel effects, I think Mike in your comments, you acknowledged that there's still open issues there.

I just wanted to capture at least those three issues, the zone of influence testing open

question, the open question on GDC-4, and the NEI letter, and the chance for the staff to evaluate it, as well as the in-vessel effects; differences between the types of fuel and where that plays out.

I need to get some more on those.

MR. BORCHARDT: Commissioner, we certainly would not be issuing the 50.54(f) letter without coming to the Commission, first of all.

We anticipate having extensive interaction with all of the Commissioners and the Commission as a body, as we proceed through the next several months on this activity.

COMMISSIONER OSTENDORFF: I appreciate that.

CHAIRMAN JACZKO: I'm sorry, just to clarify.

Bill, I appreciate that, but I want to be clear.

It requires the Commission decision, and I appreciate your reservations at this point, and we will see as the other Commissioners go forward, but right now we don't have a majority of Commissioners objecting to staff moving forward.

It takes a majority to do that.

At some point, we may get to the point of having a Commission decision, but just to be clear about it it's not a one objection to move forward.

COMMISSIONER OSTENDORFF: I understand.

CHAIRMAN JACZKO: The other Commissioners may weigh in on that as well, but for now I respect your opinion and your concerns, and I think we will have an opportunity to work through that in the next couple of months to get you the information you need to be prepared.

As of now, we don't have a formal Commission -- a decision in front of the Commission that would prevent the staff from moving forward.

Just to make sure we are clear on that.

COMMISSIONER OSTENDORFF: Thank you, I appreciate that.

So, with that being said, let me ask a question and I guess -- Mike, I will ask you this and it deals with the conservatism issue.

You addressed it very briefly, and I was going to ask you perhaps to expand upon that because I think that was a core statement by the industry panel that preceded you.

I would really like to hear a little bit more about the staff's, NRC staff's technical thoughts on the claim that maybe they've been overly conservative that you and your team -- and I acknowledge also the Chairman's statement, that was very helpful about looking at worst-case assumptions for a LOCA event.

MR. SCOTT: I would be happy to do that, Commissioner.

First of all, let me mention we have the NEI paper in front of us that refers to expected behavior.

Our view of that is it presents one side of the picture, which is the conservatisms in the respective areas.

It really does not get into the potential non-conservatisms and associated -- uncertainties associated with those areas.

So, it's a little bit, our view, a one-sided document in that sense.

Nevertheless, we recognize that you could fall captive to individual effects assessments as

you go through these evaluations, because there are a dozen of these areas, more or less, and if in fact each one is conservative and you just pile those conservatisms up, then clearly you would have an over conservative solution.

We recognized that early on when we got the licensee submittals in 2008.

We implemented what we call an integration review team, which is three senior staff members, basically experts, but who have not been involved with the individual reviews.

They get the inputs from the reviewers and they sit as a group and review that, and their charter is one thing, which is to determine whether given the conservatisms as well as the uncertainties for a given plant solution set for GSI-191; have they demonstrated, overall, that they are compliant and that their strainer performance would be successful?

If the answer is yes, then they pass that plant, even if there are unanswered questions.

The licensee has answered all the

questions, but not all of the answers may be fully satisfactory to the individual staff member, but if the IRT concludes, nevertheless, the plant is overall compliant then that is the end of it and we send the licensee a letter to that effect.

North Anna, what was presented earlier, has gotten one of those letters.

I won't name any other names, but a couple of the other plants represented today will get a letter too.

Actually, Mr. Shahkarami's Braidwood has gotten a letter of that sort.

That process was brought about to overcome this very issue of stacked conservatisms, and we think it has been successful, but it has been slow -- we've had to do it one at a time with the plants, and if the plant has many questions about it then the IRT will probably not be able to conclude that they are done.

Did that answer your question?

COMMISSIONER OSTENDORFF: Yes, you did, thank you.

I'll leave this to maybe Mr. Borchardt to

decide if you want to answer this, or anyone else at the table -- I welcome anybody's comments.

Just trying to look, and I'm not familiar with the 10 CFR 46(a) proposed rule and so can you give me some comments as to how that plays into this decision process.

MR. RULAND: Thank you, Commissioner.

The 10 CFR 50.46(a) proposed rule, which is currently due to be submitted to the Commission for its decision in December, changes the worst-case large break LOCA from the largest reactor coolant system piping, which is typically around 30 inches for a PWR, to the worst-case as the surge line typically for a PWR, which is like a 14-inch pipe, and that 14-inch pipe is called the transition break size and under current rules, a large break LOCA postulated event which is the design criteria for these plants for their ECCS systems.

The way it works is licensees are required a set of very stringent assumptions to make, they have to assume the single worst act of failure of their equipment, they can only use safety grade

equipment, and they are required to use very conservative analyses.

With the -- if the rule was approved in its current form, what licensees could do for leaks above of the transition break size is, they could use non-safety related equipment, they could use more realistic analyses, they wouldn't have to assume a loss of offsite power.

So, what that could provide a licensees, for instance, is maybe to use a back flush capability that is non-safety related, and that is not single failure proof to combat a leak greater than the transition break size.

It basically increases their flexibility to address GSI-191.

Of course this is just a proposed rule, the Commission has made no decision on it, and one of the reasons we have elected to tie the endpoint, or really the starting of the two outages to this rulemaking, is we recognize the staff always deals with the realities.

The reality is that this rulemaking will

be in front of the Commission in December, and we are concerned that with that rulemaking in front of the Commission, and if it is approved and we are in the middle of this GSI-191 resolution process, what were licensees to do at that point?

Are they going to come to us and say, I want to use this now, or not?

We are just really basing our actions based on what the current Commission policy is, which is the current 50.46, and then putting a, what I call, a minor contingency in place to address if in fact 50.46(a) is in fact approved.

That is kind of how 50.46(a) fits into this.

COMMISSIONER OSTENDORFF: Thank you.

Thank you, Mr. Chairman.

COMMISSIONER SVINICKI: I will just state that the issue of the ECCS rulemaking that is, I believe, to come to the Commission later this year, but it was just something I discovered in talking to both of you gentlemen yesterday and we ran out of time so I appreciate that Commissioner Ostendorff asked about that and its relationship to the

issues we're talking about today.

I also want to -- I want to thank both Mr. Ruland and Mr. Scott.

We've talked a lot about -- Commissioner Magwood talked about a general reaction to some of the dose estimates for removal of insulation, and I certainly had shared that view, but I want to be clear that in talking to both of you, you're very sensitive to that issue.

I don't want to by the comments that I made with the previous panel leave any kind of impression that the NRC staff, or you two specifically, are not highly sensitized to that issue, and so maybe this is a little point of pride for me I'm going to say NRC staff is -- I put no one above them in terms of caring about worker exposure.

I know in talking to both of you that you are very sensitized to that issue, if we impose a requirement that ends up in occupational doses that are significant, we will be very sensitive to that -- we will analyze that keenly, so I want to say that

both of you are a real credit to the professionalism of the NRC staff in that aspect, and I'm sure many others that I don't know about.

So, thank you both and I appreciate your sensitivity to that.

That being said, we are trying to resolve GSI-191 so that's a factor, but I didn't want to leave an implication that somehow you would rush headlong without considering, that's absolutely not the case.

I will say one thing is that, Bill, I noticed you said that the staff would analyze that the NEI proposal merited some analysis and certainly that the staff would communicate in some form, whether it's giving us an informational copy of however you document your assessment of that, I might've indicated that I asked a question about that last week and got kind of an answer of you weren't going to do an analysis.

Either I didn't articulate that question correctly last week, or perhaps this has been something that's been thought about since I asked

that question, but thank you for clarifying that point.

I, personally, would benefit from staff's views on that proposal, so I will look forward to receiving that.

Jack, I want to say that -- and I think I wrote this down carefully, you mentioned that a 50.54(f) letters, it was in plural when you said it, 50.54(f) letters are just a tool to collect information.

I reacted a little bit, I thought it's a good thing I'm someone who prides myself on not reacting too strongly to something, because RAIs, which stands for Request for Additional Information, those are a tool to collect information as well, and I think your statement -- again if I was the kind of person who reacted to things, which I'm not, I think it understates the huge difference between those two things.

I feel a need, you can react to that or not, but these very -- yes, they are tools.

They are very, very different tools.

I might state that your further statements

about there's nothing new in the NEI letter, we need to move forward because there is, I believe, another direct quote "no value" to further generic work, that sounds really profoundly like a profound disagreement with some of the back-and-forth of the previous panel about zone of influence and other issues to be resolved.

I would like to give you a chance to tell me whether -- are you really just -- your view is 180 degrees different than the previous panel?

MR. GROBE: Interesting question.

I've worked very closely with Jeff Gasser and Amir Shahkarami on a variety of issues.

I need to say that their statements are overstatements, in this regard.

We have tried to clarify some of that, but we're talking about a fairly small number of plants.

We have gone through years and years of testing and research, both performed by the industry as well as the NRC, to develop criteria in all of these areas; the chemical effects, the net

positive suction head impacts of the integration of fiber, and chemical gelatinous materials on the sump screen, the downstream effects on components that we're now testing on downstream impacts in-vessel on the fuel itself.

We've developed clear criteria and the bases for those criteria are in empirical testing.

Beyond that, I think there is no further testing, with the exception of the in-vessel fuel issues, that we have ongoing and Mo Dingler talked a little bit about that.

There isn't any more testing that we see that can help us.

The industry tried to do additional testing last fall on the zone of influence.

That testing was unsuccessful.

Just to clarify, there's different zones of influence for different types of material, there was some question as to whether that's plant-specific.

It's not plant-specific it's material-specific.

There might be a different zone of influence for certain kinds and designs of fibrous material, different kinds of coatings; zinc-based coating, polymer coating.

So, the difference in zones of influence has to do with the material that would be impacted by the blow down, but we don't see any additional -- and we haven't been provided by the industry, any bases to go for additional generic testing.

At a point in time, you have to get in to the different plants, because the designs of these plants are very different.

So, we see our position right now as to moving into a relationship with the individual licensees and the very unique characteristics of those specific plants and resolve those issues within the context of what we learned over the last six years.

We are all ears, as Michael said, many times.

If there's something new that we think there's a new phenomenon that we hadn't considered,

there's another surprise, which there could be another surprise left in 191, but if there is and generic testing is appropriate, we will engage with our office of research, we will engage with the industry, and we will do that testing, we will understand those phenomenon, but there's none that we are aware of today.

COMMISSIONER SVINICKI: I will react first by saying something I mean most sincerely, which is the NRC has an open and collaborative working environment and a strong safety culture.

So, you're entitled to your view, I'm entitled to a view as well.

Again, I am still learning about this issue, but based on what I heard and again the very productive, I thought, trying to narrow issues and really scope them and confine them, I agree with you that it is a matter of “at some point.”.

I think that there can be different views on, is this the point at which you should use -- again you have multiple tools, 50.54(f) letter is one of your tools.

Based on what I've heard, I don't think you're at the point where you should utilize that tool.

Commissioner Ostendorff expressed his view on that, I will express my view as well.

I think we will have an SRM arising from this meeting and, speaking only for myself and I am not a one-woman majority, but I think that there will be perhaps some articulation of some view on that.

I will turn for one specific -- I did ask for the summary on the BWRs, and I spent less time looking that in preparation for this meeting because it wasn't really our focus today.

Is it likely -- you talked about and we have to do this, of course, as regulators that coming out of the PWR work, I wrote down that it is informing the BWR work, or what we thought was closure of issues with the BWRs, is that likely when we get around to feeding that information back in, informing it, and engaging again with the BWRs Owners Group -- is it likely that they would be

looking at a round a further plant modifications, or is it too early to know?

MR. SCOTT: It is probably too early to know.

Remember, they are starting in a much better place having already made a number of modifications, and the plants are very different in a number of ways.

COMMISSIONER SVINICKI: The PWRs have made -- a lot of them have made modifications too, so I guess that was another disconnect I had with that statement.

The BWR, are they more extensive modifications?

MR. SCOTT: I wouldn't say that, no, but their plants are very different, the Bs to the Ps, the whole system is different.

It's certainly possible that there could be additional modifications, but one thing we are trying to do, it's what's referred to before -- the last time out we felt we needed to make immediate changes that were made, and at the same time the research was ongoing.

We're trying to take a somewhat different

approach this time and get more answers before we take a regulatory action if we feel it is prudent to wait.

That's where we are with that.

I'm really not trying to dodge your question, but we just don't know.

COMMISSIONER SVINICKI: Just briefly in my time remaining, is it likely because for the PWRs the staff documented as they had to a basis for continued operation, is there anything that we are finding out of the PWR work that concern you in terms of a basis for continued operation of the BWRs; like an immediate issue that is of such significance that you would need to do something sooner?

MR. SCOTT: We have not seen that to date.

Work continues to evaluate the phenomena associated, and remember, there are a number of phenomena each one has a different question associated with it.

For example, in-vessel effects is being looked at now.

Questions could arise that take us to the

point that you mentioned, but we are not there right now.

COMMISSIONER SVINICKI: Thank you.

Thank you, Mr. Chairman.

COMMISSIONER MAGWOOD: Thank you, Chairman.

I guess I've been at the Commission for about a week and a half, has it been?

It feels a little longer than that, quite frankly.

Preparing for this discussion was actually the first opportunity I've had to interact with the staff to talk about a specific issue.

I really want to thank the three of you here, not that I'm leaving you out, Bill, but particularly Mike and Bill for their briefings.

It's been very helpful, very informative, and I really appreciate it.

It's been a good introduction to the staff here.

I appreciate it.

Because we had actually two discussions about this, I've actually had a chance to talk

about the BWR issue, and a few other issues in more detail.

While I still have a lot of questions, I am becoming increasingly comfortable with the staff's technical approach to this.

I'm not -- while I don't think I'm ready to make a complete decision about where GDC-4 fits in to all this, I still want to ask more questions about it.

I think the approach you've taken to deal with the conservatisms has actually been reasonably effective from the discussions we've had.

The one big concern that I still have is something you raised, Mike, at the end of your talk.

That is how you're going to tie in 10 CFR 50.46(a) revisions.

I don't see how you launch this process now without getting closure on that.

I'm a little concerned about starting down this path have the Commission take action on this in December and then say, well, on second thought you

can apply these flexibilities midstream.

I don't see how you start this process now without really completing that.

My initial question is, you obviously anticipated this: What is your vision for how this is all going to come together?

MR. RULAND: As I said earlier, Commissioner, the staff is faced with the realities of the schedules and what's happening both with GSI-191 and with the proposed 50.46(a) rulemaking.

We have two goals and to some extent, as you have pointed out, are somewhat in conflict.

We are trying to meld those two pieces together, so what you have heard from the staff this morning is that we are trying to go forward and put in place a schedule for licensees to make the modifications to, basically, represent the plant as successfully tested.

While still listening to them for other different modifications, or as Mike likes to call them, refinements.

So that two-pronged approach is just what

we've been doing for GSI-191, and you overlay on top of that 50.46(a).

So, our thinking is, that we continue with the GSI-191 goal, continue on that path.

Actually, licensees know that we are going to tie the starting of the timing for the two outages roughly with the 50.46(a) rulemaking decisions that the Commission would make.

Licensees could anticipate, they could look at what the rulemaking, where it's going today, and they could develop their own contingency plans.

Licensees really do a fabulous job in working on contingency plans today.

If they have to do a particularly critical inspection of piping that might need repairs, they typically hire the people to do the repairs, have them sitting on site, and if the inspection goes south, they can do the repairs virtually immediately because they've already anticipated those.

We are trying to build into the licensees natural and really refined ability to do

contingency planning by just pointing to the fact that 50.46 (a) is out there.

Other than that, it would be presumptuous or premature for the staff to say anything more than that because it is not a rule, it is just a proposed rule and we're going through the process, and we're particularly sensitive -- we wouldn't want to put the Commission in a place where they feel like the staff is imposing something on them.

We are particularly sensitive to that.

I think the staff, frankly since 1982 I've been with the NRC, we really like to follow Commission policy.

What is the policy today?

CHAIRMAN JACZKO: Can I just say, we really like that the staff likes to follow Commission policy.

MR. RULAND: What is the policy today?

We are trying to follow it and we are trying to anticipate a possible change in policy in the future.

It's not the ideal situation, but it's the best we can do given the circumstances.

COMMISSIONER MAGWOOD: Thank you if you want to say anything else controversial let me know.

Bill, let me ask you -- we haven't had an opportunity to talk about this at all, but is there -- the schedule calls for this to come up to the Commission in December, is there a way of expediting that so that we could deal with that issue sooner and bring these two together up front instead of depending on contingency planning down the road.

CHAIRMAN JACZKO: Commissioner, let me address the question, I think that is probably more of a question for me than for Bill.

We will have at the end of the month an agenda planning session, and one of the things that we will provide, or I will provide as part of that, is kind of a look for the next six to 12 months of what kind of work is coming in front of the Commission.

That is really a discussion that we would have at that agenda planning session.

If there is interest among Commissioners to take a look at that rulemaking in a different time

frame, that's something that we would do in that context and then could give direction to the staff to re-arrange other things and shift other priorities to do that.

It is probably a question to hold for that discussion in, actually, a couple of weeks.

COMMISSIONER MAGWOOD: Thank you, Mr. Chairman, that is helpful.

I know we're behind schedule. Let me close by simply saying given that I think I will support what Commissioner Ostendorff and Commissioner Svinicki suggest, that we hold off on sending the letters until we have a chance to sort of conjugate over the SRM and maybe what we can do is decide the context of the schedule, whether it is practical to bring these schedules together.

I'm really uncomfortable with launching this process and depending on contingency planning to fix it down the road when we know that the problem exists.

If we can bring this together in some logical fashion I would like to do that.

I would like to support holding off on the letters until we have a chance to think this through a little bit.

CHAIRMAN JACZKO: Thank you, Commissioner.

I appreciate that and I think certainly -- and I think, Jack, maybe you could clarify that the staff was not intending to issue the letters now.

When is the schedule right now to issue, assuming Commission support, when would the staff at the earliest date issue the 50.54(f) letters?

MR. GROBE: Go ahead Bill.

MR. RULAND: Mr. Chairman, the staff has, while we have prepared the Commission 50.54(f) letters, our intention is to wait for an SRM coming out of this meeting.

CHAIRMAN JACZKO: But even if there were support for doing -- which there clearly right now is not support to move forward, what would be the earliest date that the staff would intend to issue the letters?

MR. SCOTT: We could be ready in the next couple of months.

The letters are drafted and I've actually reviewed the draft.

CHAIRMAN JACZKO: So, it's not an action that is pending immediately, the staff is not planning to issue this tomorrow.

The plan had been to issue them in a month or two.

I think that's helpful.

Certainly what I've heard from the Commission I think is some interest in getting a better lay of the land before we go forward.

It seems like what we can work on, we can get some of our assistants to flush out in SRM is what -- perhaps a schedule the Commission can work to about establishing exactly the information we need.

I think Commissioner Ostendorff, you indicated some information about the zone of influence and a few others I think that Annette captured.

If everyone is in an agreement we will work through in the SRM then to figure out a schedule to get the Commission the information it needs, in I think a relatively short period of time to be able to make that decision about whether we will be

supportive of the staff moving forward with those letters.

Given your timeframe, I think there should be enough opportunity to do that in the next couple of months, so we can work through that language on specifically what the Commissioners are looking for in the SRM, if there's agreement on that.

I want to thank the staff for a very good presentation.

I thank our representatives from the industry for their presentations.

I think this is an interesting and exciting meeting on GSI-191.

Thank you.

We are adjourned.

(Whereupon, the meeting was adjourned)