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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

October 31, 2007

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

AP1000 SUBCOMMITTEE

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WEDNESDAY

OCTOBER 31, 2007

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ROCKVILLE, MARYLAND

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The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:00 a.m., Dr. Mario Bonaca, Chairman, presiding.

ACRS MEMBERS PRESENT:

MARIO V. BONACA, Chairman

WILLIAM J. SHACK, Member

JOHN D. SIEBER, Member

SAID ABDEL-KHALIK, Member

J. SAM ARMIJO, Member

OTTO L. MAYNARD, Member

JOHN W. STETKAR, Member

MICHAEL CORRADINI, Member

ACNW MEMBERS PRESENT:

JAMES W. CLARKE

MICHAEL T. RYAN

NRC STAFF PRESENT:

DAVID FISCHER

JERRY WILSON

EILEEN McKENNA

ALSO PRESENT:

ED CUMMINS

ANDREA STERDIS

JIM WINTERS

TERRY SCHULZ

PETER HASTINGS

PHILLIP RAY

EDDIE GRANT

NEIL HAGGERTY

LESLIE KASS

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P R O C E E D I N G S

(8:02 p.m.)

CHAIR BONACA: Good morning. The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguards AP1000 Subcommittee. I am Mario Bonaca, Chairman of the Subcommittee. Members in attendance today are Said Abdel-Khalik, Sam Armijo, Sanjoy Banerjee I believe will come later, also Dennis Bley, Michael Corradini, Otto Maynard, Bill Shack, Jack Sieber, and John Stetkar will come later, too. They may be also tied to the fact that the ACRS never meets at 8:00, we always meet at 8:30, some people that have missed that, but we are glad to accommodate the Westinghouse people. We also have with us today two members of the Advisory Committee on Nuclear Waste and Materials, James Clarke and Mike Ryan.

The purpose of this Subcommittee meeting is to discuss the AP1000 design, proposed revisions to the AP1000 design certification rule, that is 10 CFR Part 52, Appendix D, issues to be resolved collectively for combined license of applicants, referencing AP1000 certified design by the AP1000 Design-Centered Working Group, and issues that would be resolved on a plant-specific basis by COL applicants.

The Subcommittee will hear presentations by and hold discussions with representatives of the NRC staff, Westinghouse, the AP1000 Design-Centered Working Group, and other interested persons regarding this matter.

The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions as appropriate for deliberation by the Full Committee.

Mr. David Fischer is the Designated Federal Official for this meeting. The rules for participation in today's meeting have been announced as part of the notice of this meeting previously published in the Federal Register on September 26th, 2007.

A transcript of the meeting is being kept. It will be made available as stated in the Federal Register notice. It is requested that speakers first identify themselves, and speak with sufficient clarity and volume so that they can be readily heard. We have received no written comments or requests for time to make oral statements from any members of the public regarding today's meeting. Copies of the meeting agenda and the handouts are available in the back of the meeting room.

We will now proceed with the meeting, and I call upon Mr. Edward Cummins of Westinghouse Electric Company for his introductory remarks. Mr. Cummins.

MR. CUMMINS: Thank you very much. My name is Ed Cummins from Westinghouse. Here we are today to talk about the AP1000, and the AP1000 was certified in December 2005. And we are now at a stage where actually yesterday the first Combined Operating License was applied for by TVA for the Bellafonte site referencing the AP1000. And we call this the reference COL application. It's the first one, and it's the one that every other COL applicant will follow for the standard portions.

All this discussion is about standardization, and we actually have three licensing activities that we're going to discuss. The first is the revision to the AP1000 design certification. And the purpose of the revision to the AP1000 design certification was to address COL open items that were related to the AP1000 design, and to address design changes or modifications either as a result of customer interaction, or as a result of Westinghouse detailed design process.

So we applied for the revision to the certified design on May 29th of 2007, and we would expect that that process will go between a year and 18 months until we have an FSER and then a licensing process after that. The objective here is to certify information that all of the COLs will reference as part of their standard applications in their COL application, the maximum that we can put in in the certified design.

The next level of standardization at the R-COLA, Reference Cola, includes utility processes and procedures that the utilities referencing the AP1000 have agreed that they will standardize among themselves, but which are not appropriate for certification because they may want to have a little more flexibility with change in the future to the QA plan, and the plan for operators, and processes that the utilities use, which they have agreed to standardize. And then the last piece of it is the individual COL applications, which, for the most part, will be only addressing the site-specific aspects of their particular application.

So in front of the NRC we have three licenses really. There's the revision to the AP1000 certified design, there's the portion of the

Bellafonte COL application which is the R-COLA, which will be the same for everyone, and there's a portion of the Bellafonte application which is the S-COLA, if you will, for Bellafonte, which is the site-specific information for Bellafonte.

After this introduction, I introduce the Westinghouse people. We're also going to have presentations by NuStart, and by one of the COLA applicants, so my team has Andrea Sterdis, Jim Winters, and Terry Schulz, and they'll give you a briefing on the AP1000 design.

MEMBER SHACK: Just a quick question to refresh my mind. Your changes in the design certification, are we changing Tier 1 information, or Tier 2 information?

MR. CUMMINS: We're changing a little bit of everything, a little bit of Tier 1 information, a little bit of Tier 2, and a little bit of Tier 2* information.

MEMBER SHACK: Could you refresh -- what more does it take to change Tier 1 information, than Tier 2 information?

MR. CUMMINS: Well, I think - and maybe we need to consult with the NRC experts here, but my belief is in a revision to a certified design it's almost the same, so Tier 1 you'd need an exemption to the rule, so that there will be some sort of process of getting an exemption for the changes in Tier 1, which are relatively minor, I would say, either progress along the path of design acceptance criteria, design ITAACs, and a few error corrections, and a few small modifications in Tier 1. The Tier 1 design scope is almost the same in the revision.

MEMBER ARMIJO: Is this the first time that a certified design has gone through the revision process?

MR. CUMMINS: Yes, it is. And, in fact, the 10 CFR 52 did not permit a revision to certified design until the revision that was just, I'll say finalized. It was finalized September 27th, so this is the first time that we have been able to revise the certified design. And from our customers, the COL applicants' perspective, they would prefer for things to be resolved in the certified design because then it's not subject to -- it gets its public interaction at the certification, and it's not subject to hearings at each COL application. So we put in the revision all those things that are going to be standard related to the design. Any other comments or questions? Okay. Then I'll turn it over to Andrea.

MS. STERDIS: Okay. Good morning. Thank you for inviting us to make this presentation. I'm Andrea Sterdis, and I'm the Manager of the AP1000 Licensing and Customer Interface Organization. I directly report to Ed, and I've had the wonderful experience over the last two years to bring not only the DCD revision amendment to the staff in May, but also yesterday to stand out there with my colleagues on the DCWG as we submitted the Reference COLA with TVA and NuStart.

This presentation today is here to -- we're here to do a couple of objectives. One is, we want to give you an overview of the technology. The second is, I want to give you a status of where we ended up on AP1000 originally design certification, where we're headed, and then the third thing we're going to do is have Peter Hastings from NuStart, who's going to talk about the Reference COLA, as well as Amy Aughtman from Southern, who is going to talk about the subsequent COLAs this afternoon.

As you can see, I'm not going to go through this agenda, but we've got a pretty meaty agenda here. We're going to briefly touch on all of the aspects that were requested as far as the design, and feel free to ask questions as we go along.

Okay. I'm going to start off with the overview of the design certification application. This is the original application which we submitted the DCD and the PRA in March of 2002. The AP1000, for those of you that don't know, is based heavily on the AP600 design and design certification, and was an increase in power rating, which also affected the design. So we submitted a DCD and PRA in 2002, and included in that was the Tier 1 information, where we have the ITAACs, the Inspection Test Analysis and Acceptance Criteria, as well as the Tier 1 descriptive information.

Also included are Tier 2 information, which you would recognize as a standard safety analysis report. That's also where our tech specs are. And we have a Chapter 19 which has pulled out the real significant PRA insights. The PRA, itself, is a separate document, not part of the DCD. Ed briefly touched on the fact that we did end up with some Tier 2* information in Tier 2, which, for those of you that that's a new term for, that separates -- it's not quite as important as Tier 1 requiring exemption, but it does require NRC staff approval to make changes.

AP1000 PRA report was 4,500 pages, and

it's a very complete and robust PRA. It contains detailed Level 1, 2, and 3 PRAs, as well as covering the shutdown, fires, floods, internal events. We also address severe accident phenomenon.

This is our trophy. We have two of these, one for the AP600 and AP1000. We actually also have the one for the System 80+, but this is the trophy. This is what we hang on our walls.

What do we get with design certification? That's always a question we ask ourselves. It's a question that we've asked with the potential customers, the COL applicants. We interpret the regulation to say that our design certification for the scope that we covered in the design certification provides licensing finality for that level of design. It also establishes the regulatory bases. In other words, the criteria that were used in the design certification remain valid for the lifetime, the regulatory lifetime of that certification.

The way we always like to say is, we're like an operating plant. For the scope that we certified, the same rules to change that an operating plant would be subjected to. So, of course, a significant safety impact would need to be addressed by a certified design, but small evolutions in criteria do not need to be.

The last one is an important one. We didn't finish everything at design certification, because there are things you can't finish, things that require input from a site, things that required input from technology decisions, such as I&C platform choices. So we have what we call Design ITAAC, but we also have COL information items. And I want to talk a little bit about those through this process, so you understand how we got to May when we submitted our revision, as well as how we got to yesterday, when TVA and NuStart, and the DCWG submitted the Reference COLA.

DCD defines what needs to be in the COLA. Obviously, the regulation does. What the DCD does, what the Design Certification Rule does is bring that down a level of detail. The Part 52 regulation provides the overview, and the design certification details, particularly the DCD, define what's left to be done.

I put on here a pictorial that shows you the DCD on the left. I've got to make sure it's not inverted there, and then out of that DCD came 175 COL information items. These are a variety of things, as Ed said. Some of them are design-related, some of them are programmatic aspects, some of them are site interface criteria. Those are the kinds of things that you would find in that numerical listing in Section 1.8 of the DCD, where the COL information items are listed. They are also interspersed throughout the DCD in the appropriate chapters.

The ways to deal with those are the three boxes on the right, the design certification amendment. Ed stressed that the reason that we wanted to do the design ones, and we started this a little over two years ago when we started to see activity going forward for COL applications. We looked at the COL items and said a lot of these are standard plant issues, standard design issues. Let's do these once, get them done, and in addition to the advantage Ed pointed out, we also have an advantage that it allows us to further exploit the standardization of our plant design, and that's a distinct advantage in an industry that's really hurting for experienced people, really hurting for a way to actually bring these plants to fruition with the staff that we have, and the staff that we need going forward.

The second box is the R-COLA, and that's what we submitted to you yesterday. And those two boxes are green for a reason. They're green because, as Ed emphasized, the parts of the design certification amendment that we put forward to exploit the standardization and the parts of the Reference COLA that all of the other subsequent COLAs will be using, those are the things that are the standard parts of the application.

We anticipate, and I believe the staff anticipates, that there will be the one issue, one review, one position DCWG mentality put forward. In other words, you solve the problem on our DCD amendment, it applies to all the COLAs. You don't have to come back and reinvent the wheel every time you get a new application.

Same thing with the R-COLA. When the R-COLA came in yesterday, in the left-hand margin of every part of that application, there is an annotation that tells you if it is standard COLA input, or Bellafonte-specific COLA input. And that's how the staff will be able to move forward, and be able to be efficient in doing their review. The S-COLA is where the site-specific issues are addressed, site interface criteria would be addressed, because that's something that's individual to each site.

MEMBER SHACK: So, literally, each COLA will look exactly the same as far as the R-COLA parts are, and you will plug in S-COLA.

MS. STERDIS: Absolutely. And you'll hear a little bit more about that this afternoon, because you'll also hear that even where it's different, we have really worked hard as an integrated DCWG team to look at level of detail, content and format, as well as the philosophy for addressing those things that have to be different across the different applications, different sites, different applicants.

About two years ago, actually, a little bit before I came back. I worked on AP600 years ago, and I was gone for a while, but I came back in early January 2006, but late 2005, when the activity started to heat up, Ed and his team, Jim and Terry, those guys, they started to look at these open items that we had, these information items, and what could we do.

We also had done first-of-a-kind engineering, so the design of the plant had evolved. So they wanted to look at what could we do to deal with this? And at the time, Part 52 did not permit an amendment process to an existing design cert rule. So what they decided was, we would start needling away at these issues, and try to close them standardly, at least as far as the technical staff review is concerned, and then they could be rolled into the applications only requiring the hearing process, and the final vetting of that issue. The meat of the technical issue to close a COL information item, or to deal with a design change that was necessitated because of design evolution, those kinds of things could be done once, and submitted in a technical report, reviewed, the staff would generate an SER, and then each of our COL applicants would refer to that.

The technical report process was intended to cover, basically, these three categories of changes and additions, and they are both. Sometimes it's an addition. The first one is a good example, the first two are good examples. The standard design COL information items. For example, in Chapter 7, we had a COL item to do, failure modes and effects analysis, and a software hazards analysis. Doesn't make sense to do that if you haven't picked a platform, doesn't make any sense, so we had to close that. Doesn't make sense for each of my applicants to do that, because they're all using my same platform that I've now selected, so we can close that standardly for them. And we can work with the staff. It makes the staff's job more efficient, makes our job more efficient, makes the COLAs more efficient.

Same thing with Design ITAAC. We have

three areas of Design ITAAC in our design certification, and one is piping, one is the I&C. It's the PMS design, but there's also a Design ITAAC related to the diverse actuation system that correlates to the PMS. The last one is the human factors, main control room design.

This last bullet is an important bullet, because you raised the question about the Tier 1 changes, and there's a lot of anecdotal discussion about changing the design certification, because of design changes. We did have some changes that have come out of design finalization. Jim is going to talk a little bit about those, Jim, and Terry, as well, but the bar is high for those. We're not improving. We only fix what's broke.

The second one can be something that's broke. Some of the areas of the design we do not have the operating experience that an operating plant might have, particularly when you get into the BOP, the secondary side, some of those aspects. Remember, this is a total plant, not just an NSSS, total plant design cert, so we've accepted customer input driven by consensus agreement among the COL applicants for the AP1000, and those changes are also included in our design certification amendment application.

MEMBER ARMIJO: You know what I'm still confused about is, how much of the design certification is opened up when you start the amendment process? Is the staff going to review the whole thing all over again, or just very well-defined areas where changes are made?

MS. STERDIS: The areas that will be open for the staff to review, and will be subject to the revision to the rule making, are clearly defined. They're very narrow, and very focused. We're often asked what percentage. We think it's well under 10 percent, and we think that there are -- many of the issues, as I put this slide up that has the 141 technical reports, every change that's in the amendment has been included in a technical report, which contains the description of the change, or the description of the addition, what the affect is on the DCD, as well as what the regulatory basis is for that change, so it's a very narrow focused scope. And the existing regulatory basis criteria should remain valid, as well.

This kind of gives you a little bit of number, bean counting here, on how we've divvied up these. We have 144 technical reports that we've submitted. Some of those are revisions that have happened because of RAI process on the technical report issues, but many of them, I think about 117, 118 are original base technical reports. Sixty-three of those address COL information items, 47 justify design changes that impact DCD content, two have been added to address standardization for the COL application. We found some inconsistencies in our Reg Guide Table, in our ISI/IST Tables, so as we were going through the review process with the Bellafonte COL, we actually identified that there were typos, there were inconsistencies, so we've submitted two technical reports to address those so that each of our applicants does not have to deal with basically typographical errors in every COL application.

Technical Report 135 is a regulatory requirement. If you submit an application for an amendment, you must address the SAMDA requirement explicitly. We did a detailed evaluation of our SAMDA, and confirmed that none of the changes that we were proposing had an impact on the conclusions of that SAMDA, and we submitted that report.

That bullet, plus the 47 to justify design changes, they go hand-in-hand. It addresses the fact that most of these changes are relatively minor. They could have actually been done by the COL applicants as

50.59-like changes. But, again, our drive is to get this plant to be standard. And it's in all of our best interests, we believe, to put these things into this amendment.

CHAIR BONACA: I have a question. Some time ago you said remember, this covers the whole plant.

MS. STERDIS: Yes.

CHAIR BONACA: And could you give me an example of where it becomes a site issue? For example, I was thinking the electrical system.

MS. STERDIS: He's going to give you some -- can you -

MR. WINTERS: I'll give you a definition.

CHAIR BONACA: I would like to understand the electrical system, clearly, the grid is going to be different from side to side.

MS. STERDIS: Yes.

MR. WINTERS: Yes.

MEMBER MAYNARD: Boiling water, usually.

CHAIR BONACA: So if you could just give me an idea of the boundary later on, that would be helpful.

MS. STERDIS: Power and water.

CHAIR BONACA: Okay.

MS. STERDIS: The last bullet on here provides something that we've worked out with the staff, and with the COL applicants. There was a concern, and we think we've seen a little bit of this in some of the efforts that are ongoing right now. If we submitted Rev. 16, which is what we submitted in May, and then all of a sudden we have RAIs on the technical reports, and we need another revision, well, then our COLs can be out of sync with that. So what we've done, is we've created a technical report that is not any -- no meat to it at all. It's a listing, it's an anchor, it says here are the things that are changing, and each change is related to an RAI response, that type of thing. We just provided that. That was necessary to support the Bellafonte application, and that was submitted. It was mailed on Friday, delivered on Monday.

CHAIR BONACA: Do you have a 50.59-type process you are using?

MS. STERDIS: Yes, we do. And Jim is also going to talk about the change control board. I know. There's lots of ways to dice the presentation.

CHAIR BONACA: If you -

MR. CUMMINS: It's a process of how you look at changes. It is not based on regulatory.

MS. STERDIS: Well, the criteria, Section VIII criteria in Appendix D, which is our rule, our design certification rule, in Section VIII, you find the criteria that we need to evaluate changes against. And what we've done, they look a lot like 50.59 questions. And our change control process, those questions are answered for every change that comes forward.

CHAIR BONACA: So the staff will rely on that evaluation to determine, for example, what they will review and what they will not review?

MS. STERDIS: We have documented -- no, Mario. I think that's not right, because we could have done that, we could have gone that way. We did not, because even though we could screen out using the criterion, say these need to be handled like 50.59-like issues. They don't require staff prior approval. We believe, with five applicants, six sites, a standard plant across the world, that we want to enforce standardization, and the way to do that is to roll these 50.59-like changes into our amendment, and they become part of the standard design certification.

CHAIR BONACA: No, but I was talking in terms of what the staff would review and what they would not review.

MS. STERDIS: They are going to -- we are asking them to review. Eileen.

MS. McKENNA: This is Eileen McKenna from staff, Office of New Reactors. I think a point to keep in mind here is that what they're referring to in this 50.59-like process, which is embedded within each of the appendices is specifically aimed at COLs who reference the design, have the capability of implementing the 50.59-like process, to actually change the rule, but certified in the design, so that's an agency rule at this point. It does take an NRC, actually, Commission action to actually change the rule through rule making. And, therefore, even if these changes met the 50.59-like criteria, the staff is still going -- the Agency is still going to have to approve them to actually have them appear in the certified rule.

CHAIR BONACA: Thank you.

MS. STERDIS: Okay. This slide evolves every day, as Eileen's staff can tell you. We have approximately 500 RAIs received. I believe that number is a little higher now. They're varying levels of safety and regulatory significance, some that deal with the minor changes are a lot narrower in scope, easy to answer, some are significant, and we've had to take some time with a couple of them to do some work to get a detailed answer in, structural design of the spent fuel racks, and new fuel racks, for example. More than 460 responses have been provided, and I actually think we're still at around 40, but that's because the numbers increased a little bit. Approximately 120 of those result in revisions to the technical reports being necessary, and only about 60 have resulted in additional DCD revision, so that's a pretty good - I mean, we're a little bit more than 10 percent, but that's not really a bad thing.

We have not pushed back on RAIs at all. We really felt that it was in our best interest to just answer the questions. And you can see by the only 60 of them requiring DCD revisions, that it was more for bringing a new reviewer up to speed on what the design certification covered, what the design basis was for the plant, those kinds of issues, as opposed to the ones that are really solid RAIs, where there was a real need for additional technical information.

Our amendment, we submitted our amendment May 29th. You heard Ed say September 27th was the effective date of Part 52 revision permitting an amendment. We knew when the SRM came out in April that there was going to be an opportunity to do this amendment. We understood from the SRM that the criteria was consistent with what we were looking for, and we believed that getting this document on the table in front of the staff early was in everyone's best interest.

The transition, though, has been a little bumpy, because we started out with -- we have these technical reports, not a small number, 141 of these technical reports, 500 RAIs on them. So getting to move from a technical report that addresses spent fuel rack design into where does that go, nine point what, what sections of the DCD are impacted? We've had a little bit of bump with that, but we're working with the staff, and we've got now a pretty detailed matrix, in fact, that I'm going to deliver to Eileen's staff today. We did a preview of it last week, and it actually provides the detail of how you get from a TR to the SER sections, or backwards, using database technology here, so that the staff will have access to the database, and if the staff reviewer says I want to see every change in the DCD that goes with that technical report, he can do that. If you want to see every technical report that goes with a chapter, he can do that.

The acceptance review issues, that was one of them, that's the process one. We've also had some technical issues where the staff has concerns about the adequacy or sufficiency of what we've provided in the technical reports. A lot of us have been around since AP600, small changes. We believed that it was obvious, if you were embedded in the design, it is obvious, this is not a big deal. We have new reviewers, we have reviewers that didn't understand what was the AP1000 design, don't understand, necessarily, what we've accomplished, the scope of the design certification, so we weren't working from the right venue when we were producing these technical reports. We're correcting that. Many of them have been resubmitted. That's why I have about 30 revisions of technical reports, that was to substantially increase the amount of information.

We've also been doing a lot of communications, telecons, and meetings, to make sure that we're covering exactly what the staff needs, even on these relatively small changes, but as Eileen said, it's part of the rule, we have to justify, we have to make sure we satisfy, we have to make sure we satisfy the reviewer's needs.

Westinghouse will be submitting a letter to the staff on Friday, which is very close, to say we're ready, go ahead, start the acceptance review. We anticipate, as Eileen and I talked over the past week, this has been kind of a -- it's been a big hoop for both of us to jump through, but we believe that the jumpstart this is going to give the staff in performing the actual review is going to be worth the pain that we've been seeing for the past three or four weeks.

I just listed here, you're going to hear a little bit about these as we go through, but these were some of the amendment content, that is, some of the meat in the content. We have extended the original design certification addresses only hard rock sites. We're extending that, because we have soft soil, and medium soil sites. We've got a revision for the buildings for enhanced protection. I believe Jim is going to address that, as well.

We've updated the fuel design approach for Chapter 4. The fuel core design is not final, and it won't be final. There's a COL holder item, or a set of COL holder items that will be done closer to actual fuel load, sometime between license and fuel load.

The protection system, the I&C update, we chose platform for the protection system, and we're in the process of communicating our platform selection for the diverse actuation system to the staff, as well. We updated electrical system. I mentioned that we've had some input from our COL applicants, and this is an area where we've had some input, fast bus transfer, an additional reserve auxiliary transformer. We've had some changes in this area that come about from the input of our COL applicants. We've made progress in the design of the main control room, in the application of the human factors engineering program on the plant.

Lastly, you may have heard, we have a new owner, and we have a turbine manufacturer change that's covered in this design certification amendment.

MEMBER SIEBER: Do you plan to discuss the seismic spectra in any detail today?

MS. STERDIS: No.

MEMBER SIEBER: I remember AP1000, it was originally designed to be placed on a hard rock site, a site that has a significant vault 100 miles away with 1,000 feet of sediment free soil, would have to be analyzed outside of your application?

MS. STERDIS: No. Go ahead.

MR. CUMMINS: We have expanded the site interface scope from hard rock to the site conditions defined by the utility requirements document, which is, I'll say all sites. It's not every single -

MR. WINTERS: Twenty-six eastern.

MR. CUMMINS: Yes. So it goes from soft soil, all the way to hard rock, and envelopes the existing nuclear sites in the east, anyway, and many other sites, also. So it's a -

MEMBER SIEBER: Is this available as a document, a separate document?

MR. CUMMINS: Yes, it is.

MEMBER SIEBER: Could I get a copy of that?

MS. STERDIS: Yes. We have made, I just want to point out, we have made significant progress. This area of seismic we knew was going to be a substantial amount of work.

MEMBER SHACK: Are we going to talk about this more?

MR. CUMMINS: Not today. It's up to you what you would like to talk about.

MEMBER SHACK: Just a quick question. The Reg Guide 160 kind of spectra, which I assume this really is, the early site permit plants have been finding they need to make changes in the high-frequency portion. Have you made any changes in your high-frequency portion, or is this a Reg Guide 160-like spectra?

MR. CUMMINS: It's a Reg Guide 160-like spectra applied to multiple sites. We have been working with industry groups working on this high-frequency issue. I would say that NEI and EPRI really have the lead on this high-frequency issue related to hard rock sites, mostly. And the general approach that they are taking is that the high-frequency is not damaging, and that you can show that Reg Guide 160 is adequate as a basis for design.

MEMBER SHACK: Okay. So that's the approach.

MR. CUMMINS: That's the approach.

MS. STERDIS: Right.

MEMBER ARMIJO: Now this list of changes, are these specific changes that the staff is going to be reviewing, in addition to whatever is in those 140 reports?

MS. STERDIS: These are all included. This is just a list to give you a sense of the types of changes.

MEMBER ARMIJO: A sample.

MS. STERDIS: Yes. It's a subset.

MR. WINTERS: Maybe a different

explanation, the technical reports are unique to a topic. Okay? So there is a technical report on the seismic spectra. We have two technical reports on enhanced protection, because they're driven by different reasons. So these are examples of what technical reports are covering, which are technical topics. The bump in the road that Andrea was talking about is a single technical topic, like seismic spectra, spans many chapters. And, of course, an SER has to be written by chapter, so we have to make the conversion with staff so that the SER can be written by chapter supporting all the technical topics that we covered in the 140 technical reports. So this is a sampling of those.

MS. STERDIS: Right. And last week I was here for the Vogtle ESP ACRS meeting, and the one question I had to answer, I just want to repeat for you all because you weren't all here last week, and that was that, as Ed was saying, this is a standard spectra, and the design, the standard plant design is being done to that standard spectra, so you will not be doing a design for the Vogtle-specific spectra. That was the question that I answered last week.

I talked a little bit about this Post-Revision 16. What we submitted in May was Revision

16. The original design certification that was approved in December of 2005 was Revision 15 of the DCD. We found it was appropriate to go forward from Revision 15, and not start over in our numbering. And you see Rev bars in Rev. 16 that identify the changes. And, as I said, we've developed a detailed matrix road map that ties each change, not each section, each change to a technical report, and vice versa. But the day after this went in, we had more RAIs, we had more work going on, we had the COL review, where we were getting ready for the Bellafonte application to come in. We found other things. We needed to make sure we tracked them, keeping them in a pile in my office was not going to work, so what we did is we came up with this TR134, and the 134, the Post-Rev. 16 changes are basically editorial consistency errors that we found. We missed an impact in another section, so we've gone through, we've done more searching, more looking for additional consistencies, so we have surfaced some.

Subsequent RAIs and additional technical reports, the seismic folks have been a very active crew, and we're on Revision 2 or 3 of one of their documents. We actually have several documents that deal with the seismic spectra, and one of them, I believe, on Revision 2 or 3.

The last one is COLA standardization impacts, trying to make sure we stay lock-step. This DCWG thing, I think on February 8th, 2006, when Dave Matthews stood up and talked about, everyone said wow, that sounds really great. We've lived it. We have lived that for more than 18 months, not just Westinghouse, the NuStart, the COL applicants, everyone has lived it. And all of their application preparers are an integral part of that team, as well.

The result, this bottom box is really important. The result is COLA standardization, and each of the COLAs that you will see on the AP1000, there's a minimal number of departures. What does that mean? Five, maybe, five to ten departures in the COLAs.

This is a slide I'm very proud of. This is a slide Peter Hastings, and the DCWG team put together this little logo. This logo says it all, because this is the way we work. We all work together revolving around each other, and we work with NEI on licensing issues that are standard across the industry. We work with our DCWG team on areas that maybe we can't do standard across the industry, but we can do standard for every one of the AP1000s, and then as an integral part of that, the design certification amendment, every technical report, every RAI response, and every section of the design certification amendment has gone through our NuStart team members, with a documented review process. We put it out. When it goes out for our internal red team, it goes to their team, and we get a minimum of two utility commentors, we resolve comments, and we incorporate.

Same thing happens on the R-COLA. The R-COLA was produced in the same manner. Westinghouse was integrally involved in the reviews of those R-COLA sections, and we will continue to support not only the R-COLA as it goes through the review, but the final preparations of the S-COLAs, as well as the NRC staff interactions in those areas. We 100 percent expect that there will be RAIs issued on the Bellafonte application, that Bellafonte and NuStart, or TVA and NuStart, they're going to turn to us and say this is a design certification issue, can you handle this? We know we're going to be involved. And, again, the bottom line is the result is a licensing standardization, and that's what we're going for.

In order to be successful as an industry, we have to be efficient, effective, have high quality, and be successful in driving the overall safety conclusions of this plant. The only way we can do that in the environment we have today is by following this DCWG process.

MEMBER MAYNARD: Is later somebody going to talk a little about the decision-making process among the applicants to maintain standardization?

MR. CUMMINS: Peter Hastings.

MEMBER MAYNARD: That's fine.

MS. STERDIS: Okay. With that, if there are no other questions, I'm going to turn it over to Jim.

MR. WINTERS: Good morning. My name is Jim Winters. I work for Westinghouse on the AP1000. We are happy to be here, read your invitation, and tried to meld a familiarization discussion for those that aren't familiar with AP1000, as well as a discussion of what point changes we've made from the design certification in Rev. 16. That means that we don't have a lot of time to talk about anything in detail, but we're clearly very happy to answer any questions, and we're more than happy to come again, if there's a long discussion required.

MEMBER SIEBER: We can have future meetings.

MR. WINTERS: That's right.

(Laughter.)

MR. WINTERS: I'm sure we will. And we know the way here, so it's no problem there.

I wanted to start off by describing AP1000 to those who aren't familiar with it. People that have been in the industry a long time say well, what are you trying to tell me? The AP1000 is a PWR. I know what a PWR is. Let's get on with the good stuff. Well, first thing I want to say is, AP1000 is different.

From its inception as AP600, AP1000 has challenged the paradigms of the nuclear industry in our approach to safety, our approach to construction, our approach to licensing, our approach to standardization, our approach to -- it goes on and on. And the different -- AP1000 is different than the challenge of paradigms, something that has to be absorbed, or else the review time takes forever, because you keep looking at this plant through the paradigms that you grew up with.

First of all, it's different in two major areas, in the plant itself, and what's certified, and in the philosophy that we have to go forward with this design. First of all, we have a paradigm shift from the Westinghouse approach to life. Westinghouse used to be, other than service and fuels company, an NSSS company, but AP1000 is an entire plant. From the very beginning, it was designed as an entire plant, from turbine to toilet. We included a lot of help from AES, but it's hard to separate the balance of plant from the nuclear island, because we integrated it, and we went after certifications for the entire plant. Talk about that in a minute.

The second is the passive safety design. All of our response to defined design accidents can be done in the passive mode. For our purposes, passive is defined as no need for AC power, period. We have to use AC power for anything, then it's not passive. We do use stored energy, we use natural forces, like gravity, so something falling out of the sky, if it hits you on the head, you did not think that was passive. But, for us, that's passive, because it was not driven by AC power.

Our philosophy here is different from the industry in the past, in that we believe we should have one design, a standard design, a standard design that the -- the philosophy for that was built way back in the 80s when the industry, and NRC, and ACRS, and the Commission created 10 CFR 52, which does create a basis for taking a standard design certified, and going forward with it in multiple sites.

As a result, you have to have a mindset of no changes, and we'll talk about what we consider to be no changes. Obviously, there are times that you need to change the design for good and valid reason, like it doesn't work, or it's not safe. But other than that, you set a standard, you start building those standards, and then maybe you reset the standard in the future.

So let's first talk about the plant and how it's different. First of all, it includes the entire thing. In our Lexicon, that means the buildings of containment, auxiliary building, annex building, the words go containment is containment. We all know what that is. Our auxiliary building is the building that's around the containment. It's on the same base mat as containment. Those two buildings hold all, let me emphasize that, all safety-related equipment and seismic related equipment. There is no seismic-related or safety-related equipment outside those buildings, and they are all on a common base mat.

MEMBER ARMIJO: You're talking the first three that -

MR. WINTERS: The first two, containment and auxiliary.

MEMBER ARMIJO: Okay.

MR. WINTERS: The annex building is our access control hot machine shop, locker room, health physics building, turbine building houses the turbine, rad waste building is basically an interim storage place before rad waste is shipped off-site. Diesel generator building, of course, we have one, we do have diesel generators, because if you have AC, you don't need to challenge your safety systems. Terry will talk about that later this morning. But it's not a 1E diesel. It's, from an electrical point of view, it's just a pair of diesels for investment protection.

And everything inside those buildings is in our design certification, plus the associated yard structures, that includes fire water tanks, boric acid tanks, demineralized water tanks, and the things that -- fuel oil tanks, and the things that sit around the yard, plus the underground piping that supports that.

MEMBER CORRADINI: So just a clarification. You made a point about the common base mat in the first two structures.

MR. WINTERS: Right.

MEMBER CORRADINI: So no intervention, no action is needed for how long in the base design?

MR. CUMMINS: Seventy-two hours.

MR. WINTERS: Right. No off-site intervention for seven days, so that you can replenish your water supplies, or something of the 72-hour systems after 72 hours with on-site equipment.

Okay. The passive design, we'll talk more about passive core cooling later, but all of the regulated safety response systems are passive. Our core cooling is passive, our ultimate heat removal is passive, the guys that have to be in the control room, the people that have to be in the control room, they're life-safety is held with passive heat removal, passive oxygen supply for 72 hours, no intervention from outside. The ultimate heat sink is off the containment, that's passive. We rely just on natural circulation of air around the containment to take the heat away. For our requirements to have part of your fire protection system, which is fire protection for your safety-related equipment, the seismic, well, all of our seismic equipment is on one base mat. It's also passive. The fire hoses and the sprinklers are fed by a tank by gravity. Many of our security features, especially the post 9/11 security features, are also passive. We've made additions to our passive stable of design solutions.

This is a picture of what's in the

certification. The heavy blue line, everything inside that heavy blue line, we consider to be within the standard design, standard plant design, and within the certification. That's covered in Chapter 1, Section 1.8 of the DCD. If you'll notice, the yellow building is the containment shield building and auxiliary building. That's that common base mat we just talked about, the yellow building. The blue building is the turbine building, the green building is the annex or access control building, the pink building is the rad waste building. And the orange structures around there, there's two fire water tanks, two diesel oil tanks, and service water heat exchanger cooling tower. So everything inside that blue line, there is one extension in 1.8, and that is in a security space, the blue line does include the delay fence, which is the fence between the protected area fence and the buildings.

Outside that blue line is, we consider to be site-specific, and will be covered in the COLA applications. That includes the tower heat sink. This picture shows a hyperbolic cooling tower, but it can be anything that supplies circ water at our conditions. Recognize that circ water is not safety-related in this plant, so it can be whatever the utility wants it to be.

MEMBER CORRADINI: One other question.

MR. WINTERS: Yes.

MEMBER CORRADINI: So where is the spent fuel pool, in pink or yellow?

MR. WINTERS: It's in yellow.

MEMBER CORRADINI: Yellow. Thank you.

MR. WINTERS: So what's outside the blue line needs to be covered in a COLA because the entire picture has to be covered by the COLA.

We all know what a PWR is. It's a reactor, hot water running through the reactor going to steam generator. AP1000 is exactly different than what you're expecting. We call it a two-loop plant, because it has two steam generators. It has two hot legs, but it has four cold legs. Those are each driven by a reactor coolant pump, so we have four reactor coolant pumps. That's the first difference, so we have split cold leg.

The reactor coolant pumps are mounted directly to the bottom of the steam generator channel head. Second difference. So we don't have a cross-over pipe. In other plants, operating plants today, there are a number of thermal problems in trying to get the natural circulation going when you have pumps where cold water can collect, or hot water can collect, you have to flush it out. We don't have that problem here, because there are no humps in our primary circuit.

The reactor coolant pumps are can motor pumps, that is, the motor is within the pressure boundary of the reactor coolant. Not having a shaft seal means that we've eliminated the shaft seal system, all the water that leaks off, and all the water that we have to put into the seal. It also eliminates the oil lubricated bearings. Our bearings are water lubricated, because they're within the reactor coolant boundary. It also eliminates the fire protection system from that oil system that isn't there.

CHAIR BONACA: But you have flywheels, don't you?

MR. WINTERS: We have a flywheel.

CHAIR BONACA: Because the early ones didn't have flywheels.

MR. WINTERS: The AP600 had a flywheel, and AP1000 has a bigger flywheel.

MEMBER CORRADINI: So just a design -- I'm sorry.

MR. WINTERS: Excuse me. Let me finish

this answer.

MEMBER CORRADINI: Okay.

MR. WINTERS: The flywheel, however, is within the reactor coolant boundary.

MEMBER SIEBER: Right.

MR. WINTERS: Okay?

CHAIR BONACA: Yes.

MEMBER CORRADINI: So for an old 3411 megawatt thermal plant, there were four steam generators. The design change was this way because of what?

MR. WINTERS: Okay. For an old Westinghouse 3400, there would be four steam generators.

MEMBER CORRADINI: Right.

MR. WINTERS: For the new Westinghouse, which includes CE, Combustion Engineering, there would be two steam generators. The evolution of AP1000, however, came before the acquisition of Combustion Engineering, and it is just a large AP600. AP600 was two loops, and that was a classic Westinghouse style. Okay? That was the right number of megawatts per steam generator.

However, when we went to AP1000, we said hey, we've got the ANO, for example. Westinghouse had done replacement steam generators for ANO. Those are of the size we need here, so we'll just adopt the CE style, and just go to a bigger steam generator, instead of adding loops. And that's how the genesis of AP1000 evolved.

CHAIR BONACA: So you have two cold legs, and one hot leg?

MR. WINTERS: So that was the evolution.

MEMBER CORRADINI: And the -- I understand the thinking process. The engineering advantage is minimal?

MR. WINTERS: The engineering -

MEMBER CORRADINI: I'm trying to understand the engineering advantage.

MR. WINTERS: The engineering advantage of just making the steam generators bigger, and growing the reactor vessel down a little bit to get from 600 to 1000, is that all the work that we did on structures and auxiliary piping, most piping systems, which had been laid out by that time for AP600, we had $400 million worth of design effort in the AP600. If we did not change the diameter of the reactor vessel, and did not change the diameter of the containment building, then all the stuff around it we didn't have to change. We already had that design in the bag for

AP600.

To go from AP600 to AP1000 doesn't change your need for compressed air. It's the same, HVAC the same, service water pretty much the same. And so as a result, just making the steam generators bigger, as long as we could keep those other diameters the same, allowed us to take all that design and move it, just call it AP1000.

MEMBER CORRADINI: So one little last detail, and I'll be quiet for a while.

MR. WINTERS: Sure.

MEMBER CORRADINI: So you go from 34 -- you go from 2,000 megawatts thermal, to 3411 megawatts thermal. Did the containment volume change?

MR. WINTERS: Yes.

MEMBER CORRADINI: But the reactor vessel volume did not.

MR. WINTERS: No, it also got bigger. Everything got taller. The reactor vessel got taller from the nozzles down, which meant that we changed nothing but the link with the reactor vessel. The containment vessel got taller to get more volume. To do that, the only change we had to make in piping is the piping running up the side of containment, and the wires going up on the side -- we had to stretch them, make them longer, and those are the basic changes we made -

MEMBER CORRADINI: The pressurizer got taller.

MR. WINTERS: Pressurizer got larger. It was taller, even taller for a while, and now it's a little bit taller. So we had to have more volume, obviously, in the pressurizer.

CHAIR BONACA: Is 3411 the maximum power you generate for this plant?

MR. WINTERS: It's the maximum power that this plant is licensed, or certified for.

CHAIR BONACA: But at some point -

MR. WINTERS: At some point, we'll have operating experience enough to support a decision of whether an uprate is possible.

MEMBER CORRADINI: I was under the impression the Chinese wanted to go to 1,400 megawatts electric on the same design.

MR. WINTERS: They may but -

MEMBER CORRADINI: I just wanted to bring that up, since that -

MR. CUMMINS: You've been reading the newspaper.

(Laughter.)

MEMBER CORRADINI: I once in a while do that.

MR. CUMMINS: The Chinese want to be able to use the technology, and one way to use it is if you apply it - we have a requirement to transfer the technology, so if you can apply it with a new design, then you really understand the technology. And whatever the number is that they have, 1,400 or 1,700, and the configuration is yet to be determined, and Westinghouse will participate some in this, as advisor/consultant/instructor.

MEMBER CORRADINI: Okay. I understand.

MR. CUMMINS: And, so, it could be a three-loop plant, or it could be a two-loop plant. I think the largest two-loop plant now is going to be this APR1400 for the Koreans, growing out of the System 80+, so that is more than 4,000 megawatts thermal. I don't know the number exactly.

MR. WINTERS: But it also has active safety systems, and is a little bit -

MR. CUMMINS: So you can have a larger plant.

MEMBER CORRADINI: Okay. Thank you.

MEMBER SIEBER: Just to clarify for me, going from the 600 to the 1000, make the containment bigger, basically to give you more heat capacity? And the IRWST is larger, diameter is the same, but it's deeper?

MR. WINTERS: No, we just filled it up more.

MEMBER SIEBER: Well, that's -

MR. WINTERS: There's more water. The actual layout of inside containment has the top and the bottom of the IRWST, the same as AP600.

MEMBER SIEBER: Okay.

MR. WINTERS: We just put more water in.

MEMBER SIEBER: Now the depressurization blowdown valves, more of them, or they're bigger?

MR. WINTERS: The big ones are bigger. The first three stages are the same.

MEMBER SIEBER: Okay. That avoids you using electrical safety systems?

MR. WINTERS: Right.

MEMBER SIEBER: And still doesn't necessarily screw up the containment a lot.

MR. WINTERS: Yes. It's the same recovery. Screw up is a relative term.

MEMBER SIEBER: Either way.

MR. WINTERS: It's the same recovery as AP600.

MEMBER SIEBER: Right.

MR. WINTERS: Yes, there's going to be a mess in the bottom of your containment if you have to go to safety, all passive safety systems.

MEMBER SIEBER: Okay. Thank you.

MR. WINTERS: Okay. Let's go on. So here are the passive core cooling systems. You'll notice they're kind of lumped together. All this equipment is inside containment. Terry will show you how the work. But the point to remember is, it's all inside containment. And that energy is passed to the containment shell, and then no fluids are passed through. When you're in full safety mode, passive safety mode, no fluids pass through containment, only energy. Energy passes through the wall of containment and is removed by air passing over containment, or water draining onto containment to get evaporative heat transfer.

MEMBER CORRADINI: And you said something, just to clarify. So that after the first 72 hours, the facility, or the plan is to recharge those water tanks -

MR. WINTERS: No.

MEMBER CORRADINI: Okay.

MR. WINTERS: After the first 72 hours,

you can leave it -

MEMBER CORRADINI: You made some comment about adding water. I didn't know where you meant it.

MR. WINTERS: You could, if you wanted to.

MEMBER CORRADINI: Okay.

MEMBER SIEBER: But the decay heat curve is coming down.

MR. WINTERS: Is way down.

MEMBER SIEBER: And, so, the -- basically wetting the containment is no longer necessary.

MR. WINTERS: Right. That's exactly right.

MEMBER ARMIJO: Could you move back one slide and show me, where is the IRWST on that particular drawing?

MR. WINTERS: On the left, it's the rectangular blue, right there. And what you're seeing is a cross-section -- if you look in pan view, it goes about 175 degrees around the containment.

MEMBER CORRADINI: It's a suppression pool, Sam.

MR. WINTERS: It's a suppression pool, yes.

MEMBER ARMIJO: It didn't look very big.

MR. WINTERS: It's 800,000 gallons for a

rough estimate.

MEMBER SHACK: You have a containment vent. Right?

MR. WINTERS: 600,000, sorry. 600,000. I'm sorry?

MEMBER SHACK: You have a containment vent.

MR. SCHULZ: We have a containment vent capability. It's not credited in the PRA for any design basis event, so with this containment design, the chances of needing containment venting are so low that we don't even model them in the PRA. The chances of losing cooling -

MEMBER SHACK: It's still there. It hasn't disappeared.

MR. SCHULZ: Yes. What you -- if you looked at all the valves, and pipes, and whatever, you wouldn't find it. We make use of some existing piping that's for shutdown cooling, and a cross-connection from that to spent fuel pit, to provide a vent capability.

MEMBER SIEBER: Not putting it in the PRA is not quite fair, though, because its mere existence is a vulnerability.

MR. SCHULZ: The vulnerability is

addressed in terms of containment isolation, or lack thereof.

MEMBER SIEBER: Right.

MR. SCHULZ: So I think that part of it, you could also contend that it could be -- its use might be abused, or misused. That is covered with careful writing of EOPs, and CMG-type information.

MEMBER SIEBER: Almost as good as not having it.

MEMBER CORRADINI: Just to make sure I understand, though, that all current PWRs have the ability to vent. This venting, though, goes through some sort of filtration, in difference to current, what I remember in the old containments, butterfly valves through containment. Is that correct?

MR. SCHULZ: This goes through the shutdown cooling system, containment penetrations, and from there into the spent fuel pit under water.

MEMBER CORRADINI: Okay.

MR. SCHULZ: So the spent fuel pit water provides some trapping of activity.

MEMBER CORRADINI: All right. Thank you.

MR. WINTERS: So the combination of our passive approach on the right replaces all of the stuff that's outside containment on the left. And that's one of the beauties of this design.

In plan view, and in building structure, that results in this kind of a reduction. Now you recognize we kind of cheated on this, because Sizewell has got a lot of extra stuff on it, but this is a scale comparison, so units are about the same size, although Sizewell has a little more power. The colors represent the four channels of safety. You'll notice that all of our colors are on that one base mat, and all the evolutionary plant colors are scattered around the yard, because they've got ultimate heat sinks, and diesel generators, or in the case of Sizewell, gas turbines, and other things necessary to support safety and cool-down, where in AP1000 we don't.

MEMBER ABDEL-KHALIK: Are these drawings to the same scale?

MR. WINTERS: Yes, sir.

Now the philosophy of one design. We have a class mentality, class meaning like a ship class. We've tried to impart on our design team the philosophy that shipyards have relative to building cruise ships, or casino ships. We have one design certification, which we tried to put as much possible design information as we could so the COLA applicants themselves would not have to re-explain that. That meant that they all need to be the same.

Westinghouse has 24 potential plants we're discussing with people today, 12 in the U.S. that have been declared. Those are our five utilities, one utility has two sites, so that's 12 plants that we all know about for the U.S.

The five utilities have banded together into a buyers group, so that they recognize that if they want the change, if any one of them wants a change, that it's a problem for them, because it's outside the standard. We, Westinghouse, won't necessarily make that change unless all five want the change. If all five want the change, we consider the design to be broken, and we go through our process, which includes a 50.59-like process, and a bunch of those questions that come out of Appendix D. And then determine the technical merit of that, and usually make that change. For example, in the spent fuel pit, they wanted - we've got to have more fuel in our spent - we've got to be able to store more fuel, so just make the building bigger. Well, we had already done our seismic design, and we weren't about to make the building bigger, and they recognized that, so we came up with a different spent fuel packing arrangement and rack design so that we could get more spent fuel into the same pit. We wouldn't have done that if there wasn't a consensus of our buyers group, so there is a cross-industry approach to this standard design, standard license, standard - it goes all the way down to we cannot get a human factors complete until we have a set of standard operating procedures, which we're already writing, so the utilities will start, or each of the licensees will start with a full set of operating procedures that have been run through a standard review process to get our human factors and control room certified. And that is also borne out in the active multi-COLA Design-Centered Working Group.

Just as an aside, our design meets the utility requirements document, which is a plant specification written by 16 utilities, so that it is a real effort, an emphasis on standardization in our philosophy.

MEMBER SHACK: How many sources are there for your forgings for your pressure vessel?

MR. WINTERS: Many. But if you said how many sources are there for the two ultra big forgings?

MEMBER SHACK: Yes.

MR. WINTERS: One. This is the regulatory process, and you've seen it, you'll hear more about it.

MEMBER ABDEL-KHALIK: At what point would you go from one design class to another?

MR. WINTERS: That'll probably be a commercial -- we have the five lead applicants now. They're going to be in a group. We'll call that Wave One. When the next set of people decide they want to build in the United States, or somewhere else, there may be some - let's make it better changes in-between there, and it will be based - that decision of when to switch waves will be a commercial decision.

MEMBER ABDEL-KHALIK: And would that be handled as a completely new application, or as a modification to the -

MR. WINTERS: Probably as a modification, but we don't know what's in it yet, so it's hard to say. But we'd probably call it another modification, amendment.

I don't mean to go into this a lot, except that we do have a design certification, and we've only made a few changes, or we've made a few plus minor changes in this Rev. 16 approach. So here we are back to our picture of what's in the certification.

CHAIR BONACA: Can I ask a question?

MR. WINTERS: Yes.

CHAIR BONACA: Going back to the previous slide. What's your judgment of what could be a reasonable time between combined operating license and operations, because of the simplification, and so and so forth?

MR. WINTERS: We're -- the schedule that we talk about, which isn't necessarily a contractual schedule, but a schedule we talk about has some period before combined operating license that you can do work. You can't do safety-related structural work until you have a combined operating license. Okay? So that time before construction starts can be 18 months to two years, where you buy your large forgings, you start putting down your construction facilities, you could dig the hole. The construction period that we talk about, which includes the construction acceptance criteria, from first concrete to fuel load is 48 months, four years. We say it takes about six months for commissioning, and your acceptance testing. It'll probably take a little longer than that on the first unit, because we have some one-unit-only tests to do. It'll take less than that on follow units, because we're just doing the same tests on the same design. But approach then is 48 plus 6 from first concrete for the first few units.

We believe that on the Nth unit, I don't know what N is, five, three, eight, that we've shown we can do it in 36 months from first concrete to fuel load, so you've heard that, as well.

So we're back to this picture. On the electrical side, to answer your question, inside the standard design is our side of the main transformers. It includes the whole reserve auxiliary transformers and the station transformers. From the main transformers out, is the licensee's responsibility. So we have the generator, there are no changes. If someone comes up with a change, we have two questions on our change process that people have to answer before they start. What isn't safe that you're fixing, and what doesn't work that you're fixing?

If the answer is none of those, then no to both of those questions, I'm making it better, we say, you know, we've really gone too far for the first wave to make it better. A COLA has been submitted, and we're going to get to perturb that process, so we have a very rigorous approach, and graded approach to changes. Changes that don't affect the DCD are handled with a little less review and process than those that do affect the DCD or COLA. Those that have no affect outside of a functional group, have a whole lot less of this administrivia attached to it, so we do have a graded approach. All of them -

CHAIR BONACA: The philosophy, clearly, I mean, although, all these units will be built on existing sites where there are operating plants.

MR. WINTERS: Not all. Of the 12 plants for the United States, one is total greenfield site, and one is a site that has a foundation on it with no operating plants, and another, like Bellafonte, has two built plants, but no operating plants, so it is a variety of sites.

CHAIR BONACA: But, in any event, the philosophy is such that you would have no shared systems.

MR. WINTERS: No, no shared systems. All of them are dual unit sites, and there's nothing shared, except the access road. Okay. That's an exaggeration, but there are no shared systems.

CHAIR BONACA: Okay.

MR. WINTERS: We do have a full 3D model. We're not going to talk about it today, but that's to give you an idea of what the plant looks like, again, for those who haven't been involved in it. Okay?

So we're going to switch to Terry now, and Terry is going to go into more detail of how the passive systems work, and what few modifications we made to them in Rev. 16.

MR. SCHULZ: Thank you, Jim. Good morning. My name is Terry Schulz. I also work in the Westinghouse AP1000 Engineering Department. I've been involved in the design of the passive systems since we started back in the late 1980s. And what I'm here to talk about today is both the passive safety systems, and then what we call defense-in-depth systems.

The passive safety systems, as Jim has mentioned, we have kind of a special meaning for that word, and it includes one-time alignment of valves to initiate our passive features. Those valves are powered by batteries in some cases, in other cases they're fail-safe valves, air operated-type valves. There's no support systems needed once the systems are actuated, no AC power, in fact, no DC power once you get actuated, no operating pump, cooling water, HVAC, chilled systems.

MEMBER STETKAR: Excuse me. I haven't had the benefit of sitting through the AP600, so I'm kind of new to this process. No DC power, no I&C, so the operators have no indications -

MR. SCHULZ: What I was speaking about was the mechanical systems, like the core cooling, containment cooling systems.

MEMBER STETKAR: So you do have an operating I&C.

MR. SCHULZ: WE have an operating I&C system that continues throughout the accident. It is powered by batteries.

MEMBER STETKAR: Uninterruptible power supplies and so forth?

MR. SCHULZ: Yes.

MEMBER STETKAR: Okay. What kind of analyses have you done on 72-hour room heat-up without HVAC?

MR. SCHULZ: We have done those analysis to show that both the control room, and the I&C cabinet rooms stay within their design temperature limits.

MEMBER STETKAR: Uninterruptible power supply limits?

MR. SCHULZ: I think those are -

MEMBER STETKAR: Oka. That's probably too much detail.

MR. SCHULZ: We've looked at those -- they tend to be no challenging, because there's no heat sink, no heat source in there. They're actually more of a heat sink.

MEMBER STETKAR: All DC driven, not AC

driven?

MR. WINTERS: No AC, all batteries. The structural design, especially designed, like for the control room, to be a heat sink.

MR. SCHULZ: To enhance the heat -

MR. WINTERS: To enhance the heat removal in a passive way from the room. The ceiling of the control room has extra concrete to have a large thermal mass, and fins on the bottom, so that the heat transfer into that thermal mass is enhanced, just so we can remain passive for 72 hours.

MEMBER ARMIJO: I'm still a little confused on your definition of passive, is that you don't require AC power. And in these systems, you have to align the valves to get these passive systems working.

MR. WINTERS: Yes.

MEMBER ARMIJO: And, presumably, that alignment doesn't require AC power, or does that alignment -

MR. SCHULZ: Does not.

MEMBER ARMIJO: Does not. But then you installed a number of what you call multiple reliable power sources to avoid unnecessary actuations, so -

MR. SCHULZ: Those are non-safety

features. One of the things that I'm going to try to do today is to make clear what is passive safety, 1E, seismic, tech spec design, and what is not safety, what we call defense-in-depth, and what the capabilities and the regulatory oversight of that is, because that was one of the big questions that we discussed, especially in AP600, which is the same basic arrangement and philosophy, and there was an industry/staff debate and discussion about how important were diesel generators? They used to be safety. We came in saying they aren't safety. How important are they? That was a very important discussion, and the second part of my presentation will have some slides that focus on the resolution that we came to on those features.

CHAIR BONACA: For example, you'll have charge -

MR. SCHULZ: Yes, we have.

CHAIR BONACA: They will not be receptive later, but you can use them if you had to.

MR. SCHULZ: Correct.

CHAIR BONACA: The whole issue here is to eliminate the nuclear classification and the safety-related, but you do have backups.

MR. SCHULZ: That's right. And one of the things I'll show you a little bit of information on is from a PRA perspective, how important those features are. So if you took them away, what do you have left, from a core melt frequency, large release frequency point of view, which is one of the major things to judge the importance of the non-safety features.

But continuing here, another characteristic of the passive features is that they greatly reduce the operator actions that are needed to keep the plant safe in design-basis accidents. They mitigate design-basis accidents without the need for non-safety systems to work, so they do Chapter 15-type mitigation without use of charging pumps, or diesels.

We also have an objective that we placed on ourselves, that we could meet the NRC safety goals without credit for the non-safety features. Again, the objective there was to provide a sort of minimum level of protection by the passive safety features, and not be too reliant on the non-safety features in the plant.

We do have active non-safety features in the plant. In most cases they are there to support normal operation. In some cases, it's a transient response, or anticipated-type events, so that includes the diesel generators, and some startup feedwater equipment. I'll give you some more information on that.

Typically, those features include redundant active components, pumps power by diesels. They don't necessarily have redundant separated mechanical piping systems, because those are -- the failures of those kind of systems are much lower probability. And, again, these aren't safety features, so we don't have to deal with separation for fire protection, and that kind of thing. And, as I mentioned, they're not required to mitigate design-basis accidents.

We do, however, look very hard for adverse interactions between the active and passive features. We did testing along those lines, and it's something that we look at from an analysis point of view, so that if an active system operating can make an accident worse, at least to a certain point, we include that in the accident analysis, but only because it makes it worse. Where it makes the accident better, we don't credit it.

CHAIR BONACA: The accident analysis, I mean, which one are your front line systems, come first, the passive or the active?

MR. SCHULZ: In terms of actual sequence

of operation, anticipated sequence, the active systems are designed to come on first.

CHAIR BONACA: Come on first.

MR. SCHULZ: Okay? And if they operate properly, the passive systems will not be challenged, will not be actuated. If they don't work properly, then the plant conditions would degrade somewhat, and then the passive safety features would come on.

Jim showed you this picture. I'll speak just a little bit more about it. This is showing you the passive core cooling features. Again, it's all inside containment. The large water storage tank is a refueling water storage tank in containment, refueling water storage tank. We have -

CHAIR BONACA: Going back to the previous question just for -- so your accident analysis, you have to demonstrate -- you demonstrated separate systems will provide the required safety.

MR. SCHULZ: I'm sorry?

CHAIR BONACA: I mean, although the front line systems are going to be the active ones, you are not testing them really in the accident analysis. You're testing the passive systems.

MR. SCHULZ: Yes. So in Chapter 15, the plant protection mitigation, accident mitigation is provided by the passive features.

MEMBER ABDEL-KHALIK: So how would you define the initial conditions for the safety analysis?

MR. SCHULZ: The way we traditionally do. In most of the -

MEMBER ABDEL-KHALIK: Vis-a-vis reality.

MR. SCHULZ: Pardon me?

MR. WINTERS: Vis-a-vis reality, he said.

MR. SCHULZ: We generally for everything but large break LOCA, we do a conservative analysis, so we look at limiting bounding, initial pressure levels, and whatever for the accident analysis. We consider the potential operation of active features that could drive those conditions to be more limiting, like the operation of the makeup pumps trying to say overfill the pressurizer during a Condition 2 mass addition event. We look at the operation of startup feedwater to potentially add to the overfill potential of the steam generators during a tube rupture event. In both cases, we have safety-related isolation features of those active features that will come into play at a certain point in the transient, and stop the adverse interaction before it gets to be unacceptable.

MR. CUMMINS: Maybe I could help. The initiating conditions are set by the set points in the

I&C system that cause the actuation of the plant trip, or the actuation of various passive systems, so at some point -- I mean, what Terry said is, you can take all the worst conditions less than the set point, but as soon as you get to the set point, we assume that the I&C system causes the corrective action that's appropriate.

MR. WINTERS: And even though in real life we would take credit for the non-safety active systems, in the analysis, we don't.

MEMBER ABDEL-KHALIK: Well, that's the reason for my question. I guess when it gets to specific examples, we'll be able to see how that works.

MR. WINTERS: Yes.

MR. CUMMINS: If the non-safety active systems are correctly used, you never get to the set point.

MR. SCHULZ: And, again, what we -- this philosophy was developed in AP600, implemented in AP1000. The DCD Rev. 15 incorporates all this in the safety analysis, and the DCD. And we haven't really changed that in Rev. 16.

MEMBER ABDEL-KHALIK: To follow-up on your comment, on the other hand, there are situations where the actuation of those active systems can create an initial condition for the passive system that's worse than if that was the primary system on which you rely on.

MR. CUMMINS: That's true, but the active systems are controlled in the end by the set point. I mean, when you get to the set point, the I&C takes over, regardless of what the active systems are doing, and it actuates the passive systems.

MR. SCHULZ: And isolates active features -

MR. CUMMINS: As necessary.

MR. SCHULZ: As necessary, and those conditions are accounted for in the safety analysis.

CHAIR BONACA: So I assume the analysis where the active systems are able to keep you away from the passive systems. Okay? Give you success. Are they modeled and analyzed in the accident analysis?

MR. SCHULZ: No.

CHAIR BONACA: They're not?

MR. SCHULZ: No, because we don't rely on them. It's not important in the DCD.

MR. CUMMINS: So the approach for the licensing is that the active systems do as bad a job as they could possibly do to create the worst initial conditions that you could possibly have, without reaching a set point, and then the set point occurs. If the active features still would cause more problems, it's terminated by some passive system, we isolate it.

CHAIR BONACA: We'll have to see, but you talked before of the interaction between safety and non-safety systems, and a good example is the current design of plants, is the PRV was never modeled in accident analysis, because it was supposed to be a good thing. It wasn't in all cases, I guess.

MR. SCHULZ: Well, we do, for example, in our steam generator, have power-up and refill still, and we do look at adverse opening and sticking opening of those valves. They are not safety-related to open, so we don't take credit for them when we're trying to look at steam generator over-pressurization. We do look at them if their operation can make the accident worse, and in a tube rupture from a dose point of view, if those valves do open, and stick open as a failure, then that is a worse operation. Again, it's consistent with our philosophy of looking at operation of non-safety features where they can make accident consequences and parameters worse, and not taking credit for them, or they would mitigate or reduce the consequences of the accident.

CHAIR BONACA: So there will be some conditions where the active system would not be sufficient, because you have to go to the passive systems.

MR. SCHULZ: Right. Either because the active systems are not capable of mitigating the event, or because they can be considered to not work, because they're not tech spec'd, they're not required, they're not 1E, they're not a safety feature to work.

MEMBER ABDEL-KHALIK: So, big picture, there would be two different sets of set points, one for actuating the active systems, and one which represents a more degraded condition that would result in the actuation of -

MR. SCHULZ: Generally speaking, you have to realize that the active systems are non-safety. They are controlled by the control grade I&C, not the protection system. Okay? You're not safety-related, so -

MEMBER ABDEL-KHALIK: But in terms of plant parameters, deviations from normal -

MR. CUMMINS: Yes, you have the right idea. The active systems are actuated, but not actuated with a safety-related I&C system. They're actuated with a non-safety related I&C system. And if they need to be terminated, we isolate them with the passive systems, by closing valves, or by -

CHAIR BONACA: I mean, in the current design that you have at Westinghouse, you have your charging pumps, which are also safety injection pumps. I mean, they play both roles.

MR. CUMMINS: Yes.

CHAIR BONACA: And here you have discharging pumps, which are not safety injection pumps, also they play also a role of safety injection.

MR. CUMMINS: That's right. So we have a set point for them to come on. They come on.

CHAIR BONACA: But you don't have to demonstrate that with those you will meet the LOCA requirements.

MR. CUMMINS: We don't have to demonstrate that.

CHAIR BONACA: You don't have to do that.

MR. CUMMINS: No.

MR. SCHULZ: In fact, they are not very capable of that, because they don't have recirculation capability.

CHAIR BONACA: Okay.

MR. SCHULZ: We've intentionally designed that out of those systems, because we didn't want that complication in the design, so they can make up for leakage, or maybe big leaks, but when you start getting into maybe greater than one inch breaks, they really can't mitigate that accident.

MR. CUMMINS: Another way to say this -

CHAIR BONACA: What if your passive systems did not work? I mean, it's true you have this active system that is running, and you have your diesels running them, but you don't know really what the ultimate results of the analysis will be, because you haven't performed that. Right?

MR. CUMMINS: The active systems don't mitigate every single accident. They mitigate some of the more -

MR. SCHULZ: Probable.

MR. CUMMINS: Probable accidents. Yes.

MEMBER SHACK: I thought it was everything but the large break LOCA.

MR. SCHULZ: No, there's issues, like a feed line break, the startup feedwater really can't deal with a feed line break. So there still are some low probability events, and in some cases, too, at higher probability events, that you have more, maybe active feature options. And when you get to low probability events, you have some or maybe a combination of active/passive. There's some -- one of the slides I'll show you at the end of my presentation actually is sort of the levels of defense, and combinations of systems, and what's active, and what's passive, and what's safety and non-safety.

MEMBER ABDEL-KHALIK: But even though you don't include the plant response consequent to the initiation of these active systems, you don't include that in the safety analyses. You must have done that to be able to come up with the set points for actuation of the passive systems.

MR. SCHULZ: That's the sizing. We did that kind of analysis to come up with the sizing of the active systems. Okay? So we looked at loss of main feedwater, and we sized the startup feedwater, so that on a reasonable design-basis, not a conservative safety-basis, those pumps can maintain the steam generator water level above the safety set point. Okay?

Now given the size of those pumps, and capability of that system, we then look at the safety analysis, and we look at situations where the system doesn't work at all. We look at it as it works as designed, and we analyze the different combinations of safety event, plus the operation of the active features to see when we run into the passive safety set points. And that's what we do for Chapter 15, is looking at the potential operation of the active features to either make the accident worse, in which case we include that in Chapter 15. If it makes the accident better, then we keep looking for the events that are more limiting, where we don't get credit benefit for the active features in Chapter 15 now.

MEMBER ABDEL-KHALIK: Thank you.

MR. SCHULZ: Okay. The passive core cooling system has several water supplies. It has accumulators. Accumulators are very similar to the current operating plants. One difference is that they inject through an access or injection line. They don't inject into the cold legs, which is typical of the operating plants. We did that so that we did not have to take a spill of accumulator in a large break LOCA, so both our accumulators function in a large break LOCA.

A unique feature we have is a core makeup tank. These tanks are of full reactor cooling system pressure. They are filled with water. The injection of them is a natural circulation kind of injection, so they have a pressure balance line that comes from the cold legs, and goes up to the top of the tank. These are core makeup tanks. The massive water in the core makeup tanks is about equal to the reactor coolant system mass.

MEMBER CORRADINI: So you essentially have doubled by the pressure balance line, you're just doubling the inventory.

MR. SCHULZ: Doubling the inventory, but this inventory is cold, and it's borated. Okay? So it's not hot.

MEMBER CORRADINI: Slightly borated there, is it not?

MR. SCHULZ: Significantly, it's 4,000 ppm. It's higher than refueling, a little bit higher than refueling concentration.

MEMBER SIEBER: Did you end up with a problem injecting what I consider really cold water into a hot vessel from the standpoint of brittle fracture, that kind of stuff?

MR. SCHULZ: We have to look at that. One of the reasons why people in the past didn't always use reactor vessel injection lines is because of that concern, and so if you go into the loops, it's a little easier to do the mechanical analysis.

MEMBER SIEBER: Right.

MR. SCHULZ: So this is a trade-off between optimizing the system design, and the challenge of designing the reactor vessel.

MEMBER SIEBER: Have you done that analysis yet?

MR. SCHULZ: We have done analysis there. I don't think the final ASME stress reports are done, but we have done significant work in that area to make sure there's no feasibility issues with that.

MEMBER SIEBER: When do you expect -- that should be a part of the design certification. Right?

MR. CUMMINS: That is -- there is a COL action item which is stress reports for the major equipment, and we're closing that COL action item in this.

MEMBER SIEBER: Maybe I can ask Dave, when staff gets that response, that I can get a copy of it.

MR. FISCHER: Certainly.

MEMBER CORRADINI: And so the logic, just to go back to a design logic, you said it, I want to make sure I understood it. The design logic is that putting the CMTs directly into the core avoids the chance, avoids a broken line as one of the places that essentially eliminates the use of the CMT?

MR. SCHULZ: It eliminates the chance for big breaks.

MEMBER CORRADINI: Reduces. Okay.

MR. SCHULZ: For big breaks, it eliminates it. Obviously, that line can still break. And, in fact, that is probably the most challenging break location for our plant, is the break of one of these eight inch direct vessel injection lines, which does spill one over to accumulators, one over to core makeup tanks. And I'll actually show you in four or five slides what that accident analysis looks like, and we still keep the core covered in that situation. But let me finish a little bit of the system operations -

MEMBER CORRADINI: That's fine. I just wanted to understand the connection. Thank you.

MR. SCHULZ: Sure. The core makeup tanks have a significant volume, but it's not infinite. They operate kind of like high head safety injection pumps, they can inject at any reactor coolant system pressure. They're not an accumulator that takes the gas pressure to inject. It's a pressure balance line to the cold leg, so any pressure they can inject.

As these tanks start to drain, if they start to drain in a small break LOCA, that level in the tank triggers the automatic depressurization system, so we use those tanks as kind of an indication of inventory in the reactor coolant system, because they don't start draining until the cold leg is void. And then when you're in that situation, you're obviously in an inventory challenged situation. The pressurization valves -

MEMBER SIEBER: Reactor pressure is basically atmospheric?

MR. WINTERS: Not yet.

MR. SCHULZ: Not yet. Okay.

MEMBER SIEBER: If you don't have a gas pocket, what causes -- once you get the break, those tanks depressurize. Right?

MR. SCHULZ: They follow the RCS pressure. Okay? Depending on the break size, the pressure can be up, if it's a smaller break. A bigger break, it comes down very quickly.

MEMBER SIEBER: So you're relying on gravity to -

MR. SCHULZ: Yes.

MEMBER SIEBER: -- overcome all the friction and everything.

MR. SCHULZ: Right. And we've done a lot of analysis, a lot of testing, both system and integral testing to show that this kind of a feature works, and works well in this plant. We've actually done full two integral tests that have reactor vessel, two steam generators, two core makeup tanks, DVI lines, passive RHR and all that stuff, ADS valves to show that the core makeup tank injection capabilities not only work, but work as designed.

MEMBER CORRADINI: At full pressure.

MR. SCHULZ: At full pressure, or any pressure -

MEMBER CORRADINI: No, I understand that, but you were commenting on the testing. I couldn't remember, is this the Italian -- the test -

MR. SCHULZ: The Spez testing is a full pressure test. Yes.

MEMBER CORRADINI: Okay. Fine.

MEMBER ARMIJO: These tanks are never to be used, except for accident?

MR. SCHULZ: They have no normal function.

MEMBER ARMIJO: No other function?

MR. SCHULZ: That's right. That's true of basically all of our safety features. They are not dual purpose features. They are only used during transients where non-safety features don't work, or in more severe accidents, where they're the only protection.

So the core makeup tank level is what triggers ADS. We have four stages, three of them are connected from the top of the pressurizer over to the refueling water storage tank through a sparger. The sparger is in there solely to reduce the consequences of those valves operating. This is not a pressure suppression containment, it's a large dry PWR containment, so we don't need those spargers to operate to minimize the containment pressure.

MEMBER ABDEL-KHALIK: So the level drop in the core makeup tanks, by itself, no coincident with a decrease in pressure, would actuate this depressurization system.

MR. SCHULZ: Well, not by itself. There is some coincident logic, but you need to have actuated a safety injection signal, which is a core makeup tank injection signal, which trips the reactor, starts the core makeup tanks. You need that signal, which is two out of four logic, plus two out of four logic from either core makeup tank level instrumentation.

MEMBER ABDEL-KHALIK: Okay.

MEMBER CORRADINI: I'm sorry we're asking you to review this, but just to repeat what you said, so you had to essentially open a valve to get to the CMT?

MR. SCHULZ: Yes.

MEMBER CORRADINI: Now the balance line is always open.

MR. SCHULZ: Right.

MEMBER CORRADINI: But the discharge line must be open.

MR. SCHULZ: The discharge line has two parallel normally closed fail open air-operated valves.

MEMBER CORRADINI: Okay.

MR. SCHULZ: So it's fail-safe type design for the core makeup tanks. You lose air pressure, you lose power to the valve, it opens.

MEMBER CORRADINI: Thank you.

MR. SCHULZ: That same kind of arrangement is also provided in the passive OHR, which is our transient decay heat removal safety feature. We don't rely on auxiliary feedwater pumps in this plant. We have startup feedwater pumps, but they're not safety. The safety feature in case of loss of off-site power or loss of feedwater, or feed line break is the passive OHR, which is connected directly to the reactor coolant system piping. It's arranged somewhat like the core makeup tank. There's an inlet line that comes from the hot legs to the top of the heat exchanger. There's an outlet line that comes back to the steam generator channel head. That outlet line is normally isolated. The inlet line is normally open, so the system always relies on the reactor coolant system pressure. The outlet valves are just like the core makeup tanks, normally closed, fail open, air-operated valves. So it's fail-safe, this design.

MEMBER ARMIJO: If that happens during normal operation, the water in those core makeup tanks don't go into the vessel?

MR. SCHULZ: The water in the core makeup tanks is not going to be driven strongly by the normal pressure condition in the reactor coolant system. It's basically taking an inlet from the cold leg, and it's injecting into the downcomer. Now there is a pressure drop there. There's also a velocity head recovery in there, so the pressure is actually only allow for a small core makeup tank flow in that condition.

MEMBER CORRADINI: But if you had the discharge open, there would be flow.

MEMBER SIEBER: Yes, but it's more like a migration than a flow.

MEMBER CORRADINI: With the pump running, there will be flow.

MR. SCHULZ: There will be some flow, but it will be less than the design flow, because when we normally actuate core makeup tanks, part of the logic is to automatically redundantly safety-related trip the reactor coolant pumps. So any time we have a safety injection signal in this plant, we trip the reactor coolant pumps.

MEMBER MAYNARD: But if those valves inadvertently open for any reason during operation, you're going to start borating -

MEMBER CORRADINI: I was going to say, it's a boration -

(Simultaneous speech.)

MEMBER MAYNARD: A boration event start shutting the power down if you don't get the valves shut pretty soon, that you'd be -

MR. SCHULZ: Yes, there are consequences. But my point was that they are not very severe consequences, or very rapid consequences. But, yes, there will be some boration.

MEMBER MAYNARD: That was in the right direction, so -

MR. SCHULZ: Yes. Now if the same thing

happens to the passive OHR, it's a little different, in that the way that piping arrangement is set up, it's taking an inlet from the hot leg, returning to the pump suction. So if the pump is running, there's a substantial pressure drop there in the normal flow direction, so that will force flow through the passive OHR, so you'll get a substantial flow through the passive OHR, and a substantial bump in heat removal. That is specific analysis we perform in Chapter 15 to look at the consequences of that, and it's a Condition 2-type event, and we show that there's no core damage in that kind of a situation.

MEMBER SIEBER: You don't have any kind of a check valve in there to prevent back flow?

MR. SCHULZ: Well, the way the piping is arranged, it will never go backwards. Okay? The pump is running, it goes more strongly in the passive flow direction. If the pump isn't running, then it still goes in the same direction.

MEMBER SIEBER: What's the pump DP, about 150 pounds?

MR. SCHULZ: It's somewhat less than that. It's relatively high in this plant, because -

MEMBER SIEBER: I figured it would be.

MR. SCHULZ: -- of the long core and the

flow rates we're putting through it, so it's a little higher than -- if you look at AP600, the pump heads are quite a bit lower than on AP1000.

MEMBER ABDEL-KHALIK: So in this plant, any accident scenario you trip the reactor coolant pump.

MR. SCHULZ: No. Any accident scenario that creates a safety injection signal. There are other safety signals that, for example, if you -

MEMBER ABDEL-KHALIK: So a loss of inventory event.

MR. SCHULZ: Yes. Yes. So in order to get safety injection going, one of the consequences is we turn off the reactor coolant pumps, and we start the core makeup tanks. And that puts them in the design operating condition for those tanks.

CHAIR BONACA: One comment I would like to make. You know you're running somewhat late, so I want to make sure we don't short-change the afternoon presentation.

MS. STERDIS: No. We have to stick to the presentation schedule this afternoon.

CHAIR BONACA: So you may want to manage the presentation -

(Off the record comments.)

CHAIR BONACA: The purpose of the meeting was to get information, so I think we're not wasting time. I think as you go forward you may want to look at some slides, maybe you want to bypass.

MR. SCHULZ: Let me try to just point to it quickly here. This is a section through the containment, just to give you a feeling for the layout of the key passive features. You see on the right side the accumulator and the core makeup tank. The elevation of the core makeup tank is important, because of the natural circulation operation. You see on the left side of the containment the passive OHR, which is sitting in the IRWST. The IRWST provides a large heat sink for that heat exchanger. It'll take maybe about an hour to heat that tank up to boiling, and then after that, you start steaming to the containment. The containment would start to pressurize, passive containment would come on, and that would then cool the containment, providing your ultimate heat sink, would also collect the condensate, the steam that condenses on the containment is collected in basically a gutter-like arrangement that goes all the way around at the operating deck, and then directs the water back into the IRWST. And then that means we could basically operate the passive OHR indefinitely without -- even though we're boiling, but we're bringing the water condensate back.

This is a little animation to try to give you a feeling for the integrative operation of the passive core cooling system in a LOCA. So here we have a cold leg break LOCA, pressurizer level starts coming down, pressurizer level in this case, or pressure would trigger the safety injection signal, which stops the reactor coolant pumps and starts the passive OHR. So as the passive core cooling features get actuated, they'll start appearing on the page here.

Initially, when the cold legs are voided, you'll get a hot water/cold water circulation mode going on. When the cold legs void in a bigger small break LOCA, then you start draining the core makeup tank. When it drains to about two-thirds full, it triggers ADS Stage 1, 2, and 3, which again are connected from the top of the pressurizer over to the sparger.

MEMBER CORRADINI: The balance line is off the cold leg. Right?

MR. SCHULZ: The balance line is off the cold leg, yes. So it's a cold leg voiding that triggers the CMT draining. Okay? Stages 1, 2, and 3 start bringing the pressure down. They insure that the accumulators inject, which are about 700 psi. When the accumulators are injecting rapidly, the core makeup tanks actually slow down and stop for a while, while the accumulators are injecting. Once the accumulator empties, that flow from the accumulator goes away, the core makeup tanks continue injecting. A very low level in the core makeup tank actuates Stage 4, which comes directly off the hot legs, and goes directly into the containment. Those are squib valves, and they provide a very effective depressurization of the reactor coolant system down to nearly atmospheric pressure, which then allows water from the IWRST to inject by gravity into the reactor. Ultimately, that tank will drain down anywhere between four to five - excuse me - two to four hours, and then on a lower level, we initiate a recirculation. This is also done by gravity. It's a little hard to see in this picture, but the water level in the containment is sufficient to drive water through screens by gravity into the reactor coolant system.

MEMBER ARMIJO: Where does all that water wind up, all the water that's coming out of the LOCA, and location, does that wind up around the vessel?

MR. SCHULZ: It's all open, including

under the vessel, in the compartments. We've put a lot of concrete in the basement of this plant to engineer and design the flood-up levels, so that we get the desired level, which is around the reactor vessel flange. In a LOCA, the levels will go up that high.

MEMBER ARMIJO: Okay.

MR. SCHULZ: And that's what drives the recirculation. This was something that was tested extensively at Oregon State University testing, which was another integral facility, which had all the high pressure features, but also had models for the containment, and the flood-up so that we could actually experimentally show that the recirculation part of it works.

Maybe to save time, I won't talk very much about this event. This is a limiting small break LOCA, break of one of the injection lines, so the injection supplied by the core makeup tank, the top right-hand figure there, is from one core makeup tank. The other one is spilling. You see the sort of gap in flow. That's when the accumulator is injecting, so we don't have a gap in reactor injection, it's that the accumulator, the core makeup tank slows down and stops for a period of time while the accumulator is injecting very rapidly. Key feature, the bottom left-hand curve, which shows that the core stays covered through this eight inch break DVI LOCA.

MEMBER ARMIJO: What are all those little spikes going down? What's happening there?

MR. SCHULZ: You tend to see oscillations. You also seem them in the IRWST injection, and it has to do with, the system basically is almost providing too much water, so we're tending to fill up the hot legs, and when we fill up the hot legs, it tends to retard steam venting, and the pressure goes up a little bit, and the flow does down a little bit, but there's no threat to core cooling, because we're tending to overfill the system. So that's what's going on there.

Again, we've had lots of discussions with your predecessors.

MEMBER ARMIJO: I understand. I'm just trying to understand what's going on there. Does that little dotted line mean something, that's a level you can't get below?

MR. WINTERS: That's the top of the core.

MR. SCHULZ: That's the top of the core.

MEMBER ARMIJO: Got it.

MR. SCHULZ: And none of this changes for

Rev. 16. The changes we made didn't impact this.

I'd like to talk now about passive containment cooling. As Jim mentioned, we have a steel shell containment pressure vessel. We use that pressure vessel as basically a heat exchanger in an accident, and in order to maximize the effectiveness of that removal mechanism, we pour water on the outside of the containment shell. We control the distribution of that so that we get a relatively uniform spread out of water. We have a tank that's elevated and supported by the concrete structure. That tank will run for 72 hours. We have a set of standpipes that control the flow rate roughly to minimize the total volume of the tank. The water is initiated by actually three 100 percent valves, two of them are fail-open air-operated valves, and one of them is a motor-operated valve. The third path was added for PRA reasons. It's not needed for design-basis, but it is fully safety-related 1E power supplies.

MEMBER CORRADINI: I'm sorry. Say that again. I'm sorry. Could you repeat that?

MR. SCHULZ: The water draining from the -- the initiation of the water draining onto the containment is actuated by three normally closed valves. If any one of them opens, that provides sufficient flow. Two of them are normally closed, fail-open air-operated valves, just like what we do in core makeup tanks, and the passive OHR. The third path is diverse, it's different, intentionally, because of PRA common mode failure considerations. It's a motor-operated valve. Again, normally closed. All three paths are safety-related 1E actuated by the protection system.

MEMBER CORRADINI: And so the MOV is run off of DC power.

MR. SCHULZ: That's right.

MEMBER CORRADINI: So I don't remember, but just a bounding. If there's no water drainage, do you have a problem relative to back pressure in containment?

MR. SCHULZ: Well, from a LOCA performance point of view, things work better at higher pressure, so that's not an issue. The issue of concern is the containment pressure versus the design pressure. That, obviously, is a beyond design-basis consideration, and we do look at that in the PRA.

MEMBER CORRADINI: Okay.

MR. SCHULZ: So we've got analysis on air-only cooling, and we basically show that we can go at least 30 hours with no air-cooling from the very beginning, without exceeding -

MR. WINTERS: No water.

MR. SCHULZ: Sorry, with no water, air-only cooling, and not exceed the failure pressure, or actually emergency stress limit in the containment.

MEMBER CORRADINI: Okay. Thank you.

MEMBER ABDEL-KHALIK: Now does all the water that you spray on top flashes out?

MR. SCHULZ: It evaporates, it doesn't boil. Okay? And this is -- again, we did a lot of testing to show that. The initial water flow is rather high, much higher than decay heat, and we do that -- this is showing the operation here, while I answer your question, try to answer your question. That initial water flow is very high to do two things, to spray a water film over the dome and sides rather quickly to establish cooling quickly. It also minimizes the chance of water evaporating before it gets around the containment. It also exceeds decay heat significantly, such that the containment pressure will come down in about five hours to less than half design. Okay? So it's pretty effective in knocking the peak pressure down.

Depending on how severe the accident

really is, we might have some water that doesn't get evaporated, and we have drains, redundant drains located around the operating deck, and that will drain off the water, if we do get some water down there.

MEMBER ABDEL-KHALIK: So it never really impacts the air flow, the natural circulation air flow around the containment.

MR. SCHULZ: Right. It would never impede that air flow. That certainly is a consideration.

MEMBER ARMIJO: Well, you don't want to get too much water coming in, more than what you want, that what you can evaporate.

MR. SCHULZ: It's not a safety issue, it's more of if we put more water than we need, we're kind of wasting water, and we're not effectively using the water that we've built this expensive tank on top for. Okay? So that's why we use the standpipes to roughly control the flow rate. All four standpipes are covered, the flow rate is rather high. When we start uncovering standpipes, obviously, water stops going in that standpipe, and the flow slows down.

Again, this is a picture of the containment. This is actually not the latest, latest version of it, but it at least shows you the general style. The air inlets are around the top of the cylinder, all the way around, 180 degrees, 360 degrees, and that was based on wind tunnel testing, that insight that it should be high, not low, and that avoids wind effects causing or impeding air flow through the cooling. In the center of the containment above is an exhaust, cylindrical exhaust that goes up through the water storage tank.

MEMBER CORRADINI: So how much did the containment have to grow in free volume, and how much did the axial height have to increase to go from 2,000 megawatts to 3411?

MR. SCHULZ: Well, we did a couple of things that were important there. One of them was to increase the volume, and I think it's about a 25 percent increase in volume. We had like a 73 percent increase in power, so that -- now the volume of the reactor coolant system didn't go up 73 percent. Okay? So there's a mass energy kind of trade-off there. We also increased the design pressure of the containment, so it's a higher design pressure by changing material, and making material slightly thicker.

MEMBER CORRADINI: So it's higher by?

MR. WINTERS: Twenty-five feet.

MEMBER CORRADINI: Twenty-five feet. Okay.

MR. WINTERS: About.

MEMBER CORRADINI: Okay. And then how -- I asked about the water. Where is the air inlet, air intakes and discharges for the natural -

MR. SCHULZ: The air inlets are 360 degrees around that elevation.

MEMBER CORRADINI: Oh, 360 degrees. Okay.

MR. SCHULZ: The air comes in, goes down outside of a baffle, and at the operating deck, or about there, the annulus is sealed, all the containment penetrations are down below, so the electrical, mechanical penetrations are not open to the atmosphere. The air turns and goes up in a narrow gap next to the containment, and then exhausts out through the center in the containment here.

MEMBER CORRADINI: The gap, the internal gap is about a foot?

MR. SCHULZ: On this side, I think it's a little less. Is it?

MR. WINTERS: It's about a foot.

MR. SCHULZ: The total -

MEMBER CORRADINI: It's 360 with grading?

MR. SCHULZ: On the inlets?

MEMBER CORRADINI: To stop birds, and -

MR. SCHULZ: These exteriors are also

grading. This is a concrete radiation sky shine shield here, so there's no direct site from the containment out into the atmosphere.

MEMBER CORRADINI: Okay. Thank you.

MR. CUMMINS: Now one of the changes we did make was the air inlets were changed from big holes to little holes, so that we could -

MR. WINTERS: Make them external hazards.

MR. CUMMINS: External hazards.

MEMBER ABDEL-KHALIK: So the weight of this big over structure is still transmitted to the cylindrical part of the concrete.

MR. WINTERS: The concrete structure holds up the tank. Right. There's no structural connection from the standing, freestanding steel pressure vessel containment to the concrete, except at the very bottom.

MEMBER ABDEL-KHALIK: Okay.

MR. CUMMINS: It's embedded in concrete at the bottom.

MR. WINTERS: The concrete building is completely structurally separate from the containment vessel, except at the bottom.

MR. SCHULZ: This basically shows that the passive system is very effective at reducing the pressure. It also makes the point that steam line break, which actually has the highest pressure is not really impacted by passive containment cooling. It's impacted primarily by the initial volume, and to some extent some passive heat sinks. But by the time passive containment cooling really comes into play, the peak pressure is already passed.

This summarizes some key margins, typical plant versus AP1000. Basically, the point here is that passive systems are very effective, as we've implemented them, and providing improved margins in the design. Again, we could spend days going into all the different events that make up that.

One point I did want to make is that one of the COL items was the long-term cooling containment debris issue. There were a lot of inherent characteristics and design features of AP1000 that provide a more robust and design is less likely to have an issue here. However, we are still discussing that with the staff.

One of the changes we did make in Rev. 16 is to significantly increase the screen area. Our recirc screens had a total area of about 280 square feet in Rev. 15 of the DCD. Now that may sound puny, but we don't have safety pumps, we don't have containment spray pumps, so all the velocities in that small screens were still very low. They're drastically lower than that now, because we've gone up to like 5,000 square feet, so we've really, we think, as far as screen area, done even more than what current plants are doing. Again, we have much lower flow rates in this plant than a typical plant, because we don't have the pumps that are designed for early-on removal of decay heat, plus containment spray, so they end up with much, much higher flow rates than we have.

Another feature that's very unique to AP1000 is severe accident, and, in particular, the capability of retaining a molten core, damaged core inside the reactor vessel. This animation kind of shows you the progress of that event. And, again, it's a beyond design basis, somehow we failed to cool the core, and you end up with the core overheating, melting, and relocating into the lower head of the reactor vessel. Initially, the water that leaves the reactor coolant system pours down under the reactor vessel. Then we eventually, either by accident injection or by manual operator action, dump the refueling water storage tank into the containment, and the containment floods up to about the reactor vessel flange.

A key feature of this is the reactor vessel insulation design, which is intentionally designed to both provide effective insulation during power operation, and to provide inlets at the bottom, engineering inlets, and steam vent outlets about this elevation to support a natural circulation cooling of the outside of the reactor vessel.

In Rev. 16 of the DCD, we resolved a COL item which required us to show that we had analyzed the insulation to the loads that we get during this event. We've done testing. The testing allowed us to define the structural loads we would get on insulation during this event, and we've developed the insulation design to the point where we actually were able to do that stress analysis. Along the way, we also made some changes to the detailed inlet and outlet vents, so there was kind of a combination of COL stress analysis resolution, plus design finalization, detail change to the insulation design.

MEMBER CORRADINI: So what's the gap between insulation and the vessel, a few inches?

MR. SCHULZ: It's like six inches around the cylinder. It varies around the head, generally increasing as you go down toward the bottom of the head. And, again, this was all as a result of testing that we did to provide the desired flow rates, and velocities, and heat removal from the lower head of the vessel.

MEMBER SHACK: As I recall, if your in-vessel retention doesn't work, you mentioned the utilities requirement document. You don't meet the spreading requirements of the utility requirements document, do you?

MR. CUMMINS: I think we met it for AP600, but we didn't increase it for AP1000.

MR. SCHULZ: Now I think that the general consensus is that that spreading requirement is not going to do a lot for you, because there are rather different ways that the vessel head can fail, and debris come out. And if it happens to spread out, then that spreading requirement will do something for you, but it won't necessarily do that. It might come out in a pile in one side of the room, in which case the spreading requirement doesn't help you a whole lot.

In our PRA, if the reactor vessel in-vessel retention doesn't work, we assume that we'll get a containment failure, where we might not in all cases, but we do assume that. We have shown that we don't get a -

MEMBER CORRADINI: That's an assumption in your PRA, that if you take that branch point, you're going to assume instantaneous or late containment failure?

MR. SCHULZ: Late.

MEMBER CORRADINI: Okay.

MR. SCHULZ: Now we actually don't from a probability point of view differentiate between late and early, though. We just have large release frequency, we don't have large early, or large late.

MEMBER CORRADINI: Okay.

MR. SCHULZ: So every containment failure is really treated as an early fail, even though it really isn't. We did show that when the vessel head fails, that we won't get a steam explosion, for example, that would fail the containment.

MEMBER MAYNARD: I didn't see any containment spray, or any of that, so are there any chemicals in there? Do you use any sort sodium hydroxide, trisodium phosphates?

MR. SCHULZ: We do use trisodium phosphate. We store it in baskets, so when the containment floods up and we get, of course, a large level change, so it's not so hard to find a location that wouldn't normally get flooded with little spills, but would get flooded in an accident. And that's how we get the TSP into the water solution, is through flood-up and dissolving of the TSP.

MEMBER CORRADINI: So the reason you have that is why?

MR. SCHULZ: To retain Iodine in the water, and to avoid stress corrosion cracking on the stainless steel.

MEMBER CORRADINI: To avoid stress corrosion cracking, stainless steel, during what?

MR. SCHULZ: In a post-accident situation, if you could get some chlorides into the water from concrete.

MEMBER CORRADINI: Let me reverse the question. If it weren't there, what would change in the PRA for source term release?

MR. SCHULZ: Well, it wouldn't be just the PRA, but the design-basis off-site dose analysis makes certain assumptions about Iodine getting trapped in the water, and if you don't have the correct pH, then the Iodine won't stay in the water, or a certain percentage might get into the atmosphere, and -

MEMBER CORRADINI: Based on analysis assumptions.

MR. SCHULZ: Yes.

MEMBER CORRADINI: Okay. Thank you.

MR. SCHULZ: Okay. We're now at 9:40.

MEMBER ARMIJO: Moving right along.

CHAIR BONACA: Why don't we take a break now. We need to take a break, and get together again at let's say 10:30.

(Whereupon, the proceedings went off the record at 10:13 p.m., and went back on the record at 10:31 p.m.)

CHAIR BONACA: Okay, we are back into session. Just to assure that we do not lose this afternoon's presentations. They're important to us and I know that some of the presenters have flights out, so we cannot delay the meeting.

I would like to have Westinghouse complete its presentation by 11:20, 11:25, I believe. You should be able to because I understand that the proposed revision to AP1000 certified design already has been covered.

MS. STERDIS: Right, between what I presented first thing as well as the discussion of some of the changes that Terry and Jim have in their presentation, that's covered.

CHAIR BONACA: So you should be able to do it without shortchanging the presentation. But at least if you can set that as a goal as you go through. So with that, I'll turn it over to Mr. Schulz again.

MR. SCHULZ: I'm now going to talk about nonsafety features, active features. I've already mentioned that these are typically integral operation. They minimize challenges to the passive systems. I'm not required to mitigate design basis events. Typically, these feature are simplified versions of safety features that you have in the current plants.

And I'll show you some examples of that. Also, typically, the equipment is not designed to ASME, not Seismic 1 design. It has not the full separation of prior flood type protection. The buildings they're located in, some of this equipment is located in the turbine building. Some of it's outside buildings that are not seismic, not safety. And that's consistent with their design intent.

A couple of examples is start-up feedwater.

CHAIR BONACA: What kind of reliabilities do you expect of this system?

MR. SCHULZ: Well, we calculate it in the PRA based on their failure vulnerabilities. We include a little bit extra maintenance on availability. We don't necessarily make the reliability per demand less. And then we basically calculate it based on how many components we have, common mode failures, actuation reliabilities and things like that. So it does come out to be somewhat less reliable than an active system, an active safety system, but typically because there's less components, less separation and for what I would call real reasons, we don't artificially just reduce the reliability.

CHAIR BONACA: Okay.

MR. SCHULZ: Here you see an example of the sort of feedwater system as two motor-driven, electric motor-driven pumps, typical PWR would have a third pump at least, a turbine-driven pump so it would have diversity and more redundancy. One of the features of this system is that it is automatic flow control. So as the system gets turned on, it doesn't tend to excessively feed the steam generators. So this is a very nice operational feature that is not available typically in the current plants where you don't have automatic throttling because it's a safety feature.

Again, both pumps are powered each by a diesel, so if you lose off-site power the system is available. If the system works properly, then the passive RHR is not actuated, at least in loss of feedwater, loss of off-site power events.

If you actually have a pipe break, feedline break and spill half of the flow from the system, then it would not be sufficient to provide core cooling and passive RHR would be actuated. That's an example.

Another example is the shutdown cooling system which we call the normal RHR system. It's a two-pump system which again is very much like most operating plants. One difference is is that it's got a common suction and discharge line going through the containment. And again, because we don't really need physical separation, file separation, that's an acceptable design.

We have a lot of enhancements in this to improve shutdown cooling though. It's a higher design pressure system, 900 psi, so it won't rupture. It's exposed to full reactor cooling system operating pressure. We have additional isolation valves, typically at least three. Most of the operating plants have two. So in terms of inner system LOCA PRA, this system improves the situation relative to the operating plants.

MEMBER CORRADINI: You said a couple of

things I want to make sure I understand. So this is for all intent and purpose, this is what one would see within the aux building in a current PWR.

MR. SCHULZ: Yes.

MEMBER CORRADINI: Okay.

MR. SCHULZ: The location of the pumps and heat exchangers are, in this case, even though it's not a safety system, the piping system, I'll point out in this case is fully ASME seismic. We did that because to avoid issues with if you're running this system, during a shutdown condition and you did have a seismic event, you wouldn't break the piping and then potentially have a challenge to losing too with outside containment. But it's not one emoter. The power supply is not one. But in terms of location, yes. Same general location.

MEMBER MAYNARD: But the piping heat exchangers are all designed for system pressure?

MR. SCHULZ: They're designed for 900 psi.

MEMBER MAYNARD: Oh, okay.

MR. SCHULZ: Which is higher than a typical Westinghouse plant and that's sufficient so that if you expose it to 2200 psi or something, it will rupture. It will probably bend the store. You'll get things like that happening, but you won't get gross failure of the pressure boundary.

MEMBER SIEBER: I think it's important, the ASME code --

MR. SCHULZ: Pardon me?

MEMBER SIEBER: Does it meet the normal service typing requirement of the ASME code?

MR. SCHULZ: Correct.

MEMBER SIEBER: At 900 it does, but at full reactor pressure, it doesn't.

MR. SCHULZ: That's right.

MEMBER SIEBER: So you're riding on the margin there.

MR. SCHULZ: Yes. But again, it's a PRA kind of consideration. We think that's appropriate.

MEMBER SIEBER: The factor of safety is three. That gets you up 2000 pounds.

MR. SCHULZ: The spent fuel cooling system is similar to the shutdown cooling system. Two pumps have two heat exchangers. Normally used to cool the spent fuel pit and spent fuel. But it's not the safety feature. The safety feature is blow it off of the water that's additionally in the pool and in adjacent pools that can be open to the spent fuel pit.

We also have makeup from the passive containment cooling water supply. So a limiting condition for spent fuel cooling is if you offload the whole core and you have all of that decay heat in the spent fuel pit, then we can actually devote all the water in the constant containment cooling water storage tank to the pit and we do have tech specs on when you can use and should use that water for either service.

MEMBER SIEBER: That's an operator manual action?

MR. SCHULZ: The long-term makeup, yes. You don't need that.

MEMBER SIEBER: It's a switchover.

MR. SCHULZ: You don't need that for quite a long time. And in fact, there's a table in the DCD that is shown here and I won't go into all the scenarios that we look at. All these scenearios are based on assuming a seismic event initially which breaks off the spent fuel pit suction line which drains a few feet of water off of the spent fuel pit, so that we lose some water as a result of that. If we didn't have the seismic event, we'd start from a normal water level.

And then this talks about time to saturation, what the water level is at 72 hours and 7 days.

MEMBER ARMIJO: Is that containment cooling water borated?

MR. SCHULZ: No.

MEMBER ARMIJO: So if it goes into the storage pit, it's increasing reactivity.

MR. SCHULZ: It's not a problem because what you're making up for is boil off.

MR. WINTERS: The boron is already there.

MR. CUMMINS: The boil, the boron mostly stays in the water.

MEMBER ABDEL-KHALIK: Unless you're adding the water at a faster rate than you're boiling off.

MR. SCHULZ: That's right. And in one of their requirements here is for the operators to control that so that it doesn't grossly overflow.

Now in Rev. 16 of the DCD, we increased the number of fuel assemblies that we can store in the pit. Again, as Jim mentioned, this was a utility desire and the utilities all agreed that they wanted more storage so we worked out a change and implemented that in Rev. 16. Now that didn't affect decay heat level very much because that's basically old fuel. A little bit, but not very much.

Another thing that we did which is a security-type situation is look at a scenario where somehow you drain the spent fuel pit. And then how do you cool the fuel? And what we provided is a spray capability and this is not really discussed in the DCD, but some of the interconnections are shown. We basically have two separate spray headers, one along each -- of two walls of the spent fuel pit. They're independently supplied from -- one from the passive containment cooling, the red lines. And the green lines on the upper side of the pit are water supply comes from the fire protection system pumps.

So there's two independent ways of spraying water in the spent fuel pit. In case there's no water in there at all, you can keep the fuel so that it doesn't ignite.

The next two slides talk about levels of defense and we've talked briefly about how the active features provide first level in most scenarios. The passive features provide a second level. They're the safety level. But in this plant we've got more levels than that typically, and these extra levels are typically used in beyond design basis PRA kind of scenearios. One example is passive feed and bleed kind of pooling, backs up the passive RHR. So in a PRA scenario, you assume that or calculate that the start up feedwater fails, the passive RHR fails, now what happens? Well, what happens is you can feed and bleed using ADS valves, using core makeup tanks, and there's several mixtures of features you can use for the feed and bleed cooling.

And one way of looking at that is in a picture, is for say a loss of off-site power, look at the first level of defense is the startup feedwater, it's automatic. You're on safety. The second level of defense is, in fact, our safety case that's shown in the DCD, passive RHR. And the passive containment cooling has to work with it to ultimately get the heat out of the containment.

Then there's several modes of feed and bleed cooling. One of them using ADS stages one, two, and three, and the normal RHR as an injection pump. Another one is strictly passive, using core makeup tanks and ADS stage four and the final one is sort of a backup to what happens if core makeup tanks work and we've shown that accumulators without core makeup tanks are sufficient to support a feed and bleed cooling type scenario.

One of the insights from this is or the significance is that if you look at our core melt frequencies they're very low and this is really what's driving that. A lot of redundancy and diversity in the mechanical systems. In terms of nonsafety features, with something that was systematically looked at, the process in policy was set up in AP600 days and the same approach applied to AP1000. It involved use of PRA and deterministic thinking. Ultimately, the main outcome of this was to develop some availability investment protection type controls which are defined in the DCD in Chapter 16-3. They are not tech specs, so that they kind of look a bit like tech specs. They don't require the plant to shut down, but they do require the plant to try to keep these investment protection active defense-in-depth systems operable.

A brief summary of core melt frequencies, the main thrust of this, again, it was in support of how important are nonsafety features. And this second column, you see the base AP1000, both core melt and large release frequency with all the systems and then without nonsafety features, and of course, the numbers get somewhat larger. And then you see that compared against the NRC safety goal and basically you can see that without the nonsafety mitigation capabilities, we still meet the NRC safety goals.

MEMBER STETKAR: Have you looked at how that might change if you considered a full risk assessment with fires, seismic, a seismic risk assessment, not a seismic margins. A fire analysis, flooding, all of the other --

MR. SCHULZ: We have flooding. We have shutdown. We have a conservative fire model in here. So we think we've bound --

MEMBER STETKAR: What does internal events mean then? As opposed to --

MR. SCHULZ: This actually isn't the whole story.

MEMBER STETKAR: It's okay.

MR. SCHULZ: We haven't quantified seismic, so I don't know the answer to that.

MEMBER STETKAR: That's fine.

MS. STERDIS: Okay, next slide.

CHAIR BONACA: What is quantified seismic? Are you going to do that?

MR. CUMMINS: No, it's one of the allowable seismic margins and the basic is a subset, .5 g for failures or for cliffs.

MS. STERDIS: I am going to talk briefly about the I & C and the human factors. Both of those areas, as I indicated earlier are areas where we had design ITAAC based on technology, evolving technology. But we did certify aspects of the I&C and the HFE programs and processes and design in the design certification that was completed in 2005. Specifically, it includes things like the functional requirements for the I&C, what the reactor trip functions are, what the safety feature functions are, the emergency safety feature actuation, post-accident monitoring, our minimum inventory dedicated inventory of controls and alarms and displays was part of the certification.

We also certified the design process, what kind of process were we going to use for both the development of the I&C when we selected a platform technology for PMS, when we selected a platform technology for the DAS system.

Same thing in the human factors area. We selected, we certified a process and we're in the implementation of those processes now. Basically, we're going through and we're systematically developing the designs consistent with the process that was certified and basically closing out each of those design ITAACs, that's the goal.

I'm going to talk a little bit about what the I&C systems look like.

Next slide, please.

Ultimately, there are three major levels of I&C in this plant. There's the control system which is the plant-wide, non-1E system for all normal displays and controls. It's an integrated system. It is microprocessor and software based. It is Ovation-driven. And we have extensive experience, both domestically and internationally using the Ovation platform.

The safety system, what we call the PMS, is a plant-wide 1E system that covers all safety-related displays and controls and the automatic actuation functions. We've selected our Common Q platform to implement that system on and we're going forward with that system. That system has been implemented in the U.S., Palo Verde's core protection calculators, Vogtle's diesel sequencer are implemented in that platform.

In addition, my previous life was engineering manager on the ringals upgrade and that upgrade will be installed in 2009 in the Ringals plant and it includes the entire safety system on the Common Q platform.

The diverse system, we're in the process of choosing the diverse system platform. We're going to come in with the tech report on what the platform is. Again, that contributes to the closure of the

DAC, the design ITAAC. This is a very limited scope, non-1E system. It's there to provide the mechanism to address software common mode failures in the protection system. It meets -- our selection of the platform is just the next step. We've already certified the diversity of defense-in-depth. We have an FSER that concludes that our design of the diverse actuation system, as well as our design of the PMS was sufficient at design certification to say that we meet BTP-19.

CHAIR BONACA: Safety systems, is it simply an actuation system or is also a control?

MS. STERDIS: It is not a control system. It is a safety system. There are manual controls and there are indications as well, and displays.

CHAIR BONACA: So again, it is an actuation system.

MS. STERDIS: An actuation system.

MEMBER SIEBER: Is your protection system separate from your control system?

MS. STERDIS: Yes.

MEMBER SIEBER: Separate platform, separate wiring?

MS. STERDIS: Yes.

MEMBER SIEBER: Separate transducers?

MS. STERDIS: Yes. I'm sorry, shared sensors between the control system. I'm sorry, you're right. Shared sensors between the control systems and the protection systems. We do have separate -- yes.

MR. SCHULZ: DAS is completely separate.

CHAIR BONACA: And the platforms are different?

MS. STERDIS: Yes. Three different platforms.

MEMBER CORRADINI: Just one more time, you guys know this stuff better than I do. Between the control system and the safety -- same sensors, after that, a different path.

MS. STERDIS: Yes.

MEMBER CORRADINI: Okay, and then you said with the diverse system, a different set of sensors as well? Did I hear that right/

MS. STERDIS: Yes.

MEMBER SIEBER: Very limited in scope.

MS. STERDIS: Very limited in scope.

MEMBER SIEBER: So that's how you get 3-D.

MS. STERDIS: This slide I'm going to skip in the interest of time, but it does give you an idea of systems that we have. The architecture drawing is the drawing that would show you this is a different system in the interfaces to the plant, the sensors and the components.

Next slide, please.

We do have a compact control room design on this plant. It is designed for one reactor operator and one supervisor. There will be a series of displays, both non-1E and class 1-E. The plant status and overview wall panel is a non-1E system. It's driven from the Ovation system. The detailed display via the work station video displays which are located on the operators' work stations, those are also non-1E, also driven from Ovation.

The small number, we have a very small number of dedicated displays. I alluded to those. They're referred to often in the advanced plant world as the minimum inventory. Those displays are -- they are Class 1E displays and controls on those. There are also the diverse non-1E. We do continue to meet IEEE 603 separation and independence requirements throughout our I&C design.

Our communications philosophy and our implementation of the communications philosophy, as well as our architecture drawings, all support and justify those basic premises of independence between the different safety divisions, as well as separation between nonsafety and safety.

We have recently, within the last -- actually, it's not that recently. Last December and January, we submitted two technical reports to address how our design implementation continues to meet those fundamental IEEE 603 requirements.

MEMBER SIEBER: When you apply design principles to the control room design human factors, can an operator tell whether he's in a control system, a safety system, or diverse system just by the instrumentation and the layouts, switch colors, whatever?

MS. STERDIS: Part of that, the answer is yes, to where we are in the design of the main control room and it will continue to be yes, but that's worked out as you go through. Remember, the human factors program is a feedback loop. We've done some preliminary. We've done two sets of engineering tests. Our NuStart folks have donated operators that have been involved in that sort of cycling through and that will continue as we progress through, but that is a basic premise.

MEMBER SIEBER: And control rooms for all plants will be standardized?

MS. STERDIS: Absolutely, all the way down to the operating procedures, alarm response guidelines, all of the things that you're used to being implemented individually, based on a high level of principles are no longer independent. They are standard. EOPs have been written for this plant.

MEMBER SIEBER: And the existing plant, that's where the owner always wanted to add his personal imprint.

MS. STERDIS: We're doing that up front.

MEMBER SIEBER: It's going to be a difficult challenge.

MS. STERDIS: We're getting that imprint up front by the integration of the engineering team and the builders' group that was referred to a little earlier. That's happening now.

MEMBER SIEBER: Thank you.

MR. CUMMINS: To be fully clear, however, some of the site-related systems like groundwater, they'll be different. So the screens will look different.

MEMBER SIEBER: Because the plant is different too.

MR. CUMMINS: Right, but that's way -- that's three screens out of 40,000 or something.

MEMBER SIEBER: It's probably at the end

of the control board anyway.

MR. CUMMINS: This is all on a computer screen.

MEMBER STETKAR: Do you have an emergency control room on this? Auxiliary or whatever you want to call it?

MS. STERDIS: We have a remote shutdown work station, yes.

MEMBER STETKAR: Are the -- does that handle only safety functions or also nonsafety?

MS. STERDIS: The work station that would be available there would have everything on it.

MR. WINTERS: It's redundant --

MEMBER SIEBER: It's harder to restress a plant.

MR. CUMMINS: It can do everything.

MEMBER STETKAR: Do the -- this is a lot of detail, so a single scope from the main control room to the remote shutdown to the actuated or are they in parallel?

MR. WINTERS: The logic cabinets, the main control room talks to logic cabinets. Remote shutdown talks to logic cabinets. Logic cabinets talk to the plant.

MS. STERDIS: Similarly, for the controls, there's a similar configuration. There are non-1E controls for normal operation and then there are safety-related controls and non-safety diverse actuation controls.

Again, the number of safety-related components to be actuated is small, so this number is very small. We are using our advanced alarm management techniques that have evolved and we have used those on other projects around the world and lastly, there is a computerized procedure system here that's being implemented. It's been described as part of the original design certification.

Next slide, please.

This is just a little schematic that I put in that shows -- I will point out to you that this is an old drawing. Our friends at the utilities have come in and we've redesigned the layout to incorporate some integrated operating experience from the training programs that they've had, the events they've had, and we're currently in the process of regenerating this cartoon-like figure, but our actual drawings for the layout of the revised control room are already available.

The reason why this is not really a change to the DCD is that was not really part of the certified design. It's part of the evolution of the human factors engineering program and the control room design and it will be part of the closure or the resolution of the design ITAAC.

MEMBER MAYNARD: On the previous slide, you said it's designed for one operator, one supervisor. Is that the expected normal complement or is that going to be the license requirement or I'm a little confused on --

MS. STERDIS: Definitely a license requirement.

MR. CUMMINS: There are in regulations some minimum operator which we did not challenge. And our customers don't seem to want to challenge. So when we say that we have one operator who can operate the plant, but we're going to have as many operators as the current regulations require. So it's more than one.

MS. STERDIS: This is a COL information item too, and it is being addressed in the COL application. It's in chapter 18.

MEMBER SIEBER: Do you have -- maybe you can tell me about how many local control stations outside the control room you have.

MR. WINTERS: Some of the package units

like compressed air or the diesel generator have some local stuff.

MEMBER SIEBER: But nothing that actually controls the plant proper. It's all offshoot system.

MS. STERDIS: Integrated system. Okay, that's it.

MR. WINTERS: The next four topics, three of them are ones that were in John -- Dave's request to us for topics. And the fourth we put in so that we can make sure we talk to you about the differences between Rev. 15 and Rev. 16.

On the first one here which is structures, we're talking about the building itself and recognize that the only seismic building is this auxiliary building containment type building.

MEMBER SIEBER: Containment of seismic.

MR. WINTERS: Right, it's within the shield building.

MEMBER ABDEL-KHALIK: Just roughly, what is the footprint of that footprint area?

MR. WINTERS: About 250 by 175.

MR. SCHULZ: But it is not really fully rectangular.

MR. WINTERS: It's not rectangular. It's got the hump on it. But it's about that.

And this is to reinforce that. But the current design certification --

MEMBER CORRADINI: So it is just one acre.

MR. WINTERS: Okay.

MEMBER CORRADINI: Forty-three thousand square feet.

MR. WINTERS: It's small.

MEMBER CORRADINI: It's small.

MR. WINTERS: Yes. The Rev. 15, current design is consistent with rock site only. What we've done is -- Rev. 16 is now consistent with the integrated seismic input as I've described earlier which includes soil sites in the Eastern United States.

As a result, what we wanted to do is change the input without changing the structure itself because we had a lot of design work into the building structure. Changes we've made or we found out that the pressurizer, although was okay for seismic, there are valves and the ADS valves sit on top of it and the tall, skinny pressurizers swung those around that they had high g forces that even though we thought we could pass, the valve vendors didn't want to test them for those. So Rev. 16 has a shorter, squatter pressurizer over the same volume with the same relative limits on instrumentation and trip points and everything else. Actually, it ends up better for our control purposes, but it's different from Rev. 15 to Rev. 16, so that we could get qualified valves.

MEMBER ABDEL-KHALIK: And those valves are also qualified for liquid discharge, is that correct?

MR. SCHULZ: The valves that Jim is talking about are motor-operated valves, not the safeties. They're the EDS valves, not the safeties. They're the EDS valves, not the power-uprated relief valves. They are designed to open and operate under steam, two-phase type conditions that we see during EDS operations.

I don't think we predict to actually have during an ADS which is a LOCA-type scenario, not an over-pressure scenario. We don't predict to get water to those valves.

MR. CUMMINS: There are also relief valves.

MR. WINTERS: We have two relief valves.

MR. CUMMINS: And they are not for water, right? I'm not quite sure of that.

MEMBER ABDEL-KHALIK: Are any of the valves on top of the pressurizer qualified for liquid release?

MR. SCHULZ: The ones that -- I don't know the answer, the spring-loaded safety valves. What we find for ATWS mitigation, which would be beyond the design basis type event.

I don't know the --

MR. CUMMINS: I believe we said in our accident analysis we never have water.

MR. SCHULZ: In design basis accidents, that's true. We don't over pressurize in any design basis accident. Sow e don't get water to those valves. In the scenario where they'd have to be qualified for --

MEMBER ABDEL-KHALIK: So you never get into a scenario where you have bleed and feed at high pressure?

MR. SCHULZ: We do, but we don't use the safety valves for that. We use the EDS valves. We don't stay at pressure. We depressurize.

In the process of depressurizing, we go through steam, two-phase mixtures, not water.

MEMBER ABDEL-KHALIK: Okay, thank you.

MEMBER SIEBER: At the risk of messing up your presentation, I'd like to go back to slide 23 and tell me on slide 23 which are the seismic pieces and what are not.

MR. WINTERS: Just the yellow one.

MEMBER SIEBER: Yellow and pink somebody said.

MR. WINTERS: Just yellow. No pink. Okay, the pressurizer change wasn't driven by this adding of soil sites. It was, as we discovered, as we went down the path that the detailed analysis accelerated those valves too much.

The seismic analysis done to expend our site base did not create any real design changes, just input changes in and out. However, we did change the shield building to reflect new external hazards concerns and we have a couple of pictures here.

This is the new shield building enhancement. This is high in the shield building where the air vents are. And the top is up here and the cylindrical part is down below. This is high.

And what we have are a number of angled events. They're usually three or four in a row, all 360 degrees around. We have a steel liner inside and outside and concrete and rebar holding the concrete together.

MEMBER CORRADINI: Enhancements are a thicker concrete wall or the steel shell on either side?

MR. WINTERS: Both. In this area. Sticker in this area. It's got the liner. The old vents were large. There were only 16 of them.

MEMBER CORRADINI: You had mentioned that.

MR. WINTERS: And they were straight through with a grate. These are not angled so that --

MEMBER CORRADINI: Sixteen inch squares.

MR. WINTERS: Right. Thank you. And these now are angled so that if any fluid like rain or external events or whatever, hits those, they tend to drain out instead of in where when we had the straight through you didn't know where it was going to go.

And there are smaller individual areas. The total area is not much smaller than it was before, but the individual areas are small.

That was the enhancement.

MEMBER CORRADINI: Thank you.

MR. WINTERS: We also enhanced the shield building roof. We changed the support beams. We made them thicker and changed where the concrete is and where the steel is to make it more impact-resistant. And we changed the shield building cylindrical surface. We didn't make it thicker, but instead of reinforced concrete, now it's a plate, concrete plant arrangement like our module designs.

So the Rev. 16 shield building looks different than the Rev. 15 and in the process of all of that, the top got lowered 5 feet, as well. So it does look different.

MEMBER SIEBER: Do you have a set of seismic characterizations like accelerations and frequencies that now become something against which you can evaluate the site?

MR. WINTERS: Yes. We had one before, but the soft salicytes wouldn't fit under the curve. So now we have one that they do.

CHAIR BONACA: Is the thicker rebar all the way down to the basement?

MR. WINTERS: No.

MR. WINTERS: If we look here, no rebar. From this elevation down to the operating deck there are no -- there's no rebar. It's just the plate with reinforcement on the inside, stiffeners, studs, concrete and then plate with stiffeners and studs on the inside.

CHAIR BONACA: So the stiffeners go all the way down to the basement?

MR. WINTERS: Right.

MR. CUMMINS: Once you get underground, the plates disappear and there's an overlap of rebar.

We transition by having the rebar come up between the plates so that you have a concrete transition.

MR. WINTERS: Also, the concrete gets much thicker and becomes bulk concrete to cradle the containment bottom and to hold all the --

CHAIR BONACA: There would be significant reinforcement.

MEMBER MAYNARD: I don't see any tendons here. You don't have any --

MR. WINTERS: No.

MEMBER ABDEL-KHALIK: The overall height is five feet shorter. Did that affect the inventory in that storage tank on top?

MR. WINTERS: No.

MEMBER ABDEL-KHALIK: Where did you gain five feet?

MR. WINTERS: Lowered the roof towards the containment. The whole tank came down.

Containment stayed the same size, so there's less free space between the bottom of the tank and the containment.

Secondary systems, there is a change. First, remember that all of our secondary systems are nonsafety-related. I don't know if you intended to include auxiliary systems like mechanical and volume control or component cooling water. Most of those are also nonsafety. So there's not a large impact, even what we did find.

However, we did change the turbine. It's reference -- now it's not referenced by name, but the values, the parameters that go in Chapter 10 of the DCD that are associated with the turbine have now changed from the Rev. 15 MHI turbine to the Rev. 16 Toshiba turbine.

Actually, the Toshiba turbine has more in-service because it has some than the MHI turbine. So anyhow, that's the one we reference. In order to reference it, of course, we had to ensure that its post-trip behavior, its overspeed trip and initiation and late attachments met all the rules that had previously been met for the Rev. 15 design certification. And they do.

MEMBER ABDEL-KHALIK: What kind of bypass capability do you have at this plant?

MR. CUMMINS: Forty percent.

MEMBER ABDEL-KHALIK: Forty percent.

MR. CUMMINS: It is combined with a reactor trip, partial reactor trip function so that you can get 100 percent both ejections. So you combine the -- you need bypass when you have a large decrease in power, so if you have 100 percent, a 10 percent decrease in power, the bypass will work and there will be a partial trip. And the plant will remain on line.

MEMBER ABDEL-KHALIK: What's a partial trip? It's a run back?

MR. CUMMINS: Yes.

MR. WINTERS: Faster amp back. For electrical systems, first of all, we only have three. We do not have 1E AC. So we only have 1E DC non, and non-1E AC. DC was not changed.

AC we fixed to incorporate requests from the power utilities, and that's to add a reserve auxiliary transformer as Andrea indicated.

What these additions do is minimize the number of reactor trips you get from a secondary side fault or something because it trips over to the other side and the electrical system keeps working and doesn't propagate back into the primary site. And so from trip reporting and availability point of view is very important to our customers to do that.

On fire protection -- 1E DC, the certified unchanged certification, we have four independent 1E DC, one for each safety train. Batteries, logic, distribution, connections to valves, and a spare battery for the 72 hours or 24 hours.

Yes, go ahead.

MEMBER STETKAR: Finish your sentence.

MR. WINTERS: And we've built those into the plant, as you'll see in the fire protection later, in such a way that they're separated from their birth by concrete walls.

And it basically -- you can lose one whole channel in the plant that's still safe. In fact, it's still operational.

MEMBER STETKAR: Now let me ask a question. I'll try to ask this in a way -- focus on one battery, that's all I have. How long will that battery last at its design load, how many hours?

MR. WINTERS: The 24-hour batteries will last at least 24 hours. We have two channels that also have 72-hour batteries on them. Last at least 72 hours.

MEMBER STETKAR: Each battery.

MR. WINTERS: Each battery.

MEMBER STETKAR: So you have two 24s and two --

MR. WINTERS: Four 24s.

MEMBER STETKAR: Four 24s and two 72s.

MR. WINTERS: Right. That may be is a

sound bite that sometimes we throw out here is that these actuations of safety-related, passive safety valve. but most you actuate during the worst accident is 20 of those, about 20. A lot of them actuate based upon the lost air, the spring does it, but some of them have DC.

In most cases, they actuate within the first 20, 25 minutes of the initiation. And once moved to its safety position it's not moved again. There's no control here. It's just resetting the valve. After they're reset, there is no control. So the fact that we have instrument power is so that the operators can watch what's happening. If it gets AC back, he can go do something, but there's no control required after that first half hour.

And then there's no control at all. It's really just resetting the valves.

MEMBER STETKAR: So this -- yes, what's the non-1E battery life? The nonsafety, whatever.

MR. CUMMINS: Four sets. One is sort of a motor set for lube oil. That is three or four, I'll it instrumentation and control, the nonsafety instrumentation and control. And they also power some things. So there are basically three batteries. They also have the ability to tie to the spare battery.

MEMBER STETKAR: What's their design life?

MR. CUMMINS: Their design life is at full load, two hours.

MEMBER STETKAR: Thanks.

MEMBER SIEBER: Things like emergency lights and security and all that, that stuff is on their own batteries?

MR. WINTERS: They're on their own batteries.

So the last one is fire protection and I guess people had questions. There have been no changes from the certified design to the new certified design. We incorporated division separation was designed in. We don't count on wrapping or that kind of thing. They're separated by fire walls outside containment. There were separate fire zones. And their separation inside containment, two channels run in one direction under the operating deck and the other two channels run in a totally different direction way far away and they come back together at the unit, at the components, of course, inside containments that there's been separation designed in throughout.

And we've also done a couple little changes of where equipment is placed and in particular the diverse actuation system actuate an equipment so that we can have adequate protection from externally induced fires that's the B, Bravo five Bravo, large fire and explosion thing. So that we can get into passive safety from opposite ends of the aux building independently. And we believe we satisfy the B5B approach.

MEMBER STETKAR: You mentioned earlier you had a fully passive fire protection capability.

MR. WINTERS: For the seismic.

MEMBER STETKAR: For the yellow buildings.

MR. WINTERS: Right. What that is is --

MEMBER STETKAR: It's a tank.

MR. WINTERS: No, it's dedicated 18,000 gallons of that passive containment cooling tank. It's got it's on standpipe. That gives us enough height to have flow head to satisfy the requirement of two hose streams at 75 gpm for three hours anywhere in the aux building.

MR. CUMMINS: So the top few inches of the tank are dedicated --

MR. WINTERS: To fire protection. That fire protection.

CHAIR BONACA: Okay, so questions.

MR. CUMMINS: Questions.

CHAIR BONACA: We are going to have a brief presentation of part 52, right. And we'd like to hear that.

(Pause.)

CHAIR BONACA: Thank you for your presentation, by the way. I wish we had had more time.

MS. STERDIS: We'll be back.

MR. WILSON: Mr. Chairman, my name is Jerry Wilson. I am a member of the Working Group that recently updated the licensing processes in part 52. I also worked on the original part 52. I'm prepared this morning to talk about how the Commission has revised the amendment process for existing design certifications in order to facilitate the types of amendment that Westinghouse has requested. But in the interest of time, I'm prepared and pleased to just answer questions, any questions the Committee may have on the amendment process. So whichever you'd prefer.

CHAIR BONACA: I mean, you do have one slide.

(Laughter.)

MR. WILSON: All right, let me just start that in the original design certification, the Commission's focus was on finality and the benefits of standardization. And so they created a special backfit requirement for certified designs. It looks like I just got a time out.

(Pause.)

I think everyone has a handout. And so looking at this slide, the original 5263, the finality provision consisted of items one and two, the compliance exception to the backfit rule and the protection or what we refer to as the special standards.

Well, after that and during the course of reviews, we had a number of interactions with industry sources and they requested that finality standard be modified so that it would, so that industry could make certain changes to the designs after the certification that was issued. And that's what the Commission did in this most recent rulemaking.

And you'll see in this list that we issued five additional standards or provisions on there. I have little shorthand summaries of each of them. The first one, the Commission put in to facilitate the ability to make changes to the design certification rules. We felt that the finality standard prevented that. So you'll notice that we incorporated the standards from the latest 50.59 into each of the design certification rules and we used this provision three to accomplish that.

Next provision we wanted to have the ability for applicants to actually complete the design information, to complete the design ITAAC in a generic manner so that each of the referencing applicants would use that and that would enhance standardization. That's why the Commission put in that provision.

As a result of requests from commenters who wanted the ability to correct errors that may have been discovered since the certification, the Commission put in a provision allowing for the correction of material errors and those are errors that are significantly and adversely affect the design function of the analysis and the design control document, so we added that provision. Also, the industry requested the ability to make beneficial changes. What the Commission did with that is they basically put in the existing 51.09 backfit standard which allows for substantial increases in safety, reliability, or security, provided they're cost beneficial.

And then commenters also requested a variety of other reasons to amend certifications and we created what I typically refer to as our catch-all provision that if there are other changes that a vendor would like to make that the referencing applicant supported, and that would achieve additional standardization, rather than doing that on a case-by-case basis. We have this one where it contributes to increased standardization. And so the Commission made all of those changes basically in response to requests from the industry to facilitate these amendments.

Now important points on this, Provision (a)(3) says that once the certification is amended, everyone who references that certification has to incorporate those amendments. But the Commission recognized that that burden may not be shared equally in a situation if we looked down the future where there are some plants that are already built and operating or under construction. Other plants that are just starting the referencing. So the Commission put a provision in A.2 that said we're going to give special consideration to each of those referencing applicants and their particular situation in determining whether or not these amendments will, in fact, be accepted and required for each of the referencing applicants.

That's a very shorthand presentation of how the Commission changed the amendment process and as Westinghouse has stated, they have officially filed under the new version, the version I show in this slide or in your handout, to amend the existing AP1000 design certification.

CHAIR BONACA: Under item 5, correct material errors, you specifically talk about errors which can be substantial or significant to the design. Wouldn't that reopen -- isn't there a potential for reopening the certification process?

MR. WILSON: I'm not quite sure what you mean by reopening, but let me work through an example. And I'll pick because Westinghouse talked about changes in their proposed pressurizer design. Let me for the purposes of discussion call that an error.

Westinghouse is proposing to correct that. I believe that would fit under that particular provision of the rule. Now understand the amendment process places everyone on the same footing. It doesn't matter if he's the original designer, Commission, or other members of the public. Everyone can petition and request an amendment.

So let's say in the course of the review, the staff and be careful about this. Staff's focus is on those changes, but let's say they became aware of some other error that also met this standard. They could also request as part of this amendment process that that error be corrected.

But this is not a re-review of the whole application. Staff's review is on the proposed changes.

MEMBER SIEBER: So it's possible under the provisions of 52.63 that every plant could be different, every other plant in the so-called standardized plants?

MR. WILSON: No, that's the purpose of the provision (a)(3) is that once it's amended, the Commission expects everyone to meet the amended version of the design.

MEMBER SIEBER: Or some further design after you apply this again, right?

MR. WILSON: Yes.

MEMBER SIEBER: Keep stepping up the ladder.

CHAIR BONACA: With exceptions for those which are already licensed.

MR. WILSON: No, everyone.

CHAIR BONACA: Oh, everyone. Then I misread this.

MR. WILSON: That's why we have that special consideration provision. We want to be sure we have taken into consideration those disparate burdens from the person who is already in operation or the person under construction versus the person who is just referenced like TVA just referenced the AP1000.

MEMBER CORRADINI: I guess I thought I understood it, then when you clarified Mario's conception, I'm confused.

So let's say for the sake five plants ordered this with the changes -- ordered this or have this AP1000 package class, whatever it was called. And then along comes another class that's developed. That would not fit within this. That would be a different certification because the way I heard it before, Westinghouse would come in with a modification to the current certification. So I'm trying to understand --

MR. WILSON: Let's work through that.

MEMBER CORRADINI: I'm trying to understand how this all hands together.

MR. WILSON: Right now, there's an AP1000 certification, Appendix D to part 52. And if you read in there, you'll see that certification is done to Revision 15 of their documentation.

Westinghouse is coming and asking to amend that certification. Now for the purposes of this discussion let's assume that it's revision 16 that gets approved. I'm skeptical of that, but let's assume that.

(Laughter.)

I'm going to go in there. I'm going to erase 15 and put in 16. Rev. 15 certification no longer exists. Everybody has to conform with rev. 16 now.

MEMBER SIEBER: But if you build a plant on the rev. 15 --

MR. WILSON: I'm sorry, but you've got conform with rev. 16.

MEMBER SIEBER: Well, then you go up to --

MR. WILSON: Let me finish before --

MEMBER SIEBER: -- (a)(1)(6).

MR. WILSON: Everyone has to conform with rev. 16. Now we've taken into consideration, as part of that review, those burdens that that operating plant had and if they decided it still should apply, then they would have to conform.

Now let's say you're that operating plant. And you were unhappy about the resolution of that rulemaking. You could come in and request an exemption for your particular plant from that --

MEMBER SIEBER: The seismic backfit for

this means changes in the structure, the containment, and all kinds of things, so the only choice you would have to continue operation is to get an exemption.

MR. WILSON: That may be the case. It depends on what's going on. That's -- and so the timing is very important in how this amendment process works.

MEMBER ABDEL-KHALIK: What we heard this morning was going from one design class to the next design class would likely be done through this amendment process. Is that consistent with what you've just described?

MEMBER CORRADINI: It doesn't sound like it.

MR. WILSON: I am not sure what you mean by design class --

MR. FISCHER: Can you use the mic, please?

MR. HASTINGS: This is Peter Hastings. I'm the DCWG lead for AP1000 and I'll be speaking this afternoon.

I think it's a matter of degree. If it's a fairly minor change, be coordinated with the DCWG and with the customers at the time. If it's a significant change, Jim also said it would be a commercial decision how to roll out that wave. If it was to change to a three-loop plant, that's not likely going to be an amendment to the AP1000 appendix D that's going to be a new design certification.

MEMBER CORRADINI: Design certification.

MR. WILSON: And just for clarification we have to put in the regulations dealing with that example he just talked about. I'll cite 52.59(c). At some point if it becomes so extensive, it's a different plant, then you're back to the beginning and it's a new design certification.

MEMBER CORRADINI: Okay, thank you.

MEMBER SIEBER: Or it could be another exemptions to the specification itself, the certified design.

MR. WILSON: You can do plant-specific changes. Today, I'm just talking about generic amendments. I'm not discussing plant-specific ventures.

CHAIR BONACA: Okay, any further questions? That's quite informative.

With that, I thank you for the presentation and we will recess for lunch and come together as 12:15. So get back on time and we'll have time for the afternoon presentations.

(Whereupon, at 11:33 a.m., the meeting was recessed, to reconvene at 12:15 p.m.)

CHAIR BONACA: We'll resume the meeting now and the next person on the agenda is Mr. Hastings from NuStart, and he will talk to us about issues addressed by the AP1000 Design-Centered Working Group.

MR. HASTINGS: And I will refer you to the handout package that has the NuStart cover sheet on it. Unfortunately, Ms. Aughtman is not going to be able to join us. She took ill a couple of days ago and tried to rally last night with an early turning in but she woke up this morning and could barely get out of bed. And so we put her back on a plane to try to get well. She, among the large contingent of DCWD folks who have been working very hard to pull of the Bellafonte seal applications succeeded in running herself into the ground. So -- but with me today -- well, first of all, let me introduce myself. I'm Peter Hastings. I'm the Licensing Manager for Nuclear Plant Development for Duke Energy but I'm also the DCWG, AP1000 DCWG lead and we'll talk a little bit about how the DCWG is structured.

Unfortunately, Amy, in addition to not being able to be here to make her part of the presentation, had the memory stick with the presentation on it, so that's why we had to use the handouts. With me is Phil Ray, who's the Licensing Lead for TVA and the point of contact for the Bellafonte application on behalf of the DCWG; also Eddie Grant and Neil Haggerty who are our leads for the development of the NuStart application for the Bellafonte site and so I'd certainly invite them to weigh in with any questions that I can't answer as we go along and I think Andrea is going to join us as well.

Let me refer you to Slide Number 1. This is the frisbee diagram that really represents the collaboration of the DCWG members.

CHAIR BONACA: NuStart is the complex of this organization.

MR. HASTINGS: Yes, correct. And the reason I wanted to include this graphic as more than just a decoration is to explain the relationship of the DCWG to NuStart. The NuStart consortium is pursuing two applications; one for the AP1000 and one for the GE ESPWR. We had already divided the NuStart team into two halves, one of which was the half that consisted of the declared applicants for the AP1000 design and so when the design-centered review approach was formulated, it was a very natural fit for the AP1000 team within NuStart. So the NuStart AP1000 team, because all of the AP1000 declarants, coincidentally, are members of NuStart, that team because the AP1000 Design-Centered Work Group. So it's worked out very, very well and speaking on behalf not as the lead but the spokesman among equals, I can tell you that I'm very pleased and proud to be representing them here today.

The Bellafonte site was chosen by NuStart as the site to be developed by NuStart for the AP1000 application and so very similarly it became the natural fit as the reference point for the AP1000 and the design-centered review approach was formulated. I want to clarify though, a little bit about the -- what the staff and we have agreed since was a rather unfortunate terminology because it's a little misleading. The reference COLA (phonetic) is really the carrier of standard content. It might imply that it's -- and it is a COLA that other COLAs will reference and that's not the case.

The subsequent COLAs, an equally unfortunate term, simply refers to those COLAs that use the same standard content that come after the reference COLA. So all of the COLAs will incorporate by reference the design control document, the Westinghouse certified design, but they won't incorporate by reference each other's COLAs. That just was going to get way too ugly, and so we abandoned any thought of doing that early on. Because I don't have a slide that speaks to it specifically, one of the committee members had asked for some -- a little bit of explanation on our decision process for how we handle changes in standard content. So this is as good a time as any to elaborate on that a little bit.

We are very proud to just submit the Bellafonte application yesterday and it is the reference-planned application. The next application that comes in will be in a few weeks. It's a little bit of a horse race right now between who it will be. It will either be the Duke, Lee Nuclear Application, possibly the South Carolina Electric and Gas, VC summer application, possibly the Progress Energy Harris Application. They're all working on their own paths and they'll be submitted when they're ready.

Obviously, we're certainly not competing with each other to be second in the door. But inevitably, between now and the time the first S-COL application is submitted, someone is going to find something, at typo in the DCD, a typo in the reference COLA, what have you and so we are putting into place within the DCWG and within NuStart, a configuration management process so that take as an example, when the Lee application discovers a typographical error in the Bellafonte reference application, in the standard content, we'll identify that to NuStart, to the DCWG. The DCWG committee will, through a configuration management process, vote out whether that qualifies as a change to standard content or not.

The way we envision this happening is that before the next S-COL application goes in, we'll publish some sort of an errata report to the reference plant application. Those errata, once they're decided by the DCWG, are valid changes to standard content. Then the S-COL application will incorporate that change and it will be identified as an errata to the reference plan and then at some point when it makes sense and obviously, as a function of the significance of the change, we'll do a true-up of all those applications to maintain the standard content.

CHAIR BONACA: Let me ask you a question now. Since we do not have exhibits on display, tell us when you're changing slides and what is the exhibit.

MR. HASTINGS: And with more substantive changes that may occur through the RAI process, will be handled very similarly. An RAI to one of us is an RAI to all of us particularly when it touches standard content. And so when Phil is contacted with preliminary information from the staff that looks like it's headed toward an RAI, he immediately calls the rest of the DCWG and in fact, during the acceptance review period, we're going to be having daily conference calls with the staff to make sure that we have a good handle early on with any issues that they may be having.

And as the RAI responses change standard content, we will keep the reference plant application and the standard content within it under very close configuration and control and then those changes will roll out to the S-COL applications as well. So does that -- I don't recall who was asking about the details.

MEMBER SIEBER: What companies are entering the leading plant or are they?

MR. HASTINGS: The lead plant is the TVA Bellafonte application. Duke Energy has got the lead nuclear Units 1 and 2. South Carolina Electric and Gas has the VC Summer Units 2 and 3. Southern Nuclear has Vogtle Units 3 and 4 and Progress Energy has Harris 2 and 3 and Levy County, Units 1 and 2.

And in fact, that's the bulk of the content of Slide Number 2. The benefits of the design centered review approach have been elucidated before and they're pretty clear. Any time you can handle one issue through one review and one decision, one approach, one position, it makes a lot of sense. It makes for a much more efficient review. We've seen that already through review of some of the technical reports.

We've seen it with early collaboration within the DCWG and early interaction, pre-application interactions with the staff and the resolution of issues and submittal of technical reports. It's been very effective so far. And of course, the more standardization that we have the more efficient that process will be.

And as Andrea mentioned during the presentation this morning, even when they're site specific content, we're trying to maintain a consistency in terms of level of detail so that there's no one application that makes another one look strange for some reason.

I've been through the DCWG membership so I won't repeat that but I will re-emphasize, we've been coordinating the DCWG within the AP1000 community very, very closely, regular routine meetings. Because NuStart is also pursuing ESBWR application, we've also been collaborating very closely with the ESBWR team because we're all NuStart and both class of plants and we have a lot of commonality there.

We're also collaborating with NEI and the entirety of the new plant community at the NEI/COL task force level and as I mentioned, with the NRC staff where we've had several pre-application meetings over the course of the last two years and we started off that set of meetings with a prioritized set of topics that have been very useful to talk through, things like level of detail on radwaste systems, the QA program applicability, the review of the NEI templates on radiation protection, quality assurance, maintenance room and so forth have been very useful, very helpful.

On Slide 3, this is just a very high level summary of what the license application looks like. This is for the AP1000 but most of the other applications are similar, not identical, but similar in structure. So we have what we call Part 0 which is basically just the cover letter and the affidavits and so forth.

Part 1 contains general and administrative information which includes identification of a reference plan, the listing of the contents of the application itself, or excuse me, the decommissioning report, discussion about the financial qualifications for construction and so forth.

Part 2 is the FSAR proper. And of course, it contains all the information required for the FSAR and we'll go into more detail on all these in a few moments. Part 3 is the environmental report, the technical specifications, emergency plan. You can read down the list and see what the contents are.

Part 11 is -- consists of those documents that we incorporate by reference. For the Bellafonte application, for reasons I can go into in a little while, it only consists of one document, the quality assurance program document for Bellafonte. I will point out in particular Part 9. It is information that is not safeguards information but is withheld either because it's proprietary or SUNSI (phonetic) or personal information or so forth. So when you see the public version of the document, neither Part 9, which is the withheld information, nor Part 8, which is the safeguards information, will be in that public version.

A little more detail on each of that

parts; Part 1, the general financial information includes the 50.33 information on financial qualification and also for Bellafonte some proprietary information that as I've mentioned, actually exists in Part 9.

What you'll see in the parts that contain that proprietary information where that information has been moved. In the public version, you'll see -- I guess in those versions, you'll see a redacted page where that information would have been included. Part 2, the FSAR, incorporates by reference Appendix D of Part 52, the design certification rule. We actually also refer to DCD Reg 16 which is under review and we'll talk about that in more detail shortly.

The FSAR for the COLA is structured virtually identically with some very minor exceptions to the structure for the design certification. So each section of the FSAR, one of the first statement it makes is this section, the corresponding section of the DCD is incorporated by reference and then additional information is added. And we'll go into the FSAR in a little bit more detail later.

Part 3, the environmental report, which is based on the guidance of NUREG-1555. Part 4 contains the technical -- site specific technical specifications. It starts with incorporation by reference of the DCD generic tech specs and bases. The bracketed information for the most part is filled in. There are some brackets that are the subject of license conditions that remain to be filled in, for example, rod drop time has not been specified.

And then we have a section that includes the entirety of the tech specs that incorporate that bracketed information, so we have both versions of that in the application itself. Part 5 is the emergency plan, including state and local certifications, state and local plans, evacuation time estimates and references to the emergency planning ITAAC that are contained in Part 10.

An example of the EP ITAAC is the successful completion of the -- of a substantial exercise prior to fuel up. Part 6 is reserved for limited work authorization information. Bellafonte is not currently seeking an LWA, so that section is blank for Bellafonte. Part 7 contains information on departures and exemptions. And it's a very short section which is a mark of the success of the DCWG effort and the collaboration that we've had with Westinghouse. We only have two exemptions and three departures and they're not particularly complicated.

We have a fitness for duty rule exemption that we've taken as an elective measure and this is consistent with the rest of the industry, to -- an exemption from the current regulation because we're describing in advance what we know the regulation is going to change to and so we've got a forward looking exemption there. The other exemption is purely administrative. The use of the DCD document numbering simply didn't fit in every case because the regulation calls for use of the DCD format for the COLA and we have a minor exemption for that and the departures from the formatting are clearly spelled out in the COLA itself.

Then the departures, we have the standard departure which will apply to all AP1000 which is related to the same difference in document numbering. And then we have two site specific departures, one of which is a vagary of the service water system for Bellafonte and the other is pretty consistently but not universally adopted by all of the AP1000 applicants and that is a relocation from what the DCD indicates of where the technical support center is located physically, and I'll explain that later in the presentation.

Part 8, as I mentioned, is the safeguards information. It's the security plans and of course, we won't talk about that in any detail at this meeting. Part 9 is the other withheld information, the nine safeguards information. There is some financial proprietary information from TVA in Part 9. There are also a very small number of layout drawings that were -- that we agreed with the staff were SUNSI that are in this as well.

Actually, the only reason they're in there is because of a departure to the relocates the operational support center. It's actually designated on a couple of layout drawings, so we had to make that change. Part 10 includes ITAAC and proposed license conditions and I won't belabor -- and by the way, I apologize, I'm on Slide 9 for those that -- I won't go through the entire list of license conditions. One of the more notable ones is the implementation milestones for operational programs. We have a table in Section 13-4 of the FSAR that describes the implementation milestones for various operational programs. And that's a consequence of advanced discussion with the staff, work with the staff on the development of how we were going to describe operational programs without piling up a bunch of ITAAC. I mean, the alternatives available to us through SECY-05-0197 were that you can either have ITAAC for operational programs or you can sufficiently describe the operational programs in the FSAR and include implementation milestones so that the staff can come in and inspect compliance with those programs as part of that implementation.

Part 10 also contains a proposed environmental protection plan and the security and emergency planning ITAAC and the site specific ITAAC in addition to what's in the DCD. Part 11 as I mentioned earlier, is information that's incorporated by reference. The QA program description is the only document that's included in there today. And the reason for that is that the other information we're incorporating by reference is available elsewhere say in ADAMS or we didn't have it in a timely manner to put in this appendix for example, TR-134 and in discussions with the staff we can certainly make a conforming change to add that back into the DVD as the staff sees fit.

So on Slide 11 we start going through in some detail the individual chapters of the FSAR and as an intro to the FSAR which as a reminder is Part 2 of the COLA, we incorporate by reference in the application Rev 16 of the design control document as amended by Technical Report 134 which Andrea talked about earlier today. And as a reminder, TR-134 is -- represents the minor corrections and minor changes that have occurred since Rev 16 of the DCD was submitted. You'll see the term IBR used throughout the presentation. Just to make it clear, that's what that means, is incorporation by reference. We do incorporate by reference a handful, a small handful of documents, the DCD, the TR-134 that amends the DCD and then four NEI templates that have been submitted and either approved or are currently under review by the staff and those four documents are a training program description, a maintenance rule program description, a radiation protection program description and an ALARA document, and so we incorporate those documents by reference into the COLA as well.

There are probably another half dozen or so NEI templates that we also refer to but we don't incorporate them by reference. We adopt them or describe them in some detail further in the FSAR. I'll apologize, the standardization of COL applications bullet there is an artifact from a previous presentation. You really won't see the entire IBR, essentially IBR or IBR plus in this presentation and you won't see them in the COLA. That was sort of a Rosetta Stone from earlier presentation and I intended to take that out. I apologize for any confusion.

On Slide 12, here are some of the metrics on the FSARs and the extent to which they're standardized. And I'll tell you up front, the number -- any percentage of standardization to these documents should be taken with a grain of salt because it depends on how you measure it. If you measure it by number of sections we're 80 percent standard. If you measure it by number of pages, well, it's less than that, because the site specific Chapter 2 is a big document. So just for that caveat, by section we're about 80 percent standard across the entire AP1000 fleet and again, most of Chapter 2, site specific.

We issued with the response to RIS-2006-06 and 2007-08, I think, standardization matrix that was sort of our key to how we were tackling the documents as they were being developed. And you see an excerpt from the latest RIS response here for Chapter 1. Virtually every section has some amount of information incorporated by reference from the DCD. If you count up the number of sections that are standard or partially standard, you can see a substantial number of sections there have standard information in them.

Thirty-six of the sections have -- are either site specific or partially site specific and if you add up 182 and 36, you get greater than 193 because there are some overlap. There are some sections that have both. As you saw in the description of the Part 7 departures report, we have a very small number of departures and we think that's a real success story. It's -- as I mentioned, it's a real mark of the collaboration that we've had among the AP1000 applicants and Westinghouse.

Slide 13, one of the ways that we -- very helpful, thank you. And of course, the first one he throws up is the first one you can't read, so he didn't have my TV on.

(Laughter.)

MALE PARTICIPANT: I asked him to put it on.

MR. HASTINGS: I appreciate it. Incorporation by reference, electronic review of documents, cross-referencing to documents that are incorporated by reference, and understanding how information is standard from one AP1000 application to the next can be very complicated and daunting and we're sympathetic. We think it's far and away the most efficient way to conduct the review. We think the staff agrees with us but it's not always intuitive and so what we've done for our application is annotated virtually every paragraph of the FSAR with one of these left margin annotations. And I won't bore you with all the details but basically you can tell by looking at the left margin annotation once you figure out what they stand for, whether something is standard or site specific, whether it's conceptual design information, a departure or closure of the COL information item or supplemental information.

It takes a little while to get used to how this reads, but it is very, very helpful once you have the key in your mind. We think that the staff will agree it's very helpful to be able to look at a section and know that's standard content and to know that I can go to another AP1000 and unless they've taken a site specific exception to the standard content, it will be identical. Particularly helpful, we think, for subsequent COL applications.

MEMBER ABDEL-KHALIK: The staff would have to take your word for that margin notation or the --

MR. HASTINGS: They can certainly hold the two pages up to the light and see that they are identical if they choose to do that.

MEMBER ABDEL-KHALIK: No, I mean, if you

have different paragraphs, you can't do that. They're not going to be --

MR. GRANT: The wording should be identical.

MEMBER ABDEL-KHALIK: No, I mean, you're referencing a specific paragraph in a specific document, correct? And you're telling them that this paragraph is identical to the paragraph in that other document.

MR. HASTINGS: Correct.

MEMBER ABDEL-KHALIK: This becomes a very cumbersome process for the staff if they really want to verify that your notation is correct.

MR. HASTINGS: That -- it could be. We're hopeful that they would only feel compelled to do that on a sample basis because the intent of this -- the primary intent of this is for subsequent COL applications not to have to spend a lot of time and energy reviewing something that's already been reviewed and accepted as standard content.

MEMBER CORRADINI: So I have a question to go with this. I hesitate. So in this electronized world we're in, why not have a hot link so you press on your notation that takes you to the other place?

MR. HASTINGS: Well, the reason is that we want to make it efficient. We don't want to --

MEMBER CORRADINI: Make it easy? Sorry.

(Laughter)

MR. HASTINGS: You had an opening there. No, it gets back to one COL application not referencing another one.

MEMBER CORRADINI: I understand.

MR. HASTINGS: We're really not inviting the staff to review two applications at once. We're just trying to point out to them that this is standard content. The idea of the one review, one position approach was that once the staff has reached a conclusion on a particular piece of standard content, they shouldn't have to do that review again, except on a confirmatory basis to make sure it will be a standard. And we would expect some review of that on a sample basis.

MEMBER ABDEL-KHALIK: But, you know, I mean, we're not saying that somebody will intentionally mislead the staff by doing this but this is a process that is, in my mind, just fraught with the possibility of error.

MR. GRANT: Essentially, what it will take is -- if this were the Bellafonte application and this were the Harris application, you would hold these up and go.

MEMBER ABDEL-KHALIK: But somebody has to do that.

MR. GRANT: Well, but they have to review the other piece of that. If they're not doing, "Yeah, those are the same", then they're reviewing every word on this page and comparing it to their acceptance criteria and determining whether or not it meets that acceptance criteria and writing the Safety Evaluation Report. If they can put all of that aside and go, "That's just like what I reviewed last week", I've already written the Safety Evaluation Report. I've already compared it to all of the acceptance criteria. All I have to do is change the name to protect the innocent and send out the next SECY --

MEMBER ABDEL-KHALIK: So you're comparing, you know, the process of taking two pages and making sure that indeed, this paragraph is the same as the one I've reviewed before against the process of actually reviewing the paragraph. But somebody has to actually verify that those paragraphs are the same.

MR. HASTINGS: And again, we would expect that that would happen on a sample basis, yes.

MEMBER ABDEL-KHALIK: Thank you.

MR. HASTINGS: That is part of our

configuration management of the various documents that an S-COLA applicant is not allowed to include standard information unless it's standard. He's not allowed to change it without the DCWG agreeing that it's a change to standard content. If for Lee, for example, we prepare a paragraph that for whatever site specific reason we decide we're not going to use the standard content, we're obligated to change the left margin annotation to indicate that that's site specific information. And we do have -- to answer Dr. Corradini's question, we do have hot links back to the DCD.

MEMBER CORRADINI: Oh, you do, okay, okay, well, then that's important.

MR. HASTINGS: And that's the bulk of --

MEMBER CORRADINI: Because that's the basis, right, in terms of your standardization.

MR. HASTINGS: Right, and there are chapters of the FSA that have no content except for reference back to --

MEMBER CORRADINI: Okay, okay, good.

MR. HASTINGS: Okay, on Slide 14, just a high level summary of the COL information items. There are 175 of them in the standard DCD. About 66 and I say about because some of them are multi-part and some of them get counted twice by some people and so that the number varies a little bit, but there are about 66 that were eliminated one way or another with REV 16, 48 of them because they were closed and that included seven that were deleted because they were just entirely redundant to ITAAC and then 18 that were rebucketed from COL information items to COL holder items, typically consisting of things that required as-built confirmations. It's very difficult to leave them on as well.

The remainder of the COL information items are closed in the COL application itself. Again, that's -- the COL left margin indication flags those items. That information is in the COL information items. A couple of examples of COL holder items are shown on Slide 15. Just to give you a frame of reference, what we mean by COL holder item, is it typically information that's needed but can't be confirmed until some point after receipt of the license. And this is one of the options available in Reg Guide 1.206 about how you flag information that is a forward looking commitment. So these are included in the license conditions that we referred to earlier.

Slide 16, we'll go through the FSAR chapters fairly quickly. If you have any questions or see anything that causes you confusion, just feel free to stop me. Chapter 1 again, introduction of general design, excuse me, general description, and this is incorporation by reference of Appendix D, discussion of the format of the balance of the FSAR, material that's incorporated by reference has some COL information item closure in it and contains a new section 1.10 on impact of multi-unit construction. The DCD is predicated on a single unit. All of the AP1000s are in configurations. Some are at sites for the existing operating units and so we have a discussion of the administrative controls associated with construction on Unit X against Unit Y that is operating at the time, be it an existing operating unit or Unit 1 while you're building Unit 2.

Chapter 2, certainly the largest site specific chapter, as you'd expect, the FSAR are on Slide 17. The standard departure 1.1-1 is the formatting, the document formatting departure that I mentioned earlier. This is the chapter that describes that the site characteristics against the site parameters in the DCD. Slide 18, Chapter 3 is primarily incorporation by reference of the DCD, some dual unit information there as well. In this case, things like turbine missiles from the second unit, impacts on the first unit. The in-service testing program description, for snubbers and valves. You'll notice there's no articulated pumps but that's a no set for this particular section.

Slide 19 is almost entirely incorporation by reference. There's one COL holder item to a rear consumption of the BNBR limits. Slide 20, again, mostly incorporation by reference, also includes the description of the in-service inspection program. Slide 20, Chapter 6 again, mostly incorporation by reference. It includes description of the containment lead rate testing program. This is one of the program descriptions that we submitted early on via technical report to the staff and we just actually received an SER on that particular one a few days ago. It describes Class 2 and 3 in-service inspection.

Slide 22, Chapter 7 is entirely incorporation by reference. There is no new information in Chapter 7. That said, Chapter 7 with ECD also describes that. So there is more information to come during development or during review of the REV 16 of the DCDM proposals.

MEMBER MAYNARD: Wouldn't you rate Chapter 7 for some site specific implementation and control?

MR. HASTINGS: Sorry?

MEMBER MAYNARD: Wouldn't there be some potential in Chapter 7 for some site specific on instrumentation and control for cooling water systems, pipe feed --

MS. STERDIS: For those systems, that would be outside the scope of what's required by the SRP and the accompanying REV Guide 170, Rev Guide 1206 content. It would be -- you're right, there is site specific controls associated with like the cir water system but they don't reach the level of significance that puts them into Chapter 7.

MR. HASTINGS: Chapter 8, we're on Slide 23 again, mostly IBR, does contain some conceptual design information replacement and information on the site specifics which are in grid information. Slide 24, Chapter 9 is mostly incorporation by reference. It has the site specific departure for Bellafonte that talks about a different routing that they have for the blow-down flow path that goes to the waste water system exclusively, whereas in the BCD there are options it can blow down to and just because of the vagaries of their site layout, they have chosen that departure. There are other similar departures on some of the S-COLs as well but this one is unique to Bellafonte.

Full-text incorporation, just to dwell on this a little bit, in some cases if you try to do incorporation by reference plus addition of supplemental information or departures or addition of conceptual design information, it just gets so confusing you literally can't read it. So in those cases we've just done full text incorporation and then just --

MEMBER CORRADINI: And then just insert the new stuff in there.

MR. HASTINGS: Correct, yeah.

MEMBER SIEBER: Do you mark it in any way?

MEMBER CORRADINI: Like underline it or something?

MEMBER SIEBER: Or a solid bar?

MR. GRANT: It's marked as separator bars that divide it into groups such that if there is information that is a pure repeat of the design certification document, we have a DCD out in the left margin annotation, then there will be a separator bar. Then there will be some new information and it will be labeled as CDI, Conceptual Design Information, and then there will be another separator bar and then there will be more information that is pure repeat of the DCD.

MEMBER SIEBER: So everything is going to be in order.

MR. GRANT: Yeah, everything is in order.

MEMBER SIEBER: And you can tell where it came from.

MR. GRANT: You can, yes.

MR. GRANT: Now, it doesn't -- what it doesn't do is provide you nice clean paragraphs like you had in the DCD because we're going to break it up a bit when we separate it so that we can show where it came from. But it's in the order.

MEMBER SIEBER: Well, that's all right.

MR. HASTINGS: On to Slide 25, Chapter 10 another example of where it just made sense to add in some Conceptual Design Information using the flow extent incorporation method that Eddie just referred to. Slide 26, again, waste management mostly incorporation by reference, some additional information to describe the radiation and effluent monitoring program. And by the way, that's an example of one of the operational program descriptions that we've put in with milestones in 13.4 pursuant to SECY-05-0197.

Slide 27 radiation protection, again, mostly incorporation by reference with the addition of

ALARA description, information on dose to construction workers and radiation protection program. There is an Appendix 12AA that's included here, simply because the NEI template that provides this program description information and the format of the DCD 12.5 would have resulted in more confusion than made sense, so we just created an appendix to keep those separate.

MEMBER SIEBER: I would think some radiation protection is so driven by company policy, that they would differ significantly from company to company.

MR. HASTINGS: It is -- there is always going to be for operational programs in particular a natural tension between standardization with your existing operating fleet and standardization with the AP1000 fleet, and we've got a very strong commitment on the part of our management to err on the side of standardization with the operating fleet. We would expect that on any given program that's going to find its own center.

MEMBER SIEBER: Well, if you use that at a station worker, you're almost stuck with that.

MR. HASTINGS: There will be some of that and there will be some give and take along the way, I'm sure. Interestingly enough, everyone has adopted the new QA program description which is pretty popular for fleet standardization but everybody is committed to the AP1000 standard. Now, some, and Duke is one of them, intends to conform their existing operating fleet program to the new program that we've committed to for the AP1000. So there's some in the other direction as well.

MEMBER SIEBER: Okay, thank you.

MR. HASTINGS: Chapter 13 on Slide 28, again, mostly IRB. The --

MEMBER SIEBER: That's probably not correct.

MR. HASTINGS: Oh, yeah, that's a good point. Yeah, this one -- that's probably a typo.

MR. GRANT: I think that one slipped past us.

MR. HASTINGS: Mostly IBR is probably not correct for 13. 13 also, and this is not controversial but just because it's a little different, for 13.3 and 13.6, this actually provides pointers to other parts of the document. 13.3 contains the -- or points to the emergency plan. 13.6 points to the security plan and so they are just pointers to those external documents.

And 13.4 is the section that contains the table that has the operational program milestones that I referred to earlier. 13.7 is a fitness for duty section that is a new section, not in the DCD and that conforms to the NEI template for proposed fitness for duty program.

MEMBER SIEBER: You have a new rule coming.

MR. HASTINGS: We know, we've been watching.

MR. GRANT: And in fact, the new rules that came out September 28th that revised Part 52. Why we have a new section that wasn't in the DCD because it requires that we address the fitness for duty.

MR. HASTINGS: Chapter 14 a description of the initial test program. It also contains the site specific ITAAC screening. We've adopted the ITAAC screening criteria from the DCD and applied it to the site specific line items. Chapter 15, mostly IBR. We did move a failure analysis for one of the tanks to Chapter 2 because it just made more sense in the context, so site description, we maintained in Chapter 15 and we didn't want it in two places.

Chapter 16, a pretty short chapter because the tech specs are equal in part, so again, this largely points to a separate external document that's also part of the application.

MEMBER SIEBER: There will always be an external document to the FSAR.

MR. HASTINGS: Correct.

MEMBER SIEBER: Right. And your application.

MR. HASTINGS: It's part of the application. It will be attached to the license.

MEMBER SIEBER: As a separate piece.

MR. HASTINGS: Yeah. Chapter 17 again, shorter than one might otherwise infer because it points to the QA program description that's contained in Part 11. So 17.5 is a very simple pointer to Part 11 of the application and it is the QAPD which was submitted by NEI and approved by the staff not too long ago with the addition of a bracket of information that's company and site specific.

17.6 is a description of the maintenance rule program, again, another NEI template that was incorporated by reference. Slide 33, Chapter 18 is human factors and is mostly incorporation by reference. This is the site specific departure for relocating of the technical support center and operational support center. And a little background on that, most of AP1000 applicants have elected to move the TFC out of its BCD location for the purpose of combining the TFC to serve both units. It varies a little bit where it will go and not everyone wanted to do that which is why it will show up those -- in this case, four different site specific departures but the departure language is very similar from one application to the next.

MEMBER SIEBER: If you have two control rooms you're going to have a major programming job to make it work, right?

MR. HASTINGS: And there was -- initially we perceived that it might be a challenge because of the criteria and the regulatory guidance about things like access to the control room and so forth but through -- and this was another good example of very good interactions with the staff in advance where we concluded as a group that the communication technology that was available today and certainly that we expect to be available in four, five years, obviated the need for that two-minute access as a routine requirement for --

MEMBER SIEBER: And the original purpose of the two minute rule was two-fold. One is because some TSCs didn't have a lot of instrumentation. The other one was to provide operators with command presence. Here comes the boss, shape up, kind of thing.

MR. HASTINGS: They're all ITAAC associated with the TSC that we're not taking a section to that talk about access to the appropriate information from the control room.

MEMBER SIEBER: Yeah, okay.

MEMBER ABDEL-KHALIK: Long-term, is there anything that prevents any of the people in this group from going to a different fuel vendor and getting their completely different fuel design?

MR. HASTINGS: Not that I know of, apart from the pleadings of Westinghouse which -- (laughter).

MEMBER SIEBER: You said fuel?

MEMBER ABDEL-KHALIK: Yeah.

MEMBER SIEBER: Who is licensed on a reload by reload basis.

MR. GRANT: You know, we're just trying to make sure that nothing in this process --

Well, once a licensee gets a license then they can individually submit for changes, exceptions, whatever, whether it be for fuel design or any other part of the design.

MEMBER ABDEL-KHALIK: So how would the impact the standardization goal? Would they have to go back and redo their safety analysis calculations?

MR. HASTINGS: Sure, they would have to confirm that whatever their new fuel design and this is true whether it's -- whoever provides the fuel would have to confirm that the new core design fits within the envelope of what they've been licensed for.

MEMBER SIEBER: And every licensee would have to do that and anything you would put in the original COL would not apply to reloads. So you have to do that analysis every time you get ready to reload that plant.

MR. HASTINGS: And again, that's true irrespective of which vendor is providing the fuel. The extent to which standardization and things like that continues in the long term will be in large part, commercial considerations.

534, just to see if everybody is paying attention, should not be titled inherent safety features but PRA. I apologize for the typo there and Chapter 19 is -- all but one section is incorporated by reference and 1959 has some information on confirmation of applicability and PRA configuration control for Reg Guide 1200. That's the overview of the COLA.

We went through it pretty quickly in the interest of time. I'm sure we will be back so we can take any questions now or later that you have on the COLA itself.

MEMBER SHACK: On the PRA, I mean, you're going to hand the baseline PRA over to the licensee?

MS. STERDIS: Absolutely. The baseline PRA has been deemed to be applicable to all the sites that are applying to our -- using our technology. The key areas -- we have two areas, we have two COL information items in Chapter 19. One dealt with external hazards and making sure that any particular site specific external hazards were addressed in our -- the PRA.

The second one was a list of a potential for evaluating sites to make design impacts so that the limited part of the design that we said was not covered in the design certification are any of those site specific design aspects going to impact the PRA? So we worked with the DCWG, Westinghouse worked with them. We prepared two technical reports including two checklists. One is we asked for input from each of the sites regarding the external hazards and the initiating frequency and they provided that input and in TR I believe it's 101, TR-101 and this is reflected in Rev 16 of the -- Chapter 19 of the Rev 16, we got -- we reassessed the external load events and ensured that our consideration of those or modeling of those in the PRA, the standard PRA, allows that PRA to be applicable to each of those six sites.

The other one, once we gave them a checklist and said, "These are the significant assumptions that you need to look at and consider as part of your -- and look at your site specific design, circ water, switch yard design and tell us if there's anything here that you're not consistent with to come back. We might A, have to do an evaluation for you, or B do a modeling change in the PRA."

We never got to the point of doing either the evaluation or modeling -- or remodeling of the PRA. Because of the limited significance of those aspects of the design, everybody came back and said, "No, we're fine with this. We're good". We checked and they have on file the completed checklist and in their file is a statement of fact validation to support their COL application.

So Chapter 19 for all intents and purposes is incorporated by reference and we will turn that over to them.

MR. HASTINGS: On to Slide, I think it's 20 -- 35, excuse me, most of the issues that the DCWG is working through and dealing with we really already talked about because Westinghouse is part of the DCWG. We're certainly reliant on their success with the design certification amendment, that it's implied in our COL applications. The COL applications incorporate Rev 16. We've spent a lot of time working with Westinghouse to understand what COL information items we thought made sense to roll up into the DCD because it's more efficient to take care of that once than it is to take care of it five or six times.

And so most of the issues on this list are not new and many of these we've talked about today already. One is the ever-present issue of design finality. How do we continue to work closely with the staff to make sure that we maintain the veracity of the certified design and that we don't stumble into a place where we're re-opening something that we think has already been approved.

Thresholds for changes is really another issue that we're seeing in the DCD amendment and the review of it. We want to make sure that we maintain a consistent understanding with the staff on when more information is needed on a particular subject particularly when it's a change to something that's been reviewed before. Configuration management for standard content, we talked about earlier in this presentation, very, very important for us to maintain standard content consistent from one application to the next. And I mentioned to you some of the procedures that we're using to make sure that happened.

Many of the issues that we've talked about are being worked at the industry level with the NEI COL task force. We've spent probably half of our time as a group in the last two years working hand in glove with the staff on the evolution of the regulations and the guidance. The staff's been very forthcoming with that information as it's being developed. Some of it didn't come together quite as quickly as we or the staff would have preferred, but for where we were at the time and where we are now, I think from our part, we think we did a pretty good job and we certainly applaud the staff for that as well.

There's a lot of work going on now to understand what the construction inspection program is going to look like, ITAAC verification, trying to borrow from things like the Reactor Oversight Program, those elements of the program that make sense for construction inspection. We've worked very closely and this is mostly a logistical issue, but it's been very demanding and again, we've worked very closely with the staff on the guidance for submittal of electronic documents. It's not as easy as you think.

And I will say that in particular the staff that's working the electronic guidance piece, because they understand how vulnerable we are as licensees, as applicants, as the guidance is evolving and changing, and we're all sort of trying to feel our way through that. They've been very, very gracious with things that they get that don't quite pass what they thought needed to pass in order for it to get loaded into ADAMS and that's been a real success story as well.

It continues to evolve but we're very close. I think we're converging on a solution and again, they've been great to work with in that regard.

MEMBER SIEBER: Do you have a way of just submitting changes to the electronic documents or do you have to send in the whole thing over and over again?

MR. HASTINGS: I don't know the answer to that.

MS. STERDIS: We haven't pursued it.

MR. HASTINGS: Yeah, we haven't pursued page changes. Leslie, do you -- Leslie Kass of NEI is sort of our point person.

MS. KASS: Using the new electronic submittals tool that we have that the Office of Information Services has developed, you would send in your updated application and you would have to send in the whole thing, you know, but you could leave the files that are unchanged, you know, those would be from your last submittal and would remain unchanged and simply there is a way to label the ones that are new, so that those will get loaded into ADAMS. But there is an electronic process that actually for the first submittal of the STP application, public version took 39 minutes to get into ADAMS, so it is a very efficient electronic process that we've worked out with the staff.

MR. HASTINGS: And it's certainly easier to submit the entire application when it's one DVD as opposed to 7,000 pages.

MEMBER SIEBER: The more you do it, the better I like it.

MR. HASTINGS: Continuing on the COL task force level, the task force with the support of NEI, has produced a number of templates that have made some operational program description information much easier to incorporate by reference and get it consistent across the industry to the extent we can. The technical issues, again, no different that what was described this morning. We're working very closely with Westinghouse to make sure we've got the right seismic considerations, to make sure that we've got a spectrum that incorporates both soft soil sites as well as the hard rock site, working through the path forward on resolution of that and then the operational programs I mentioned earlier. There are several of those and making sure we hit the mark there to give the staff enough information for them to draw the reasonable assurance conclusion without getting to the point where we have to submit the entire program itself has been pretty successful so far.

Moving onto the next slide and I'll apologize again for the absence of our colleague, Ms. Aughtman. You wouldn't have enjoyed her presenting, believe me. She was not well. And I will not do her presentation justice but I'll give it a shot. Moving on to 37, there are some site specific issues that you'd expect. Having said that, the challenges associated with site specific information that has to be incorporated, site specific departures that have to be taken into account because of the vagaries of a given site, in no way diminish the value of the standardized approach and to a company, every DCWG member continues to reiterate how important that is.

There are different types of sites, even within the AP1000 community. We have a number of sites that have existing operating units. We have two sites that have partially constructed plants. The Lee site was 50 percent complete on Unit 1 when it was cancelled back in the early '80s. Bellafonte Units 1 and 2 were almost complete when they were stopped.

And so that's not quite Greenfield, but pretty close. There's some of the infrastructure on both those sites that will be borrowed for the new plant but not a lot. And then there's one to the Greenfield site. We do try to maintain a common approach to resolution of site specific issues whenever it makes sense to do so. We try to keep our emergency plans roughly consistent. There are obviously details at the state and local level that aren't common, but we try to keep those as consistent as possible.

We do try to coordinate with the DCWG whenever an issue comes up because it's not always obvious when an issue comes up or that it's standard rather. Sometimes these things will evolve and they'll become clear as was the case with the passive plant emergency action levels for the emergency planning, that it really was a generic topic. And then, of course, the DCWG as we know it today, will evolve as the effort evolves and eventually the DCWG and the builder's group, the buyers group, depending on what you want to call it, will become one and the same. But maintaining standardization once you actually go into construction is just as important in terms of efficiency as it is in getting a license.

Next slide, please. The benefits, pretty obvious, but we'll reiterate them. It's been of tremendous value to us to -- in the preparation and review of the COL application and just to remind you of what Andrea said this morning, in addition to the two-member minimum review on changes to the DCD and the technical reports that Westinghouse has submitted, every section of the COL application by procedure, received at least a two-member review, in most cases a three or four or five-member review to make sure that we were A, getting the right number of independent eyes on the document, but also to make sure we maintain that cross-pollination across the different companies and the different cultures.

Certainly to the extent you're developing a standard product, it supports conformance with the URD, it supports the finalization, consistent finalization with the design across sites and I can't say it enough, the more you standardize, the more efficient we're all going to be going forward.

Next slide, please. This slide, I think, is a little bit mistitled. These are site specific features that really aren't standard, but again, we tried to maintain the approach and the philosophy and the level of detail as consistently as we can. Obviously, because of where you are on the site or where you are in the country and what your site looks like, you'll have different details on circ water and raw water, different company choices based on their operating experience and based on certain aesthetic considerations of whether you use a mechanic draft tower or hyperbolic tower.

The issue we talk about before on the stand-alone TFC, the details of some of the other site buildings like maintenance facilities, admin buildings, training facilities, a lot of that is determined to topography. A lot of it is based on synergy with the existing operating units. Clearly, if you've got an operating site with a nice new training center, like Summer has, you're not going to go build another one. So but again, we try to learn from each other as we're doing all of these things. The builder's group has a site layout subgroup and an operation subgroup and they try to make as common a decision as they can on where people are going to put their maintenance buildings and training facilities and so forth.

Next slide. This is the one I am least familiar with and these are some of the site specific issues for Vogtle. Amy is from Southern Nuclear and so she's the COLE for Vogtle. And Vogtle is a little different in several aspects. Every site has its own unique aspects to it. In the case of Vogtle, they're in the middle of an ESP review, and so they'll incorporate by reference not only the DCD but also their ESP. They've also requested unlimited work authorization as part of their ESP. So that introduces a whole separate layer of complexity that the rest of us don't enjoy.

They also have raw water that comes from both the Savannah River and from groundwater. They have a co-located combustion turbine plant that they have to take into account as an external hazard. They also have the soft soil sight. They and Levee County have a different set of seismic issues to deal with, although we're trying to maintain the design consistent so that it satisfies all of those sites. And then obviously, all of us have our own switchyard design, our own site specific emergency plans. The organizational details will vary from one company to the next and then obviously, as a consequence of the site itself, the security plans will look different.

MEMBER SIEBER: I would advise for the Vogtle site, to get the seismic portion of the application in as early as you can.

MS. STERDIS: Yes, I'm going to speak on behalf of Amy. I was here last week for their ACRS subcommittee meeting representing Westinghouse as part of their team, and we were very clear that what they're doing is they're developing their site specifics backdrop and then it's evaluated to show that it's bounded by the generic spectra that we've been working on so the design -- that is actually part of their ESP. They're site specific and then the comparison.

MEMBER SIEBER: So that's later this week.

MS. STERDIS: Yes, you're going to see it.

MEMBER SIEBER: Prepared.

MS. STERDIS: Yes, I think it's actually

tomorrow, yeah.

MEMBER SIEBER: Yes, it is.

MR. HASTINGS: That concludes our presentation. We've very pleased to have been invited to come here in support of Westinghouse. I'm sure we'll have an opportunity to thank Westinghouse for coming in support of one of our meetings in the future, and we look forward to working with the Committee, continue working with the staff. The one thing we've found in the last couple of years is the more we talk, the better it is for everybody. So we encourage more of these meetings and look forward to them. Any questions?

MEMBER SIEBER: We appreciate your coming in and providing a good presentation to us.

MR. HASTINGS: Pleasure, and I want to re-emphasize, it's not me, it's us. This is absolutely a team and you will see that behavior continue going forward.

MEMBER SIEBER: Good. You'll be here for BWRs also?

MR. HASTINGS: We'll be out there, out there watching.

MR. GRANT: Not unless Westinghouse changes their design an awful lot.

(Laughter)

(Off the record comments)

MEMBER SIEBER: I thought I heard somebody say that and I'm scratching my head to figure out which one of you on that screen up there would do that.

MR. HASTINGS: That would be more than just a departure.

MR. GRANT: I think that will be a different set of people that will come and chat.

MEMBER SIEBER: Okay.

CHAIR BONACA: And I appreciate your coming and telling us about all these things because it gives us a sense of the path ahead, things we will have to be involved with and I appreciate the presentation for Westinghouse, that was very helpful. I wish we had more time to spend on that but maybe we'll have another opportunity in the future.

MS. STERDIS: I expect that, as I indicated earlier, that we will be sending a letter in this week for the staff to begin their acceptance review of our amendment application on next week, November 5th and I expect that I would come to a conclusion in that acceptance review and the development of the detailed schedule for the staff review of the amendment application that we will be setting up dates and times. We have found in our AP600 and AP1000 experience that the more we come and talk about the issues, because AP1000 is different, because Part 52 is different and because we continue to break new ground, more often is better, so that we're all clear on where we're all headed together.

And I didn't know if you wanted to make some closing --

MR. CUMMINS: Well, I think that we're still available if you want to have questions.

MS. STERDIS: That was Ed's comments.

MR. CUMMINS: We appreciate the opportunity to have come today and we're quite willing to finish your schedule if you wanted to have some more questions or want to do something in the remaining time.

CHAIR BONACA: I refer to the members whether or not they have any specific questions at this time. I don't see any, so I think at this time, it's fine. With that, if there are no further comments or questions, yeah, please.

MS. STERDIS: No, we're good.

CHAIR BONACA: No? Okay, so if there are no further questions or comments, then I will adjourn the meeting. Thank you for coming.

(Whereupon, at 1:29 p.m. the above-entitled matter concluded.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Reactor Safeguards

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Charles Morrison

Charles Morrison
Official Reporter
Neal R. Gross & Co., Inc.

Bellefonte 3&4 | Lee Nuclear 1&2 | Summer 2&3 | Vogtle 3&4 | Harris 2&3 | Levy 1&2

NuStart Energy[sm]

AP1000 Design-Centered Work Group Presentation to ACRS

Peter Hastings
AP1000 DCWG Lead

October 31, 2007

NuStart Energy[sm]

AP1000 DCWG

Duke Energy®

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Progress Energy

TVA

Bellefonte 3&4	Lee Nuclear 1&2	Summer 2&3	Vogtle 3&4	Harris 2&3	Levy 1&2

NuStart Energy

Introduction

- **Design Centered Review Approach**
  - "One issue, one review, one position"
  - Maximum benefit achieved with higher degree of standardization
  - Site specific issues coordinated
- **AP1000 DCWG Members**
  - R-COLA – Tennessee Valley Authority, Bellefonte
  - S-COLAs
    - South Carolina Electric & Gas, Summer
    - Duke Energy, Lee Nuclear
    - Progress Energy, Shearon Harris & Levy County, FL
    - Southern Nuclear, Vogtle
- **DCWG Coordination**
  - With AP1000 applicants
  - With ESBWR DCWG
  - With NEI
  - With NRC Staff: prioritized pre-application discussion topics

COL Application

- Cover Letter, Affidavits, etc. ("Part 0")
- Part 1 – General & Administrative Info
- Part 2 – Final Safety Analysis Report
- Part 3 – Environmental Report
- Part 4 – Technical Specifications
- Part 5 – Emergency Plan
- Part 6 – Limited Work Authorization Information
- Part 7 – Departures & Exemption Requests
- Part 8 – Safeguards Information
- Part 9 – Other Withheld Information
- Part 10 – License Conditions & ITAAC
- Part 11 – Other IBR Documents

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BLN COLA Highlights

- **Part 1 – General and Financial Information**
  - Addresses 52.77 requirement to include 50.33 information
  - Includes some proprietary information (moved to Part 9)
- **Part 2 – Final Safety Analysis Report**
  - Incorporates by reference the DC rule – section 1.1
  - Each FSAR section references appropriate DCD section(s)
  - Format and outline follow that of the DCD
  - More detail later

BLN COLA Highlights

- **Part 3 – Environmental Report**
  - Based on NUREG-1555
- **Part 4 – Technical Specifications**
  - IBR of DCD GTS (including Bases) – no departures/exemptions
  - COL item – Fill in brackets – most filled in
  - Some brackets remain – proposed License Condition in Part 10
  - Section A includes information on brackets
  - Section B includes a full set of PSTS and Bases

NuStart Energy sm

BLN COLA Highlights

- **Part 5 – Emergency Planning Information**
  - Site specific licensee Emergency Plan
  - Includes Certifications and Cross-references
  - State and local plans
  - Evacuation Time Estimate
  - EP ITAAC in Part 10

- **Part 6 – LWA (not requested for Bellefonte)**

BLN COLA Highlights

- **Part 7 – Departures and Exemptions**
  - Exemptions (2)
    - Fitness for duty program description per expected rule
    - COLA organization and numbering per guidance
  - Departures (3)
    - STD DEP 1.1-1
      - Administrative departure for organization and numbering for the FSAR sections
    - BLN DEP 9.2-1
      - Service Water System (SWS) blowdown flow path
    - BLN DEP 18.8-1
      - TSC & OSC relocations

BLN COLA Highlights

- **Part 8 – Safeguards Information (separate submittal)**
  - Security Plans
  - Not discussed in this public meeting
- **Part 9 – Withheld Information**
  - Proprietary, SUNSI (no personal identification information)
  - Some information from Part 1, Part 2, Part 3

BLN COLA Highlights

- **Part 10 – Proposed License Conditions with ITAAC**
  - Proposed License Conditions to:
    - Incorporate ITAAC into COL
    - Complete Holder items prior to initial fuel load
    - Implement Operational Programs by specific milestones in 13.4
    - Provide Fire Protection Program revision criteria
    - Provide Security Program revision criteria
    - Provide operational readiness schedule
    - Provide Vendor AE Constructor qualifications
    - Provide Startup Program revision criteria
    - Complete bracketed items in Tech Specs
    - Incorporate Environmental Protection Plan
  - Draft Environmental Protection Plan
  - ITAAC – Security, Plant Specific, Emergency Planning

BLN COLA Highlights

- **Part 11 – Incorporated by Reference Information**
  - Quality Assurance Program Description

FSAR

- COL applications based on incorporation by reference of DCD Rev 16 plus TR-134 (DCD errata and other minor changes)
- "IBR" = Incorporation By Reference
  - DCD Rev 16
  - TR-134
  - Various templates
- Standardization of COL Applications (FSAR)
  - "Entirely IBR" – DCD incorporation (no COL Info Items)
  - "Essentially IBR" – DCD incorporation, some additional information required to address COL Info Item(s)
  - "IBR plus" – DCD incorporation with significant amount of additional information
  - Does not necessarily reflect minor supplemental information

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FSAR Standardization

Sect.	IBR	STD	PS
1.1	IBR	X	X
1.2	IBR		X
1.3	IBR		
1.4	IBR		X
1.5	IBR		
1.6	IBR	X	
1.7	IBR		X
1.8	IBR	X	X
1.9	IBR	X	X
1.10	new	X	X
1A	IBR	X	

Excerpted from AP1000 Standardization Matrix

- **Extent of standardization:**
  - ~80% by section
  - Most of FSAR Ch 2 is site specific
- **From AP1000 Standardization Matrix**
  - IBR: virtually all chapters/sections incorporate DCD
  - Standard or partially standard: 182 of 193 (includes "all IBR")
  - Plant-specific or partially plant-specific: 36 of 193
- **Limited DCD departures**

Bellefonte 3&4 Lee Nuclear 1&2 Summer 2&3 Vogtle 3&4 Harris 2&3 Levy 1&2

Left Margin Annotations (FSAR)

MARGIN NOTATION	DEFINITION AND USE
STD DEP X.Y.Z-#	FSAR information that departs from the generic DCD and is common for parallel applicants. Each Standard Departure is numbered separately at an appropriate level, e.g., STD DEP 9.2-1, or STD DEP 9.2.1-1
NPP DEP X.Y.Z-#	FSAR information that departs from the generic DCD and is plant specific. NPP is replaced with a plant specific identifier. Each Departure item is numbered separately at an appropriate subsection level, e.g., NPP DEP 9.2-2, or NPP DEP 9.2.1-2
STD COL X.Y-#	FSAR information that addresses a DCD Combined License Information item and is common to other COL applicants. Each COL item is numbered as identified in DCD Table 1.8-2 and FSAR Table 1.8-202, e.g., STD COL 4.4-1, or STD COL 19.59.10.5-1
NPP COL X.Y-#	FSAR information that addresses a DCD Combined License Information item and is plant specific. NPP is replaced with a plant specific identifier. Each COL item is numbered as identified in DCD Table 1.8-2 and FSAR Table 1.8-202, e.g., NPP COL 4.4-1, or NPP COL 19.59.10.5-1
NPP CDI or STD CDI	FSAR information that addresses DCD Conceptual Design Information (CDI). Replacement design information is generally plant specific; however, some may be common to other applicants. NPP is replaced with a plant specific identifier. STD is used if it is common. CDI information replacements are not numbered.
STD SUP X.Y-#	FSAR information that supplements the material in the DCD and is common to other COL applicants. Each SUP item is numbered separately at an appropriate subsection level, e.g., STD SUP 1.10-1, or STD SUP 9.5.1-1
NPP SUP X.Y-#	FSAR information that supplements the material in the DCD and is plant specific. NPP is replaced with a plant specific identifier. Each SUP item is numbered separately at an appropriate subsection level, e.g., NPP SUP 3.10-1, or NPP SUP 9.2.5-1
DCD	FSAR information that duplicates material in the DCD. Such information from the DCD is repeated in the FSAR only in instances determined necessary to provide contextual clarity.

Summary of COL Information Items

- **175 COL Information Items (DCD Rev 16 Table 1.8-2)**
- **48 closed in DCD Rev 16**
  - Includes seven deleted because of redundancy to ITAAC
- **18 COL Items transition to COL Holder Items (proposed license condition in Part 10)**
- **Remainder closed via COL application**
  - Includes three covered by operational program TRs

COL Holder Items (Examples)

3.7-3 Seismic Interaction Review

- *The seismic interaction review will be updated by the Combined License holder for as-built information. This review is performed in parallel with the seismic margin evaluation. The review is based on as-procured data, as well as the as-constructed condition. The as-built seismic interaction review is not provided with the COL application, but is completed prior to fuel load.*

5.3-4 Reactor Vessel Materials Verification

- *The Combined License holder will complete prior to fuel load verification of plant-specific belt line material properties consistent with the requirements in subsection 5.3.3.1 and Tables 5.3-1and 5.3-3. The verification will include a pressurized thermal shock evaluation based on as procured reactor vessel material data and the projected neutron fluencies for the plant design objective of 60 years. This evaluation report will be submitted for NRC staff review.*

FSAR Chapter 1
Introduction and General Description

- Mostly IBR of DCD, IBR of Part 52 Appendix D, STD DEP 1.1-1
- Discussion of format, e.g., LMAs and numbering of Figures, Tables, & References
- Lists - acronyms, RG usage, SRP conformance, RG conformance
- Complete list of material incorporated by reference
- Summary of Departures as Table 1.8-201, e.g., STD DEP 1.1-1
- STD COL 1.9-1, 2*, 3* (RGs, BLs & GLs, and USI/GSIs)
- COL Item tabulation as Table 1.8-202
- New Section 1.10 on multi-unit site construction considerations

FSAR Chapter 2
Site Characteristics

- **Mostly site specific material, STD DEP 1.1-1**
- **Comparison of BLN Site Characteristics to DCD Site Parameters**
  - Combined listing of DCD Tier 1 Table 5.0-1 and Tier 2 Table 2-1
- **SUP material and COL items**

FSAR Chapter 3 Design of SSCs

- Mostly IBR of DCD
- Dual unit information (DCD is for single unit)
- Inservice testing program description
  - Snubbers
  - Valves (no pumps)
- SUP material and COL items

FSAR Chapter 4
Reactor

- Mostly IBR of DCD
- COL items

FSAR Chapter 5
Reactor Coolant System

- Mostly IBR of DCD
- Inservice inspection program (Class 1)
- SUP material and COL items

FSAR Chapter 6
Engineered Safety Features

- Mostly IBR of DCD
- Containment leak rate testing program
  - (per approved NuStart TR)
- Inservice inspection program (Class 2 & 3)
- **SUP material and COL items**

FSAR Chapter 7 Instrumentation and Controls

- All IBR of DCD

FSAR Chapter 8
Power Systems

- Mostly IBR of DCD
- Conceptual design information (CDI) replacement
- Switchyard and grid information
- SUP material and COL items

FSAR Chapter 9
Auxiliary Systems

- Mostly IBR of DCD; STD DEP 1.1-1
- BLN DEP 9.2-1 – service water cooling tower blowdown
- Full-text incorporation in 9.2.8 – Turbine building closed cooling water (CDI replacement)
- **SUP material and COL items**

FSAR Chapter 10
Steam and Power Conversion

- Mostly IBR of DCD
- Full-text incorporation for 10.4.5 – Circulating water (CDI replacement)
- Inservice inspection program (Class 2 & 3)
- **SUP material and COL items**

FSAR Chapter 11
Radioactive Waste Management

- Mostly IBR of DCD
- Radiation and effluent monitoring program
- SUP material and COL items

FSAR Chapter 12
Radiation Protection

- Mostly IBR of DCD
- 12.1 – ALARA
- 12.4 – Dose to construction workers
- 12.5 - Radiation protection program (Appendix 12AA)
- SUP material and COL items

FSAR Chapter 13
Conduct of Operations

- Mostly IBR of DCD; STD SUP 1.1-1
- 13.1 - Organization – generic terms
- 13.2 - Training
- EP (13.3) and SGI (13.6) are separate documents
- 13.4 – Operational Programs
- 13.5 – Procedures
- 13.7 – Fitness for duty (not in DCD)
- SUP material and COL items

FSAR Chapter 14
Initial Test Program

- Mostly IBR of DCD
- ITAAC criteria
- ITAAC screening
- SUP material and COL items

FSAR Chapter 15 Accident Analysis

- Mostly IBR of DCD
- Tank failure analysis moved to Chapter 2
- SUP material and COL items

FSAR Chapter 16
Technical Specifications

- Mostly IBR of DCD
- 16.1 – Plant specific TS in Part 4
- SUP material and COL items

FSAR Chapter 17 Quality Assurance

NuStart Energy

- Mostly IBR of DCD; STD DEP 1.1-1
- Quality assurance program description (QAPD) in Part 11
- 17.5 & 17.6 not in DCD
- SUP material and COL items

FSAR Chapter 18
Human Factors Engineering

- **Mostly IBR of DCD**
- **BLN DEP 18.8-1 – Moved TSC & OSC**
- **SUP material and COL items**

FSAR Chapter 19
Engineered Safety Features

- **Mostly IBR of DCD**
- **SUP material and COL items**

DCWG Issues

- **Finality (certified design)**
- **Threshold for changes (level of detail)**
- **Configuration management for standard content**
- **NEI Level (COL Task Force)**
  - Evolving regulation and guidance
  - Construction inspection
  - Electronic submittal guidance
  - Templates (RP/ALARA, QAPD, Training)
- **Technical issues**
  - Operational programs
  - Seismic
  - DAC

NuStart Energy[sm]

AP1000 Plant Specific Issues Summary to ACRS

Amy Aughtman
Southern Nuclear, Vogtle 3&4 COL Lead
October 31, 2007

Plant Specific Issues

- Combination of site specific challenges
  - Sites with partially constructed plants
  - Sites with existing operating units
  - Greenfield site
- Site-specific issues, common approach where feasible
- High level of coordination within DCWG
- AP1000 Builders Group standardization efforts

Standardization of Site Specific Features

- Benefits
  - Supports COLA preparation and review
  - Supports URD conformance
  - Supports Design Finalization
  - Supports AP1000 fleet standardization philosophy and goals of making the plant design as standard as possible
  - Potential savings to utilities through efficiencies gained in design, procurement, construction and operation

Standardization of Site Specific Features

- Circulating Water pumps and pump intake structure
- Raw Water pumps and pump intake structure
- Training facilities
- Admin. Building
- Maintenance facilities
- Stand alone TSC
- Natural draft cooling tower and Mechanical draft cooling tower

Plant Specific Issues for Vogtle 3&4

- **Examples**
  - IBR ESP
  - LWA requested
  - Raw Water provided from combination of river water and groundwater
  - Consideration of hazards from existing co-located combustion turbine plant
  - Soil site
  - Switchyard design
  - Emergency Plan (Vogtle ESP)
    - Common Technical Support Center for four units
  - Organization description
  - Security Plan

NuStart Energy

Duke Energy

SOUTHERN COMPANY

SCE&G
A SCANA COMPANY

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Progress Energy

TVA

Bellefonte 3&4 | Lee Nuclear 1&2 | Summer 2&3 | Vogtle 3&4 | Harris 2&3 | Levy 1&2

U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

Amendment Process for certified designs

Jerry N. Wilson, PE
Division of New Reactor Licensing
Office of New Reactors

§ 52.63 Finality of standard design certifications

(a)(1) Amendment via rulemaking:

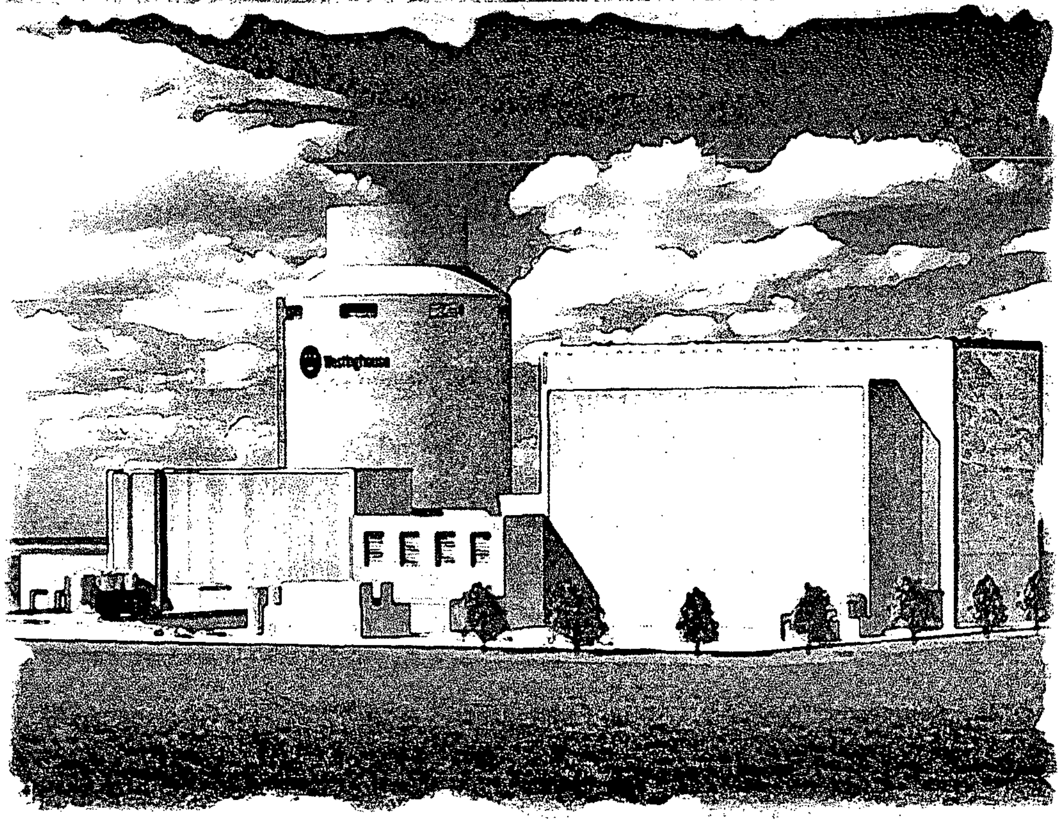
- (i) Compliance exception
- (ii) Adequate Protection Back-fit
- (iii) Reduce unnecessary regulatory burden
- (iv) Complete design acceptance criteria
- (v) Correct material errors
- (vi) Substantial Increase Back-fit
- (vii) Contributes to increased standardization

(a)(2) Cost/benefit consideration for plants licensed or under review

(a)(3) Any modification the NRC imposes on a design certification rule under paragraph (a)(1) of this section will be applied to all plants referencing the certified design, . . .

AP1000
Presentation to the ACRS

October 31, 2007



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Opening Remarks

Ed Cummins, Vice President
Regulatory Affairs and Standardization

AP1000

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Introduction

Andrea Sterdis, Manager
AP1000 Licensing and Customer Interface

October 31, 2007

AP1000

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Agenda

AP1000

•8:15	Design Certification Overview	Andrea Sterdis
•8:45	Technology Overview	Jim Winters
•9:10	Passive Safety Systems	Terry Schulz
•9:40	Defense-In-Depth	Terry Schulz
•9:55	I&C	Andrea Sterdis
•10:15-10:30	BREAK	
•10:30	Structures Secondary Systems Electrical Systems Fire Protection	Jim Winters

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Agenda (continued)

AP1000

- 11:15 Design Certification Amendment Process — Jerry Wilson
- 11:30-12:15 LUNCH
- 12:15 DCWG and R-COLA Issues — Peter Hastings
- 1:45 Subsequent COLA — Amy Aughtman
- 2:15 Wrap-up

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Design Certification Overview

Andrea Sterdis

October 31, 2007

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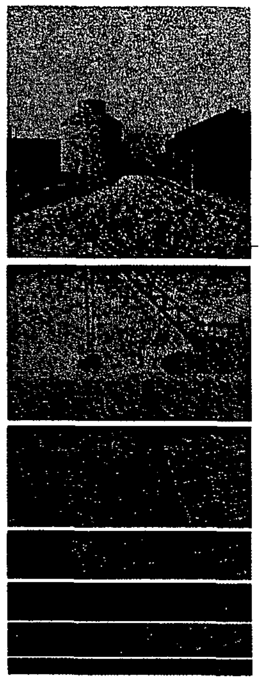
AP1000 Design Certification Application

- Submitted DCD and PRA March 28, 2002
  - AP1000 Design Control Document (DCD) – 7000 pages
    - Tier 1 Information
      - Inspections, Tests, Analysis and Acceptance Criteria (ITAAC)
    - Tier 2 - Information
      - Standard Safety Analysis Report
      - Technical Specifications
      - PRA Insights
  - AP1000 PRA Report submitted – 4500 pages
    - Detailed Level 1, 2, 3 including shutdown, fires, floods
    - Addresses severe accident phenomenum

Design Certification Rulemaking



The United States
Nuclear Regulatory Commission

hereby certifies the

AP1000 Standard Plant Design

as set forth in Appendix D of 10 CFR Part 52
Dated the 23rd day of January 2006.

Director
Office of Nuclear Reactor Regulation

Chairman
U.S. Nuclear Regulatory Commission

Design Certification Approved December 30, 2005

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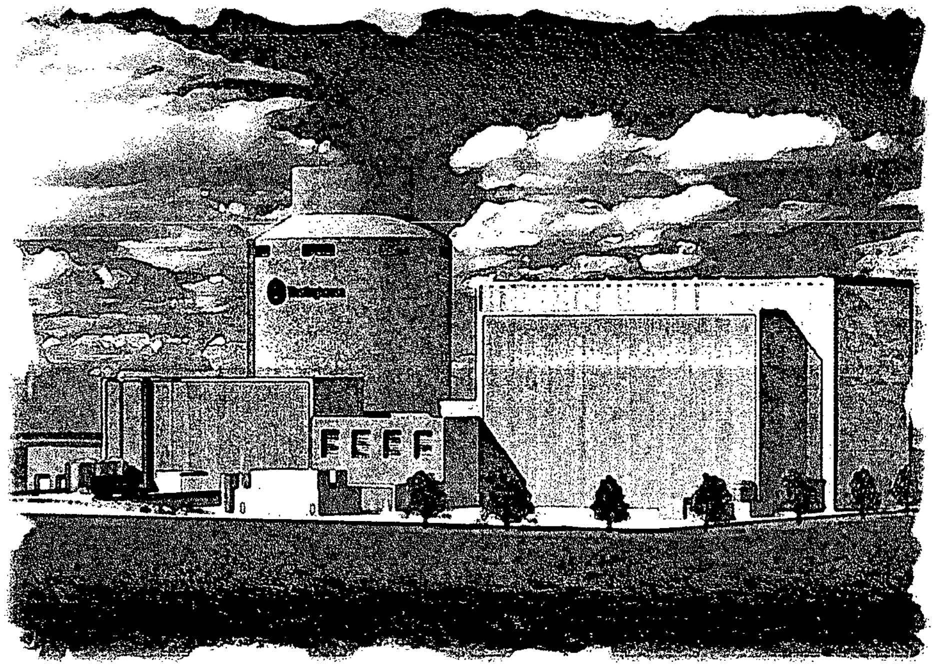
Design Certification

AP1000

- Provides Licensing Finality for Design
- Establishes Regulatory Bases
- Identifies COL Information Items



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COLA Content Defined by DC Rule

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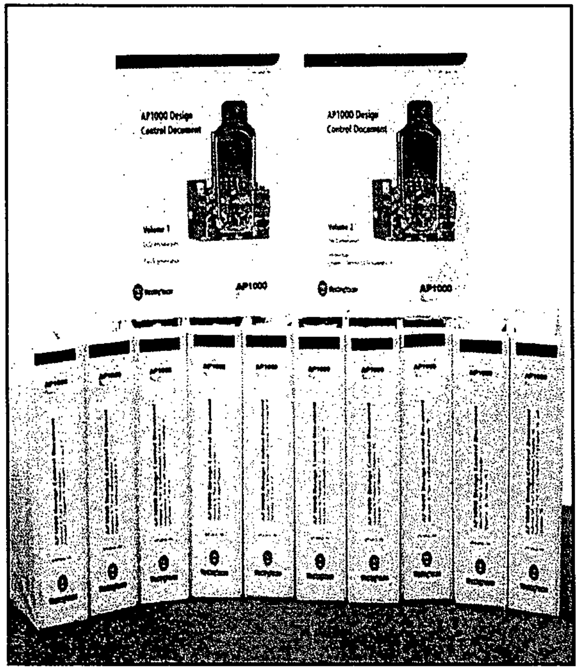

175 COL Information Items

- DC Amendment
- R-COLA
- S-COLA

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Technical Report Generation

AP1000

- Standard Design COL Information Items
- Design ITAAC areas
  - Piping
  - I&C (PMS Design)
  - Main Control Room/Human Factors Engineering
- Limited number of design changes
  - Design Finalization
  - Customer Input—Standard Plant

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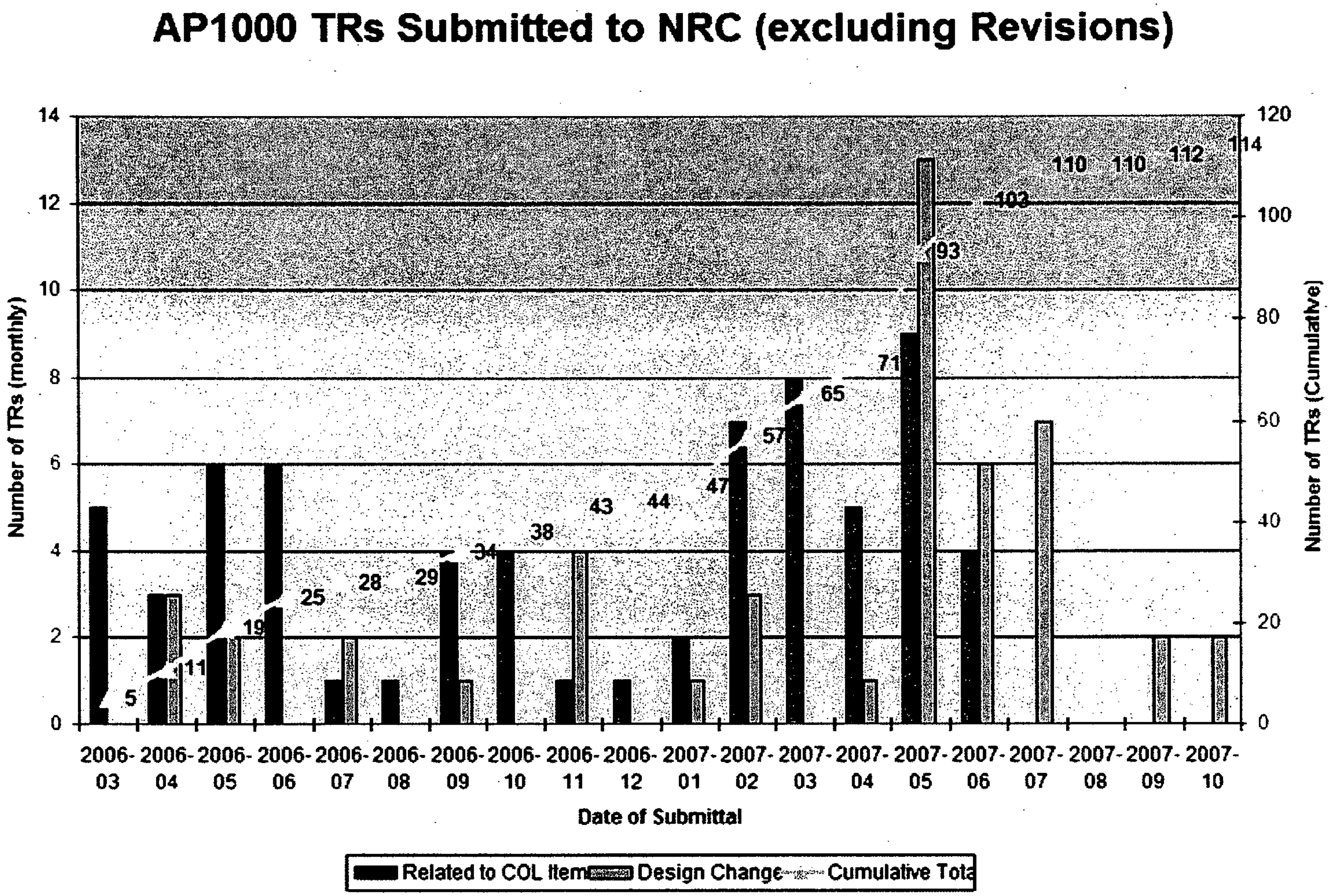
Technical Report Submittals

AP1000



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Technical Report Subjects

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- 63 to address COL Information Items
- 47 to justify design changes that impact DCD content
- 2 to address standardization for COLA content
- TR 135 provides SAMDA confirmation for design certification amendment
- TR 134 provides DCD Post-Revision 16 impacts to support COLA standardization

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NRC Status of TR Reviews

AP1000

- Approximately 500 RAIs received
  - Varying levels of safety/regulatory significance
  - 460 responses provided
  - Less than 40 still outstanding
  - Approximately 120 resulting in TR revisions
  - Approximately 60 resulting in DCD revisions

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Design Certification Amendment

AP1000

- Application submitted May 29, 2007 (DCD Revision 16)
- 10 CFR 52 Revision Effective September 27, 2007
- Transition from Technical Report Review to Integrated DCD Revision Review
- Acceptance Review Issues
  - Technical
  - Process
- Acceptance Review to Begin November 5, 2007

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Design Certification Amendment

AP1000

- Extension of seismic spectra to soil conditions
- Revision of buildings for enhanced protection
- Update of fuel design approach
- Protection system I&C update
- Update of electrical system
- Progress on HFE
- Turbine manufacturer change

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Post-Revision 16 Configuration Control

AP1000

- AP1000 COL Applications Reference DCD Revision 16 + Post-Revision 16 Changes
  - Editorial/Consistency Impacts
  - Subsequent RAIs and Technical Report Impacts
  - COLA Standardization Impacts
- TR 134 Identifies Post-Revision 16 Changes

Result is COLA Standardization

Minimal Departures

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AP1000 DCWG Teamwork

- Licensing Issues
- Design Certification Amendment
- R-COLA
- S-COLA

Result is Licensing Standardization

AP1000 Overview

Jim Winters

412-374-5290

winterjw@westinghouse.com

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AP1000 is Different

AP1000 is Different

AP1000

- Plant
  - Entire plant
  - Passive design
- Philosophy
  - One design
  - No changes

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The Plant

AP1000

- Our Design Certification includes:
  - Containment
  - Auxiliary Building
  - Annex Building
  - Turbine Building
  - Radwaste Building
  - Diesel Generator Building
  - Everything in buildings
  - Associated yard structures
- It is based upon:
  - Passive Design
  - Passive Core Cooling
  - Passive Control Room Habitability
  - Passive Containment Cooling
  - Passive Seismic Fire Protection
  - Passive Security Features

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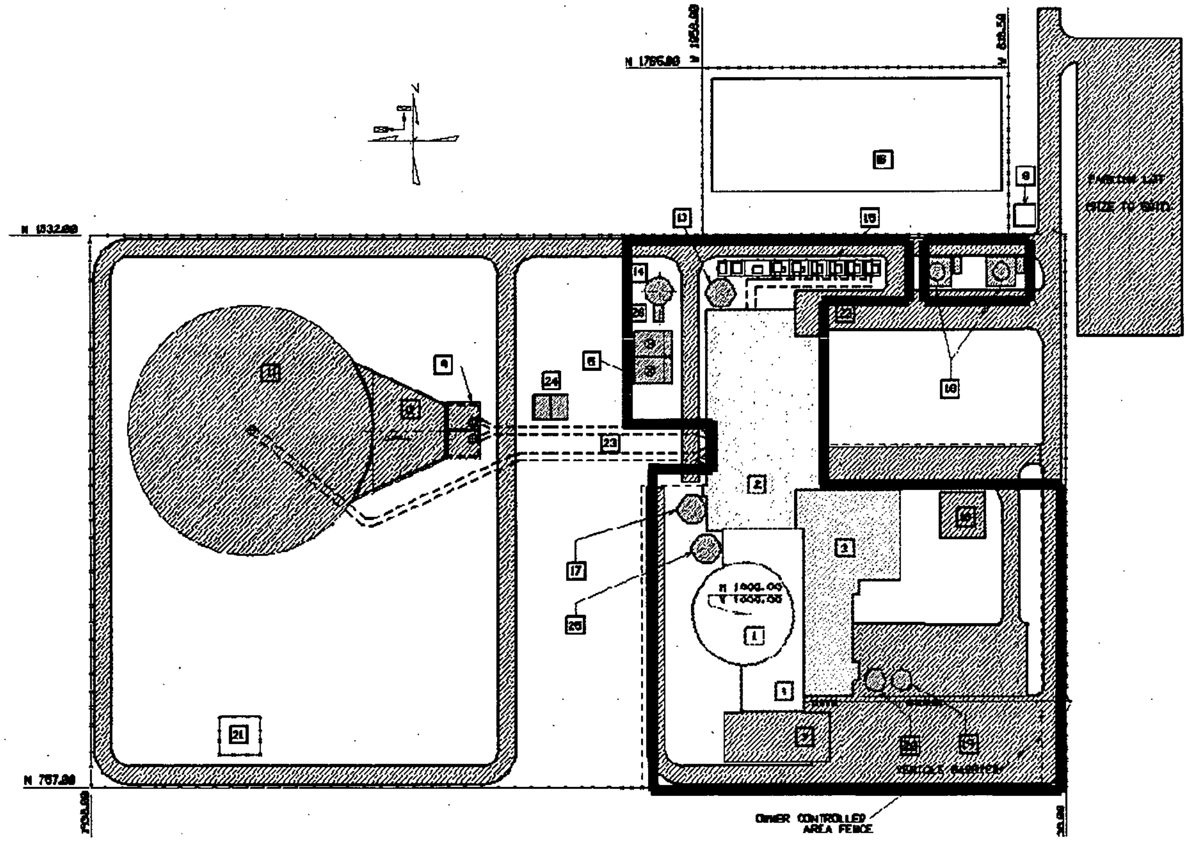
Entire Plant

AP1000



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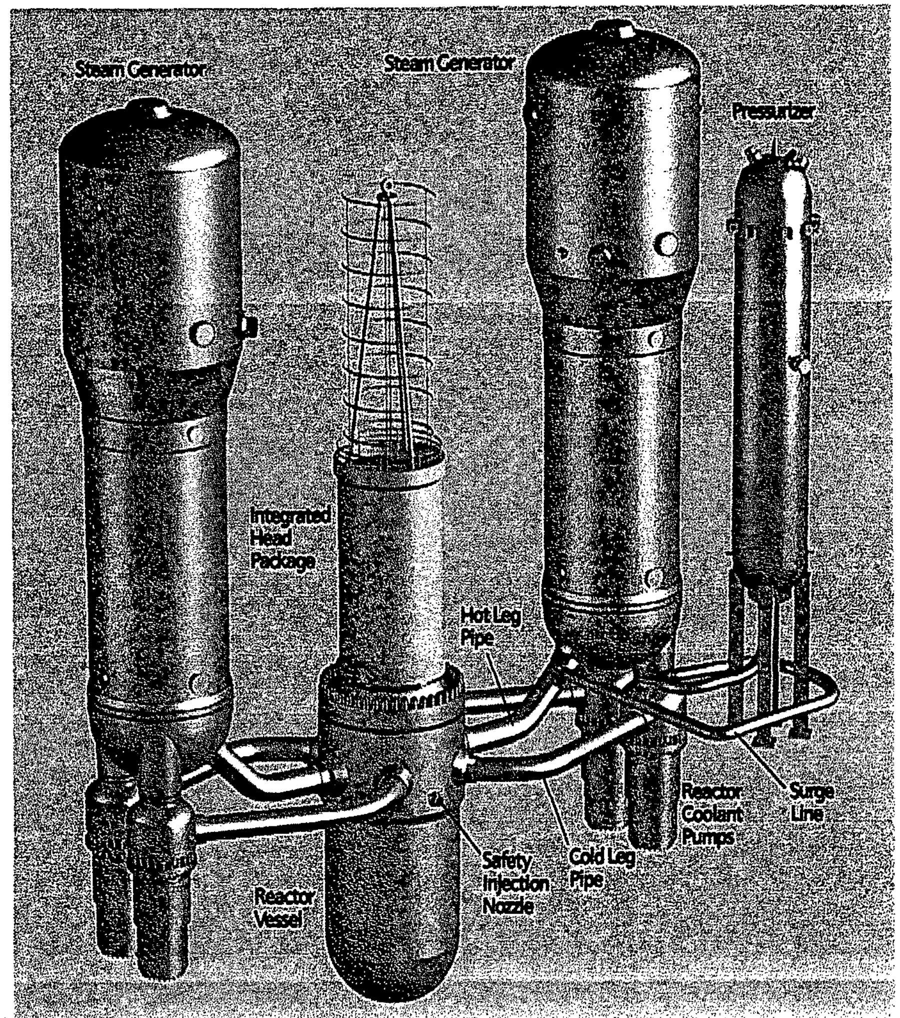
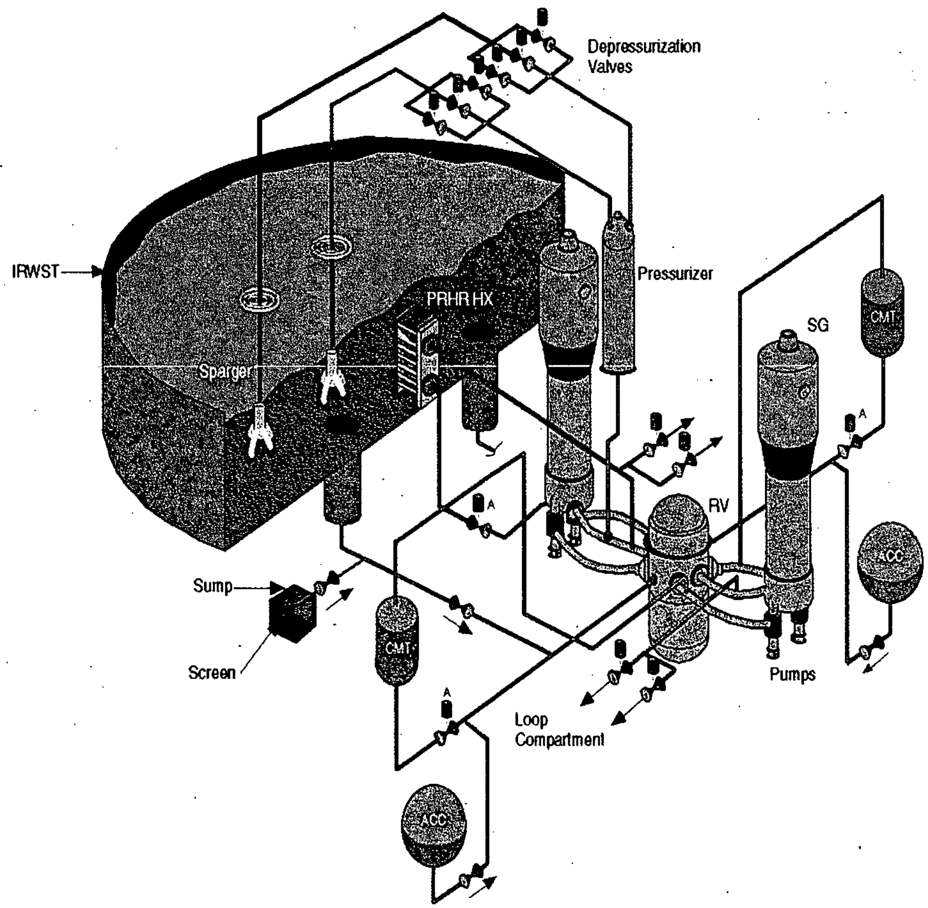
Reactor Coolant System

AP1000

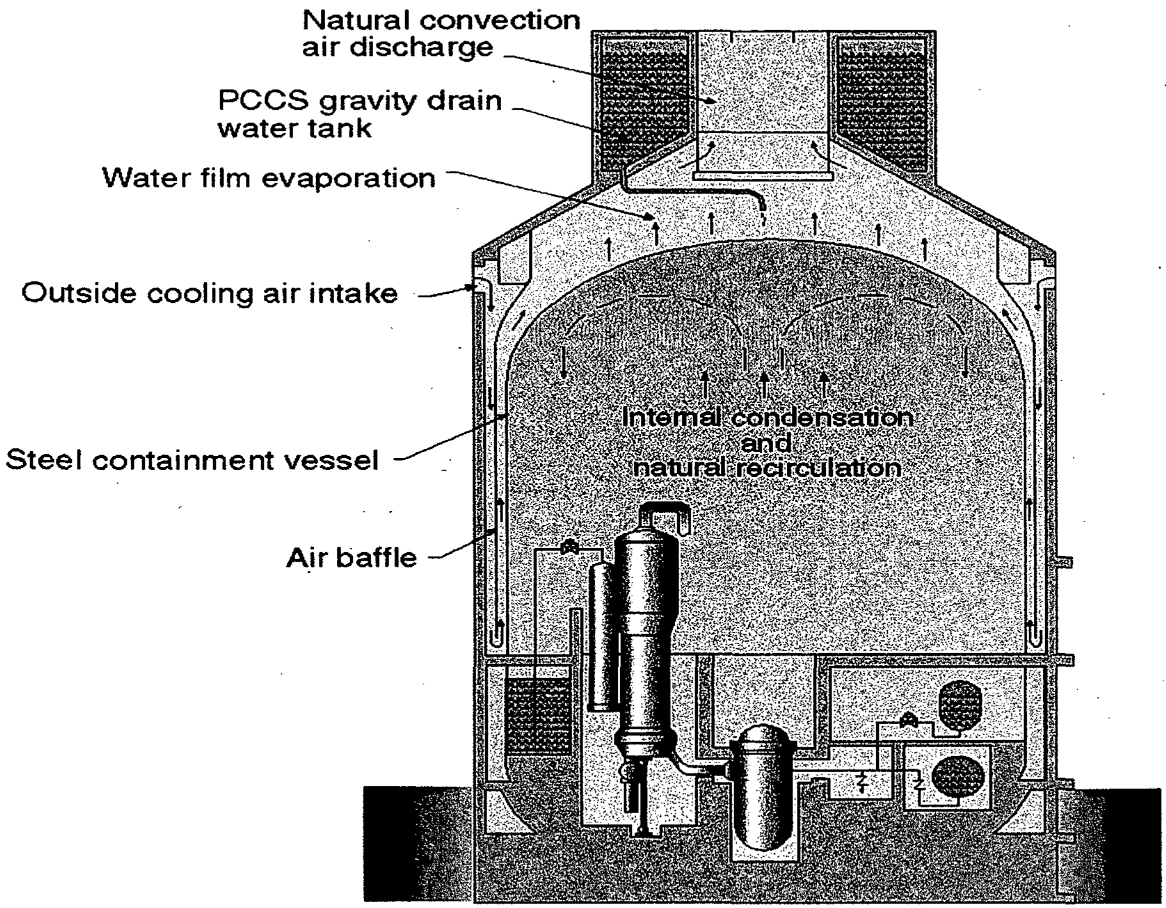
- **Reactor Vessel**
  - **W 3XL Vessel**
  - **No bottom-mounted instrumentation**
  - **Improved materials - 60 yr life**
- **Δ125 Steam Generators**
  - **ANO RSG**
- **Reactor Coolant Pump**
  - **Canned motor pumps**
    - **AP600, early commercial reactors**
- **Simplified Main Loop**
  - **Same as AP600**
  - **Reduced welds / supports**



AP1000 Passive Core Cooling System



Passive Containment Cooling System AP1000



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Simplification of Safety Systems Dramatically Reduces Building Volumes

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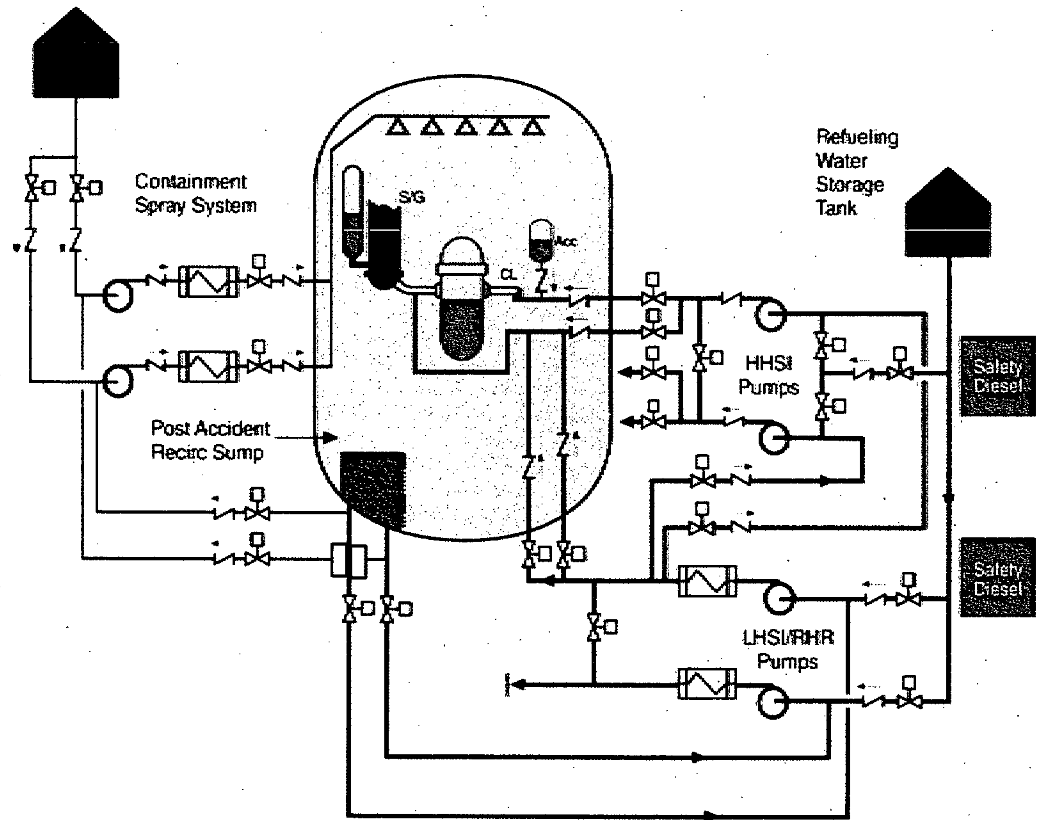
Standard PWR



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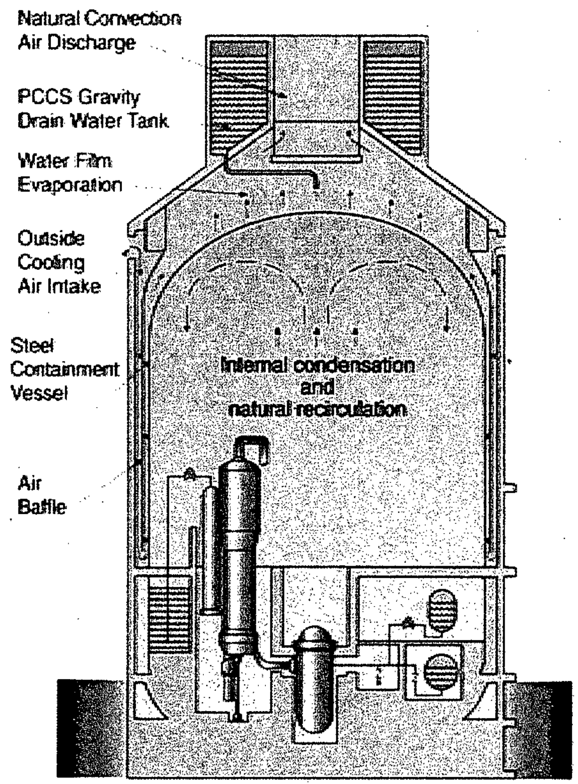

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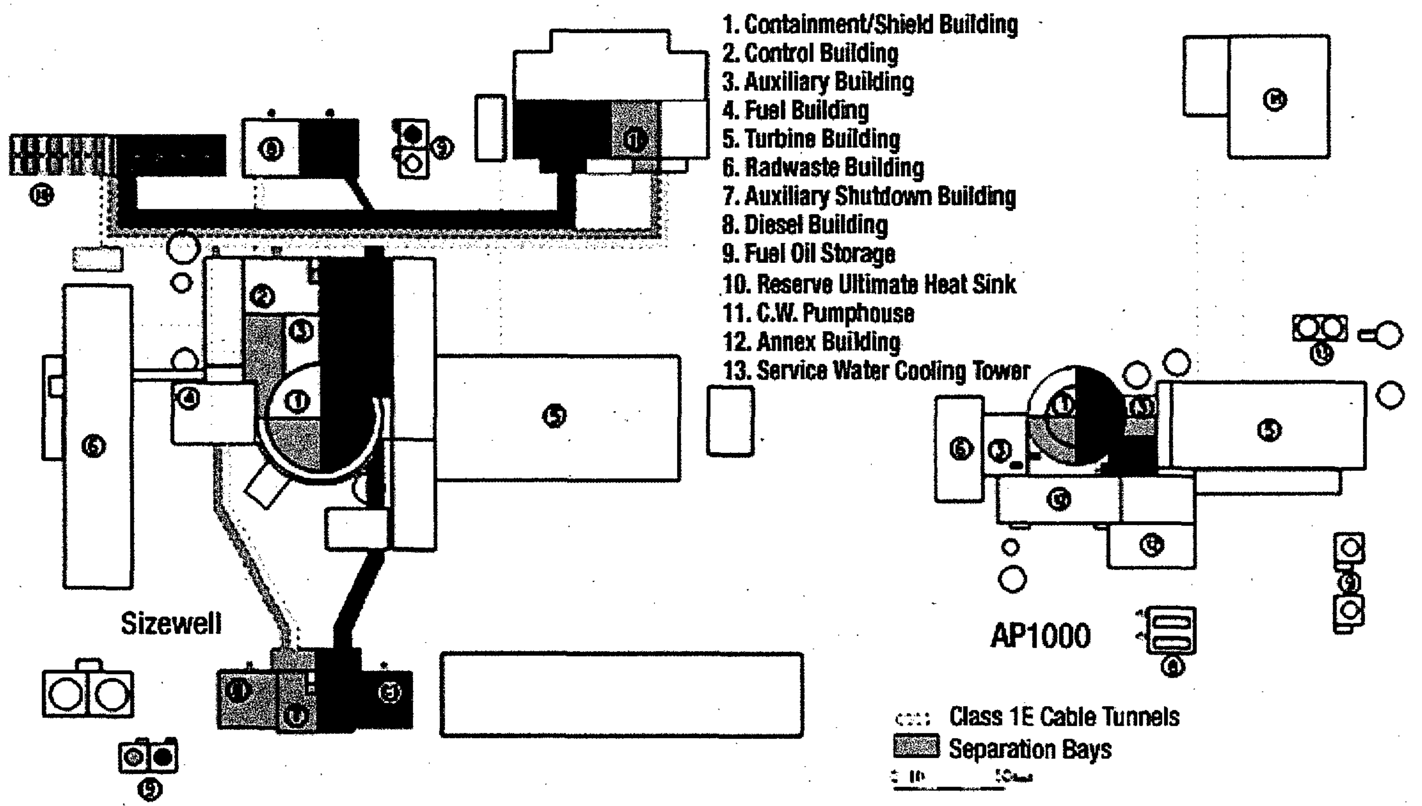
AP1000 Smaller and Dramatically Simpler than Evolutionary Plants

AP1000



Sizewell B

AP1000

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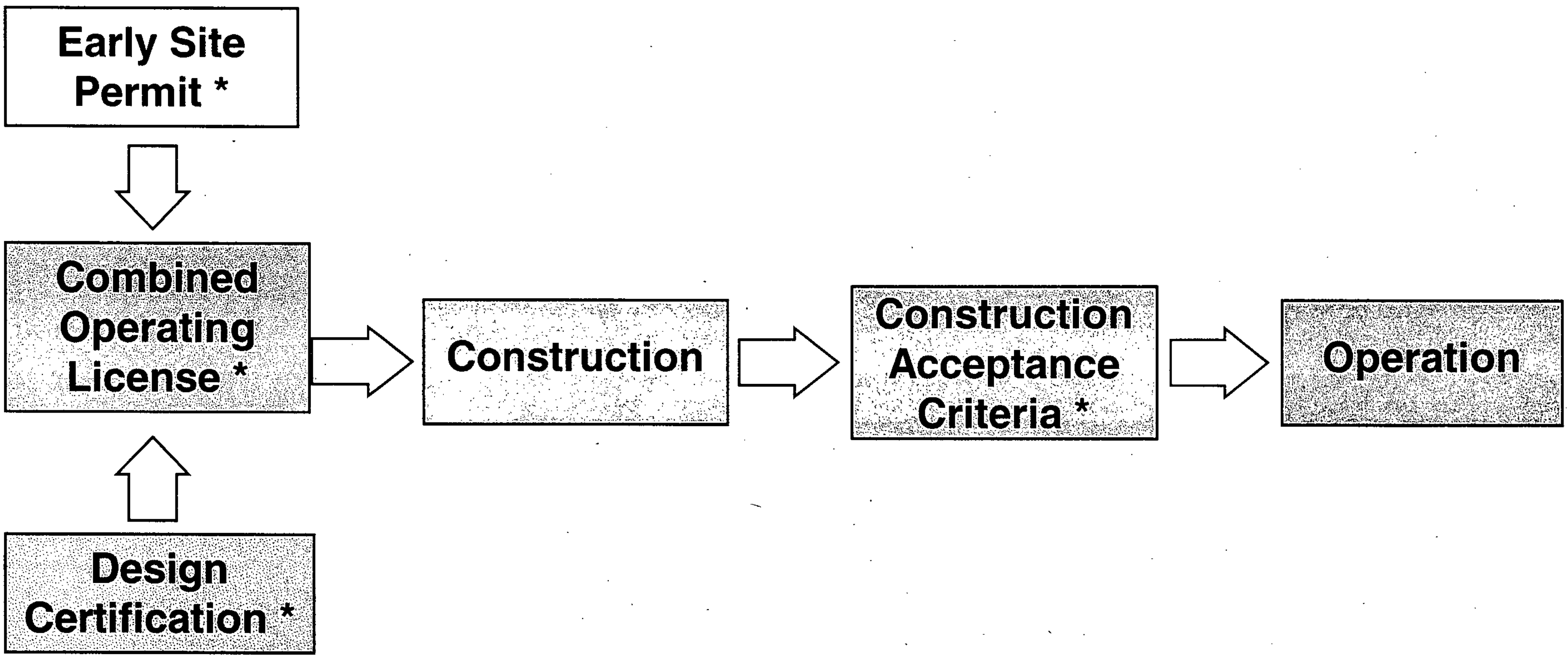
The Philosophy

- One Design (Class Mentality)
  - One Design Certification
  - 24 potential plants today (12 in the U.S.)
  - Buyers Group in the U.S.
  - Single, active, multi-COLA Design Centered Working Group
  - Design meets URD

Regulatory Process

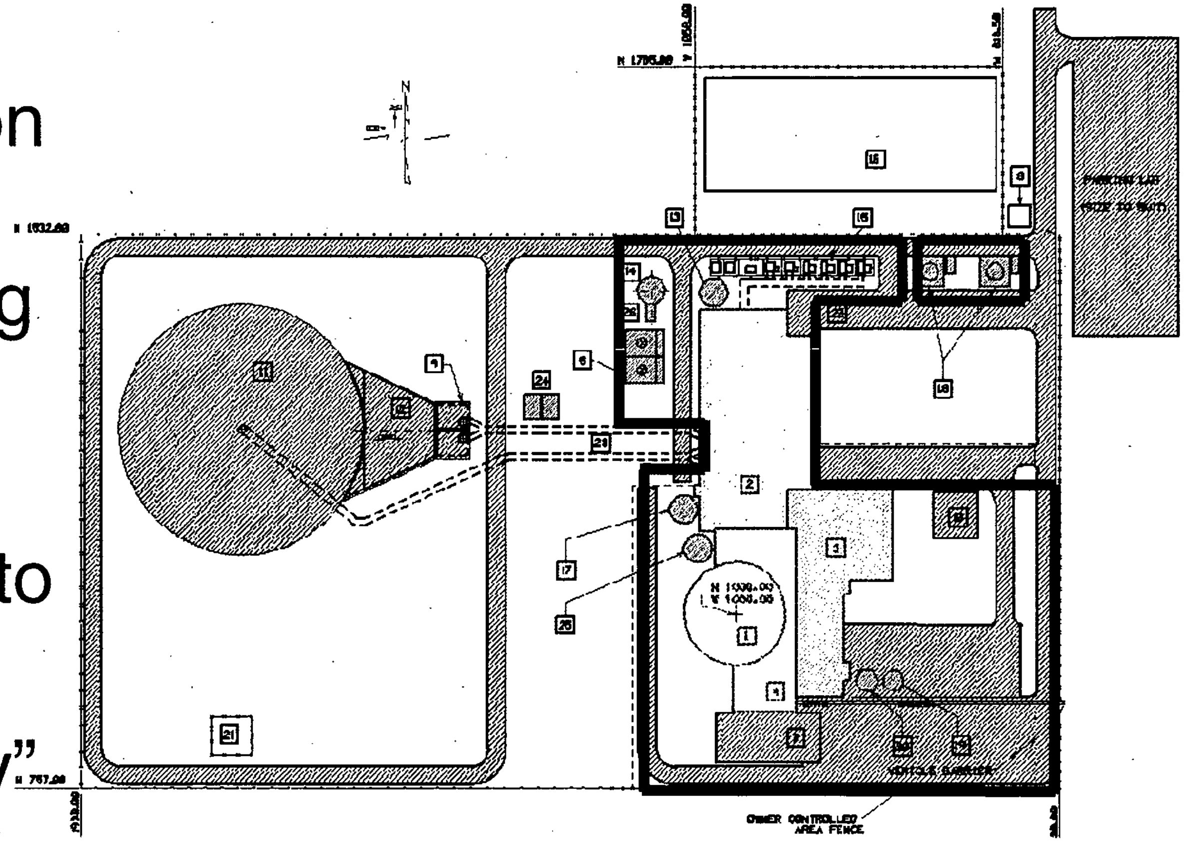


* Public Comment Opportunity

AP1000 Design Certification

AP1000

- Goal of AP1000 Design Certification was to achieve maximum licensing basis closure for design aspects
- Scope not limited to NSSS
- Outside "boundary" is site specific and non safety.



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The Philosophy (cont.)

AP1000

- "No" changes
  - Design must be safe and correct
  - Design Certification is for entire plant
  - Each difference from Design Certification must be identified in each COL (added NRC and public review)
  - Additions and additional details are not changes
  - We have a graded approach to design change "burden"

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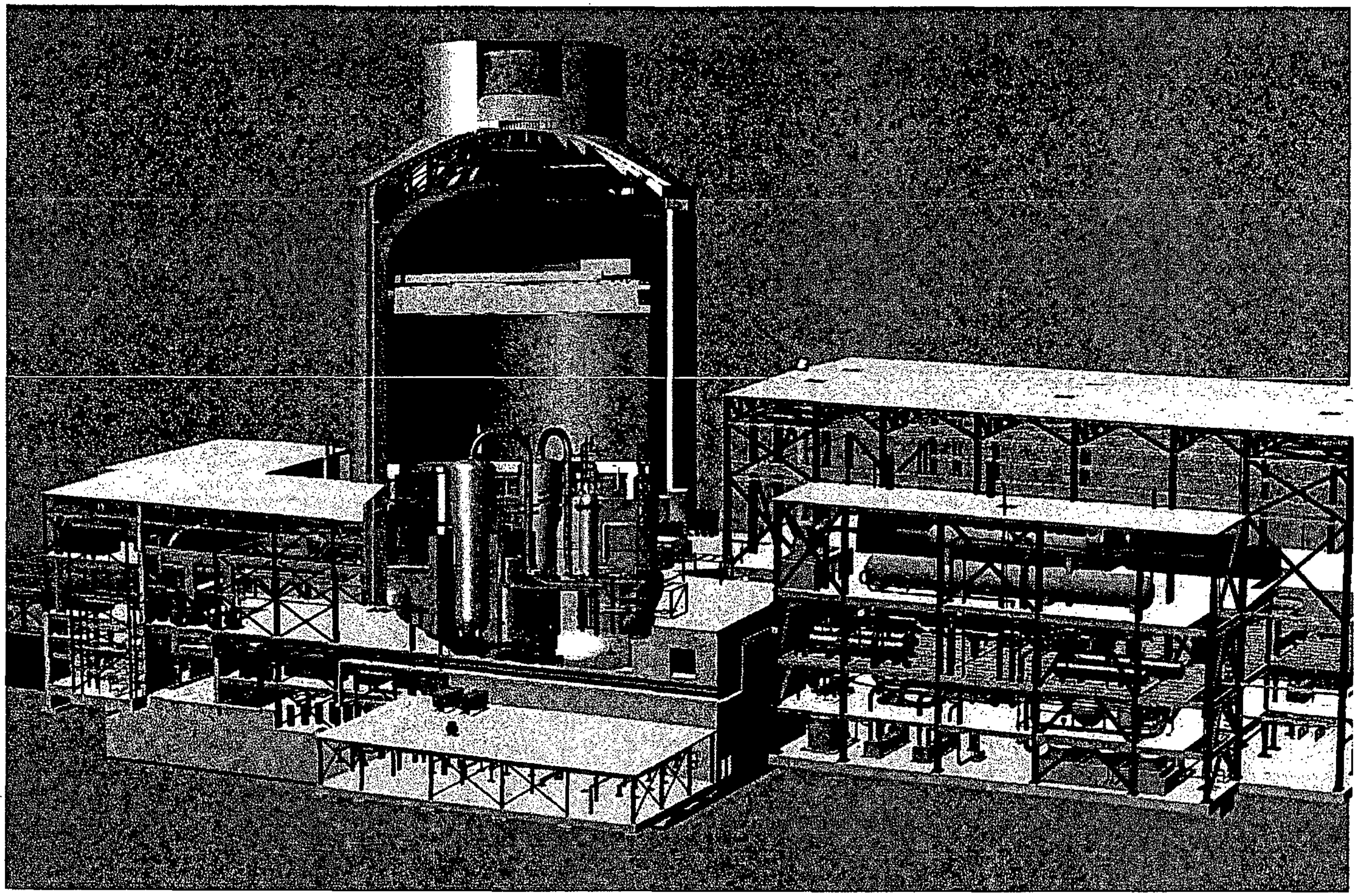
AP1000 3D Model

AP1000



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AP1000 Passive Systems

Terry Schulz

Westinghouse

AP1000 Approach to Safety

AP1000

- Passive Safety-Related Systems
  - Use “passive” process only, no active pumps, diesels, ...
    - One time alignment of valves
    - No support systems required after actuation
      - No AC power, cooling water, HVAC, I&C
  - Greatly reduced dependency on operator actions
  - Mitigate design basis accidents without nonsafety systems
  - Meet NRC PRA safety goals without use of nonsafety systems
- Active Nonsafety-Related Systems
  - Reliably support normal operation
    - Redundant equipment powered by onsite diesels
  - Minimize challenges to passive safety systems
  - Not required to mitigate design basis accidents

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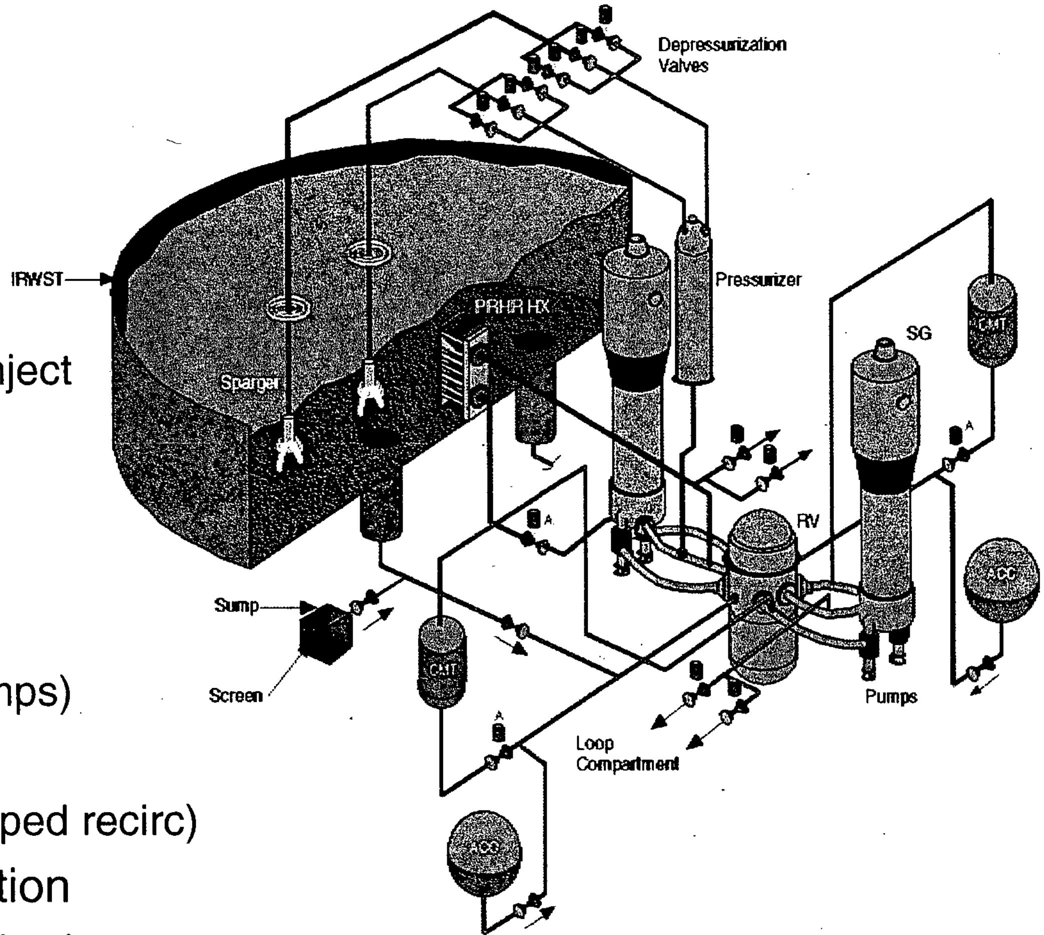
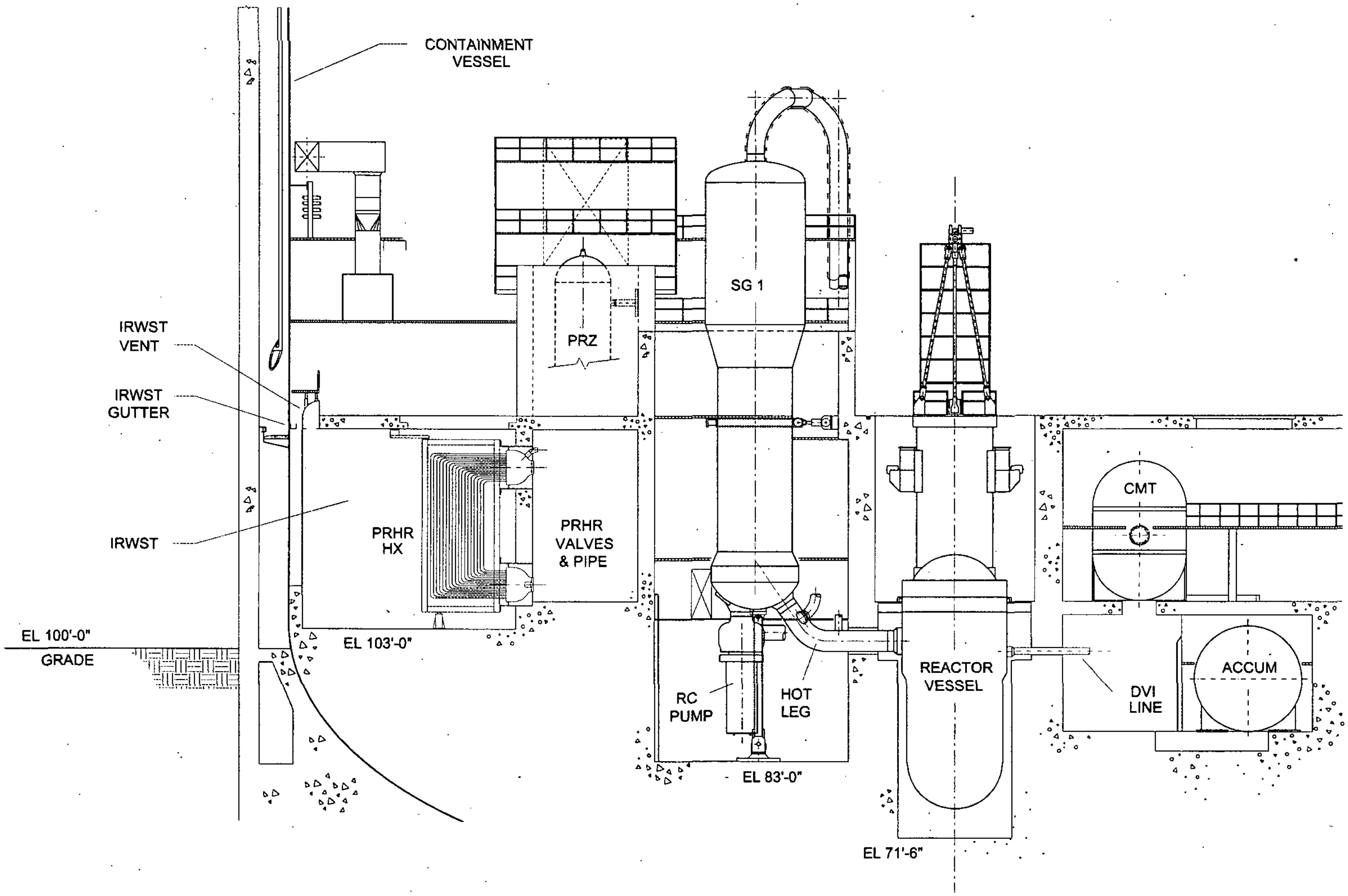
AP1000 Passive Core Cooling System

- PRHR HX
  - Natural circ. heat removal
    - Replaces AFWS pumps
- Passive Safety Injection
  - Core Makeup Tanks
    - Full RCS pres, natural circ. inject
    - Replaces HHSI pumps
  - Accumulators
    - Similar to current plants
  - IRWST Injection
    - Low pres (replaces LHSI pumps)
  - Containment Recirculation
    - Gravity recirc. (replaces pumped recirc)
  - Automatic RCS Depressurization
    - Staged, controlled depressurization
    - Stages 1-3 to IRWST, stage 4 to containment



PXS Equipment Layout

AP1000



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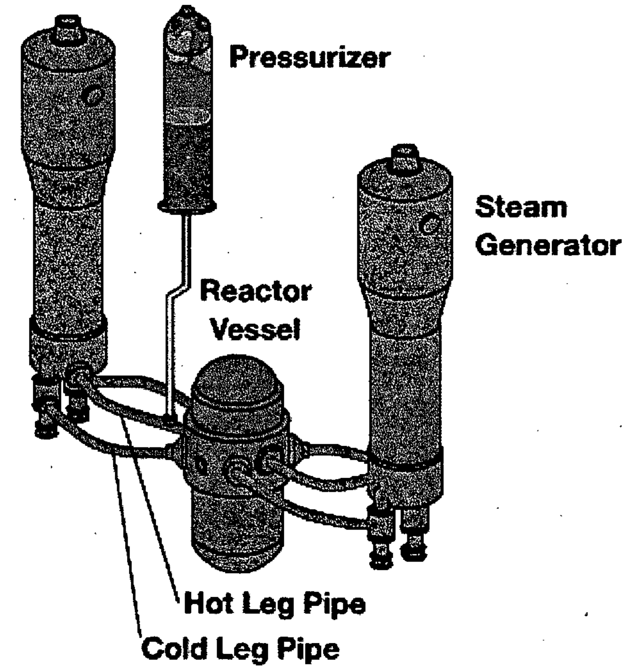
Passive Safety Injection Operation During a LOCA

AP1000



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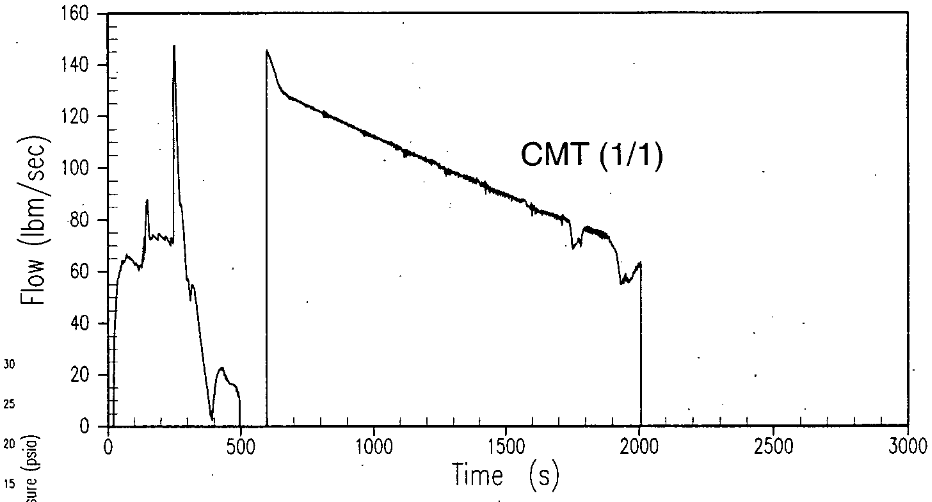
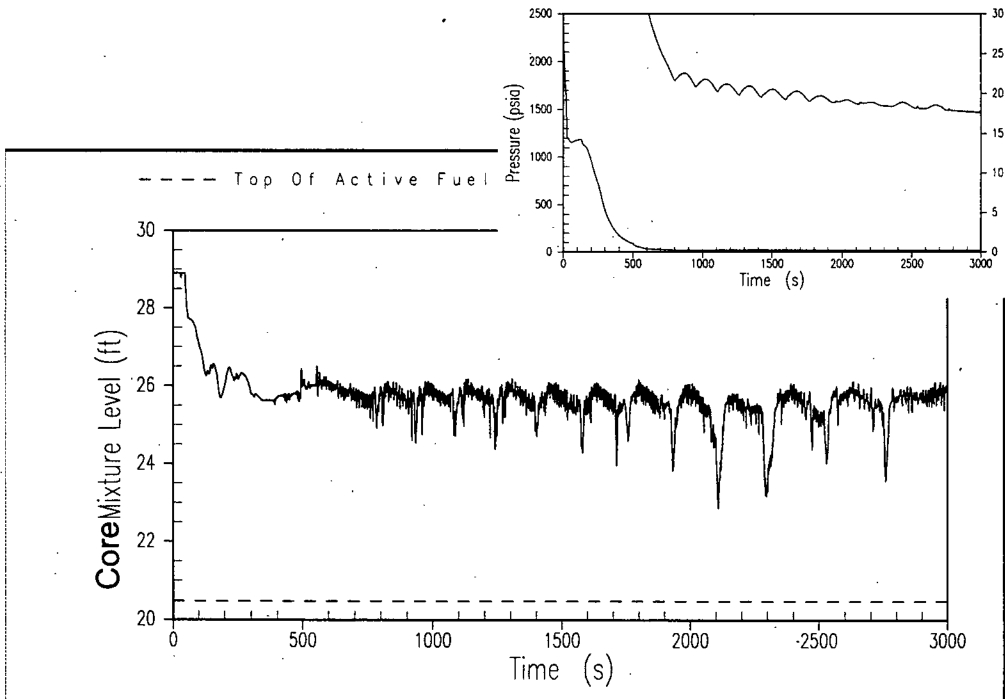
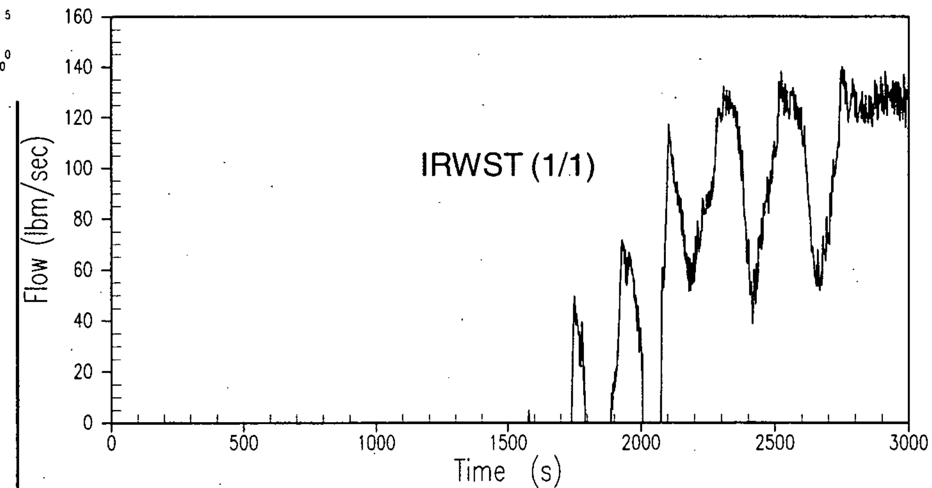
PXS Provides Improved Margin DVI LOCA Case (Limiting)

- PXS Provides Effective Core Cooling
  - CMTs, Accum and IRWST provide injection
    - 1/2 CMT, Accum, IRWST line spill to contain.
  - ADS effectively reduces the RCS pressure
  - Core remains covered with significant margin







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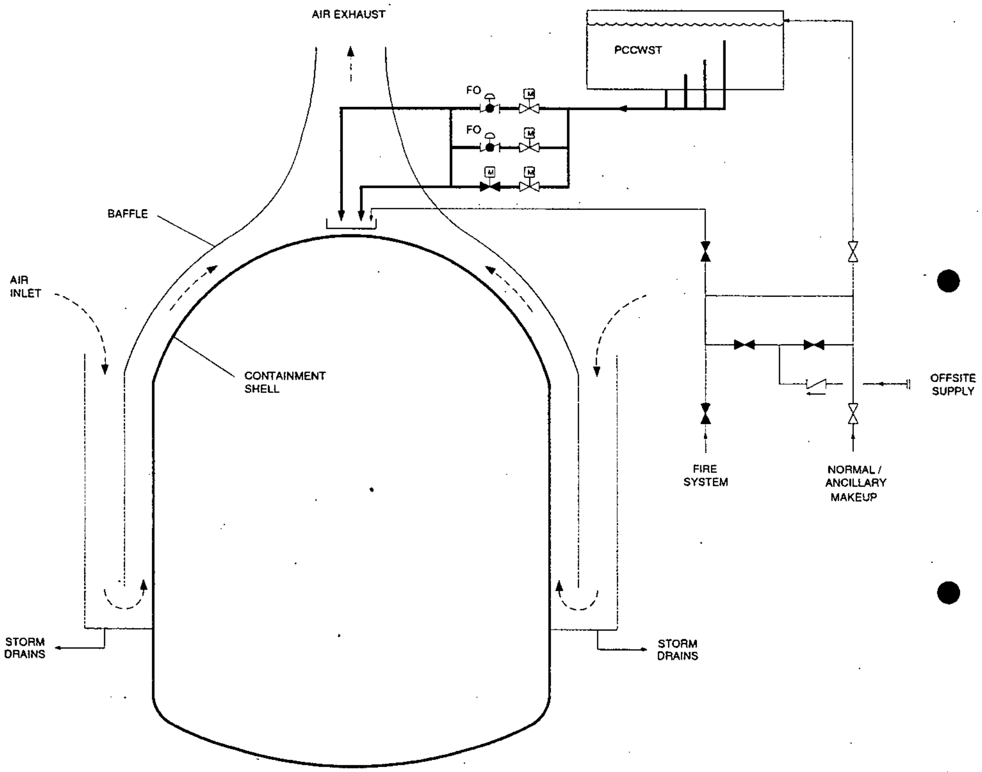
Passive Containment Cooling System

AP1000



- PCS Water Storage Tank
  - Provides 72 hr drain
    - Afterwards use on/offsite water
    - Air only cooling prevents failure
  - Flow decreases with time
    - 4 standpipes control flow
- PCS Flow Rates
  - High initial flow
    - Rapidly forms water film
    - Effectively reduces cont pressure
  - Later flows match decay heat
- 3 Redundant Drain Paths
  - 2 AOV, 1 MOV
  - Improves PRA reliability
- DCD Rev 16, Increase Wet Bulb Temp
  - Needed for Florida
  - No impact on containment pressure

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Passive Containment Cooling Operation During a LOCA

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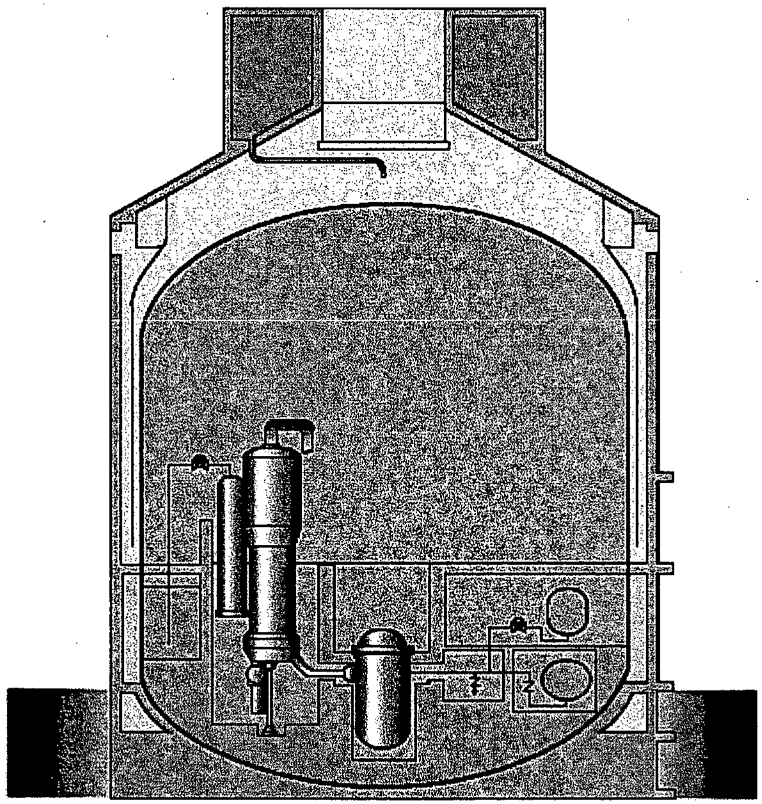

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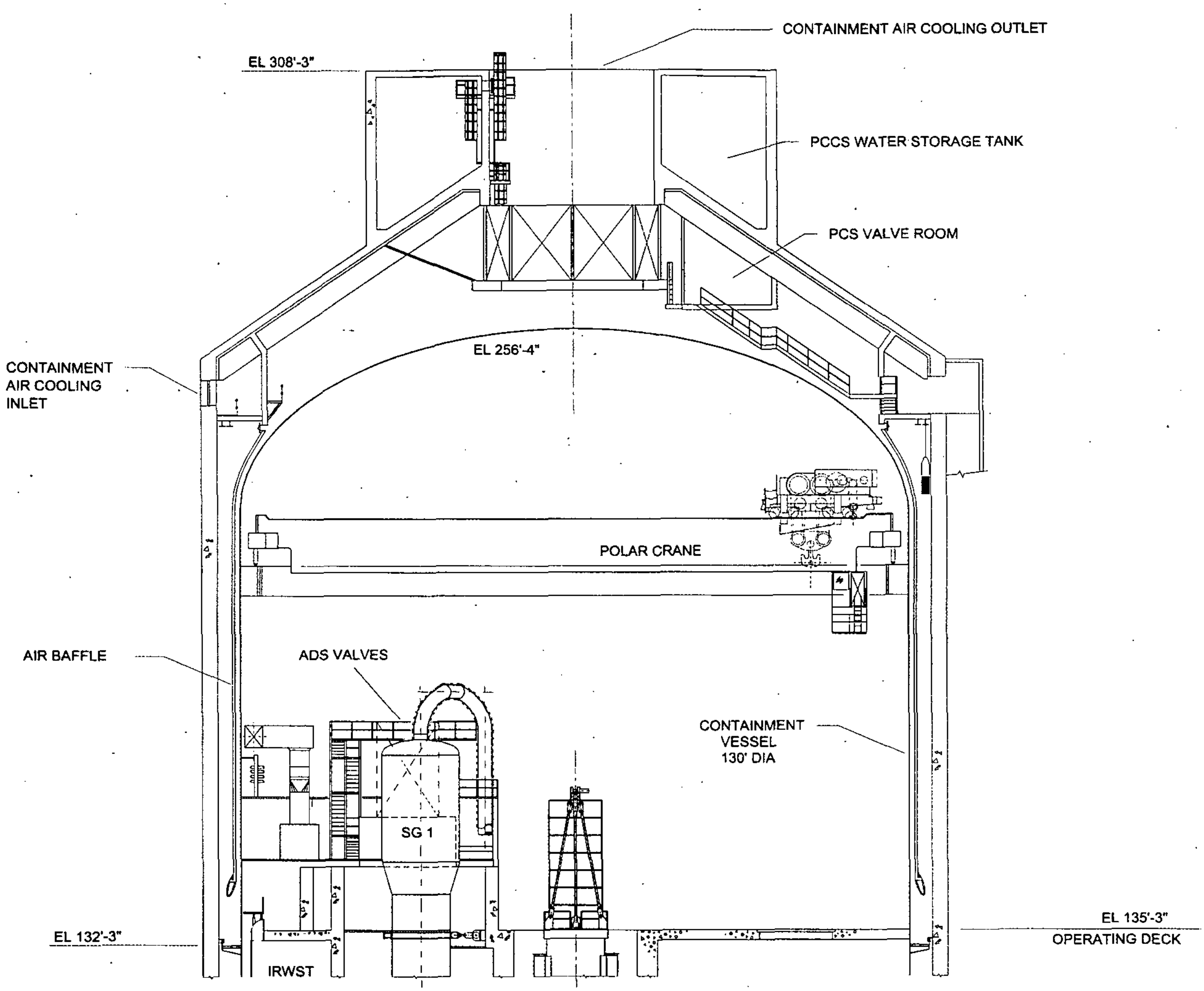
PCS Equipment Layout

AP1000



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PCS Provides Effective Cooling LB LOCA and Steam Line Breaks

AP1000

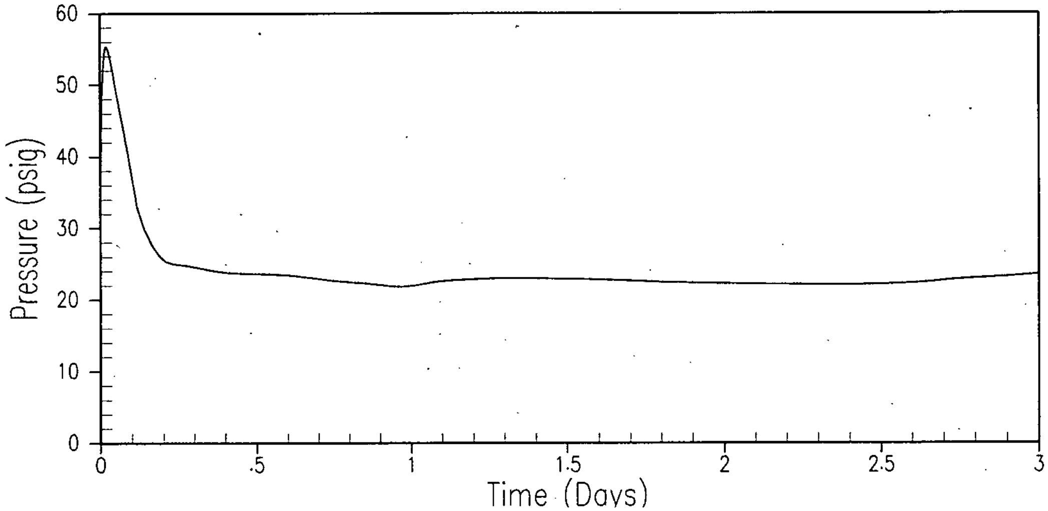
- **AP1000 Containment**

  Provides Increased Margins

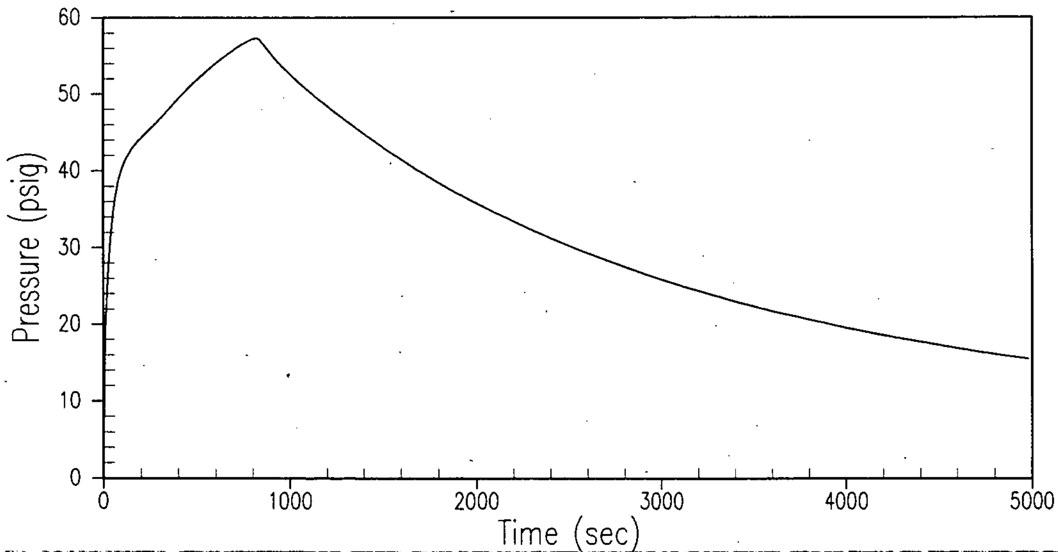
	AP600	AP1000
– LB LOCA	1.6	3.6
– MSLB	0.9	1.7

(Design - Peak pres (psi))

AP1000 DECL LOCA Containment Pressure



Main Steam Line Break Pressure



- **Main Steam Line Break is Limiting**
  - Not sensitive to passive containment cooling performance

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AP1000 Increases Safety Margins

AP1000

	Typical Plant	AP1000
• Loss Flow Margin to DNBR Limit	~ 10-14%	~15%
• Feedline Break (°F) Subcooling Margin	>0°F	~140°F
• SG Tube Rupture	Operator actions required in 10 min	Operator actions **NOT** required
• Small LOCA	3" LOCA core uncovers PCT <1500°F	< 8" LOCA **NO** core uncovery
• Large LOCA PCT (°F) with uncertainty	1700 - 2200°F	2124°F (1)
• ATWS, Pres (psig) (% core life)	3200 psig 90%	2800 psig 100%

Note (1) ASTRUM analysis shows AP1000 Large LOCA PCT is actually < 1600°F

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AP1000 Addresses Contain. Recirculation Debris Issue

AP1000

- No Fiberous Debris Generated by LOCA
  - Most operating plants use fiberglass insulation; significant fiber generated
  - In AP1000 all insulation in LOCA jet zone is RMI; no fiber generated
- Enhanced Debris Settling
  - Deep floodup levels with low flows / velocities
  - Long delays before initiation of recirculation
- Protective Plates Above Screens
  - Prevents particles (coating debris, etc) from being transported to screens
- Large Screens Provided
  - Increased in DCD Rev 16; 280 ft^2 to 5000 ft^2
- Coatings Inside Containment
  - Non-safety related - if detached, will settle before reaching screens
  - Reduced use of coatings inside containment (stairs, cabinets, etc)

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Severe Accidents Addressed

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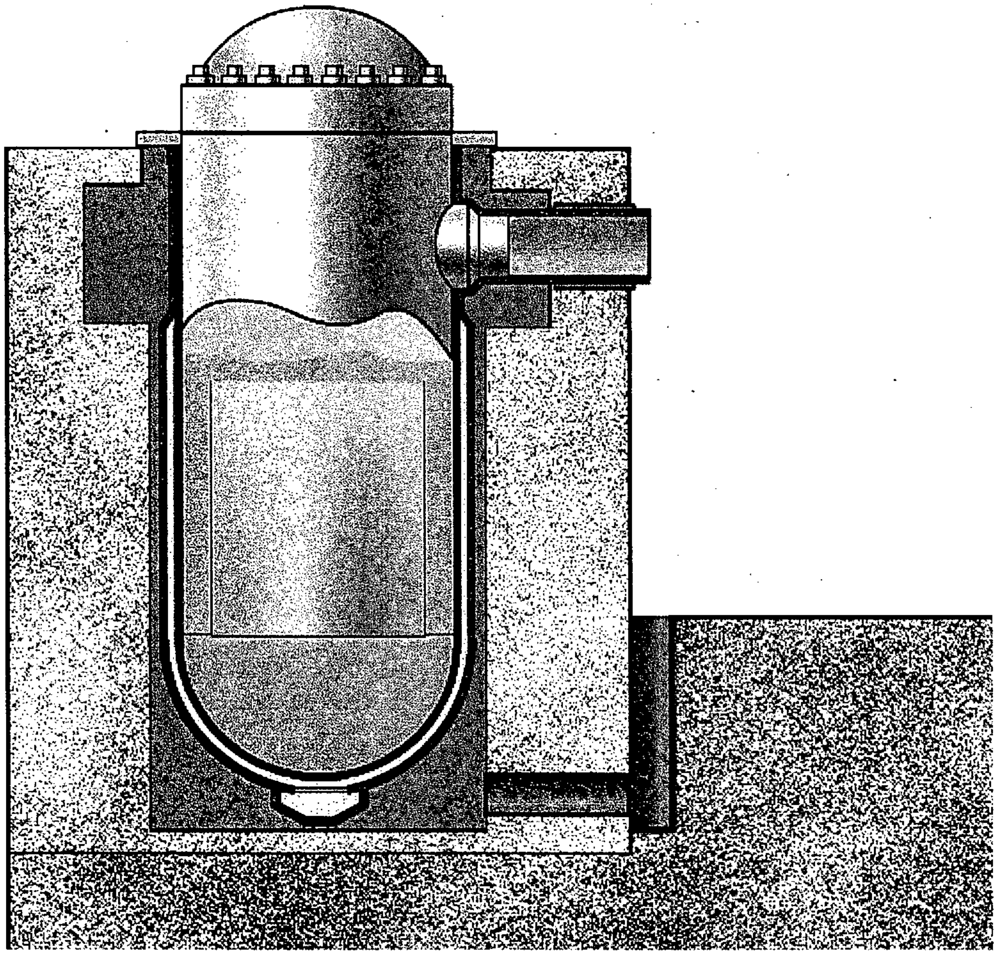

- Core-Concrete Interaction
  - Ex-vessel cooling retains damaged core
  - Tests and analysis of IVR reviewed by U.S. NRC
  - Prevents core-concrete interaction
- High Pressure Core Melt
  - Eliminated by redundant, diverse ADS
- Hydrogen Detonation
  - Prevented by redundant igniters and plant layout features
- Steam Explosions
  - Prevented by IVR
- DCD Rev 16 resolved COL item includes changes to RV insulation design

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AP1000 Defense in Depth

Terry Schulz

Westinghouse

AP1000 Active Nonsafety Features

AP1000

- Active Nonsafety Functions
  - Reliably support normal operation
  - Minimize challenge to passive safety systems
  - Not required to mitigate design basis accidents
  - Not required to meet NRC safety goals
- Active Nonsafety Design Features
  - Simplified designs (fewer components, separation not required)
  - Redundancy for more probable failures
  - Automatic actuation with power from onsite diesels
- Active Nonsafety Equipment Design
  - Reliable, experienced based, industrial grade equipment
  - Non-ASME, non-seismic, limited fire / flood / wind protection
  - Availability controlled by procedures, no shutdown requirements
  - Reliability controlled by maintenance program

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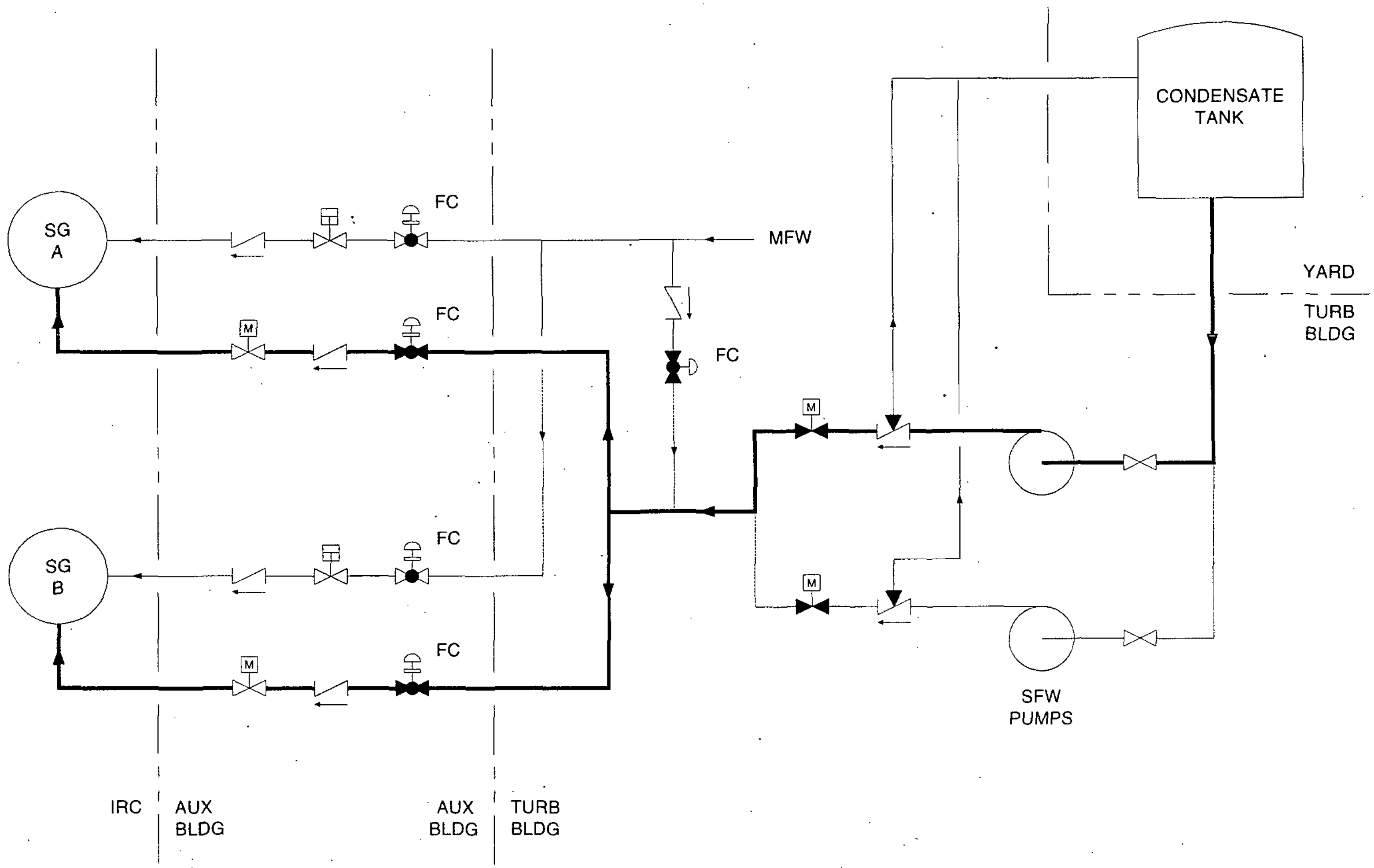
AP1000 Startup Feedwater System

AP1000



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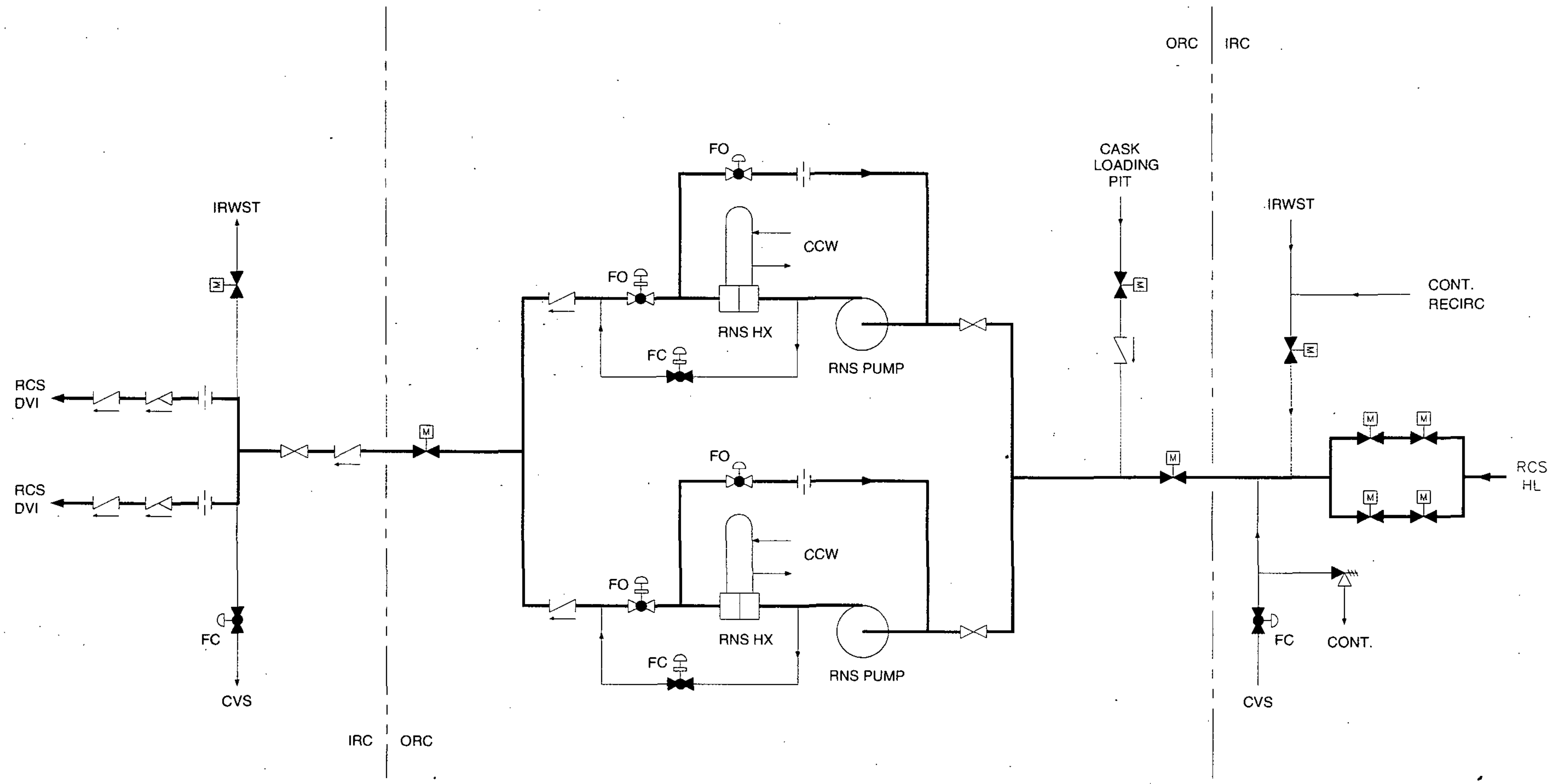
AP1000 Normal RHR System

AP1000



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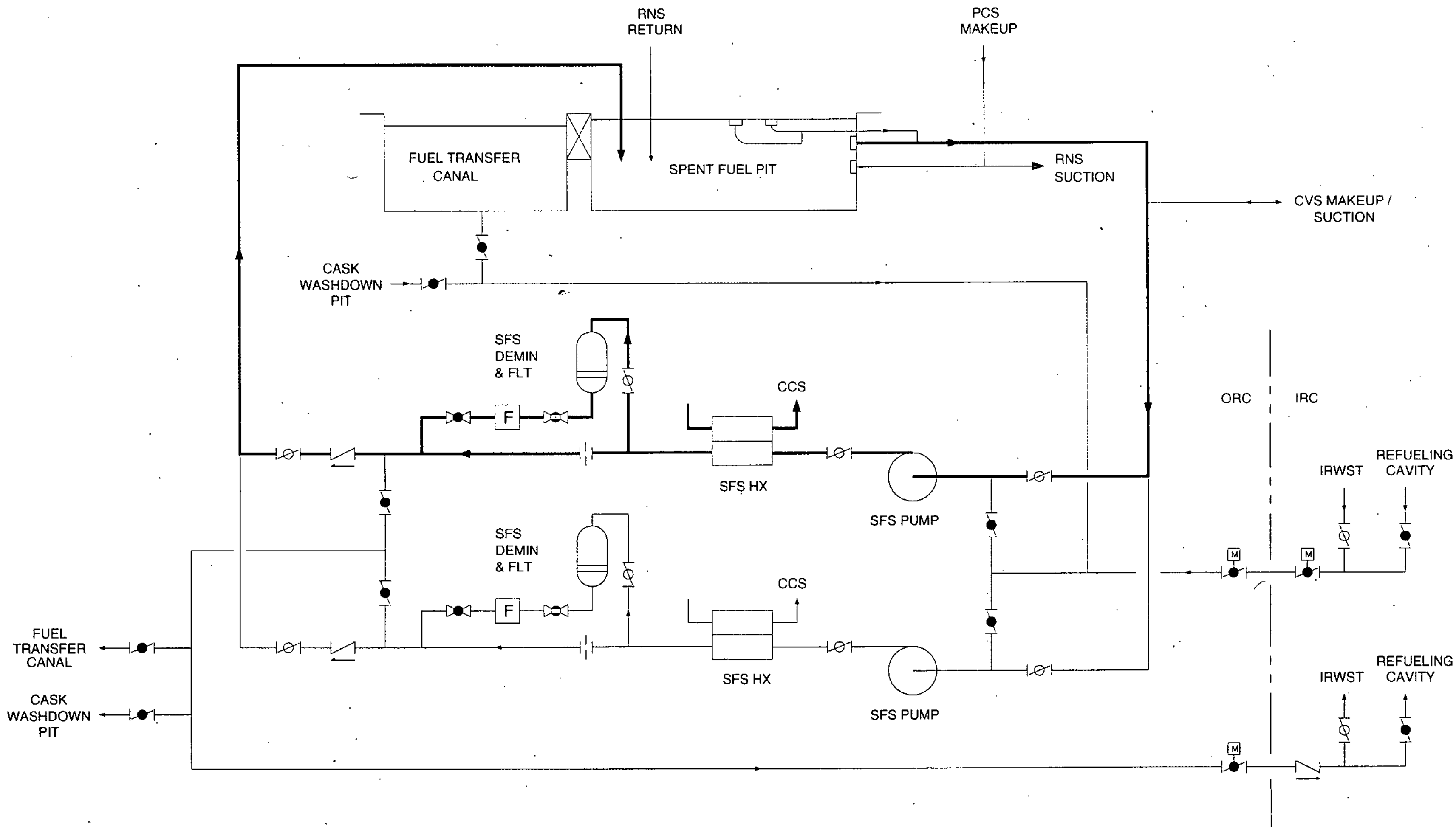
AP1000 Spent Fuel Cooling

AP1000



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Safety Spent Fuel Cooling Provided by Water Heatup, Boiloff

AP1000

Event	Time to Saturation(1) (hours)	Height of Water Above Fuel at 72 Hours(4) (feet)	Height of Water Above Fuel at 7 Days(4) (feet)
Seismic Event(2) – Power Operation Immediately Following a Refueling(7)	6.5	1.6	1.6
Seismic Event(8) – Refueling, Immediately Following Spent Fuel Region Offload(3)(7)	4.68	8.3	8.3
Seismic Event(8) – Refueling, Emergency Full Core Off-Load(3) Immediately Following Refueling(7)	1.37	8.3	8.3

- In DCD Rev 16, the spent fuel pool capacity has increased from 619 to 889 fuel assemblies.

Notes:

1. **Times calculated neglect heat losses to the passive heat sinks in the fuel area of the auxiliary building.**
2. **Seismic event assumes water in the pool is initially drained to the level of the spent fuel pool cooling system connection simultaneous with a station blackout. Fuel cooling water sources are spent fuel pool, fuel transfer canal (including gate), and cask washdown pit for 72 hours. Between 72 hours and 7 days fuel cooling water provided from passive containment cooling system ancillary water storage tank.**
3. **Fuel movement complete, 150 hours after shutdown.**
4. **See subsection 9.1.3.5 for minimum water level.**
5. **Alignment of PCS water storage for supply of makeup water permits maintaining pool level at this elevation. Decay heat in reactor vessel is less that 9 MW, thus no PCS water is required for containment cooling.**
6. **Alignment of the PCS ancillary water storage tank and initiation of PCS recirculation pumps provide a makeup water supply to maintain this pool level or higher above the top of the fuel.**
7. **Seismic event assumes water in the pool is initially drained to the level of the spent fuel pool cooling system connection simultaneous with a station blackout. Fuel cooling water sources are spent fuel pool, fuel transfer canal (including gate), cask washdown pit, and passive containment cooling system water storage tank for 72 hours. Between 72 hours and 7 days fuel cooling water provided from passive containment cooling system water storage tank and passive containment cooling system ancillary water storage tank. The number of fuel assemblies refueled has been conservatively established to include the worst case between an 18-month fuel cycle plus 5 defective fuel assemblies (69 total assemblies or 44% of the core) and a 24-month fuel cycle plus 5 defective fuel assemblies (77 total assemblies or 49% of the core).**
8. **Seismic event assumes water in the pool is initially drained to the level of the spent fuel pool cooling system connection simultaneous with a station blackout. Fuel cooling water sources are spent fuel pool, fuel transfer canal (including gate), cask washdown pit, and passive containment cooling system water storage tank for 7 days.**

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SFP Cooling Assuming Complete Pool Drain, Incorporated in DCD Rev 16

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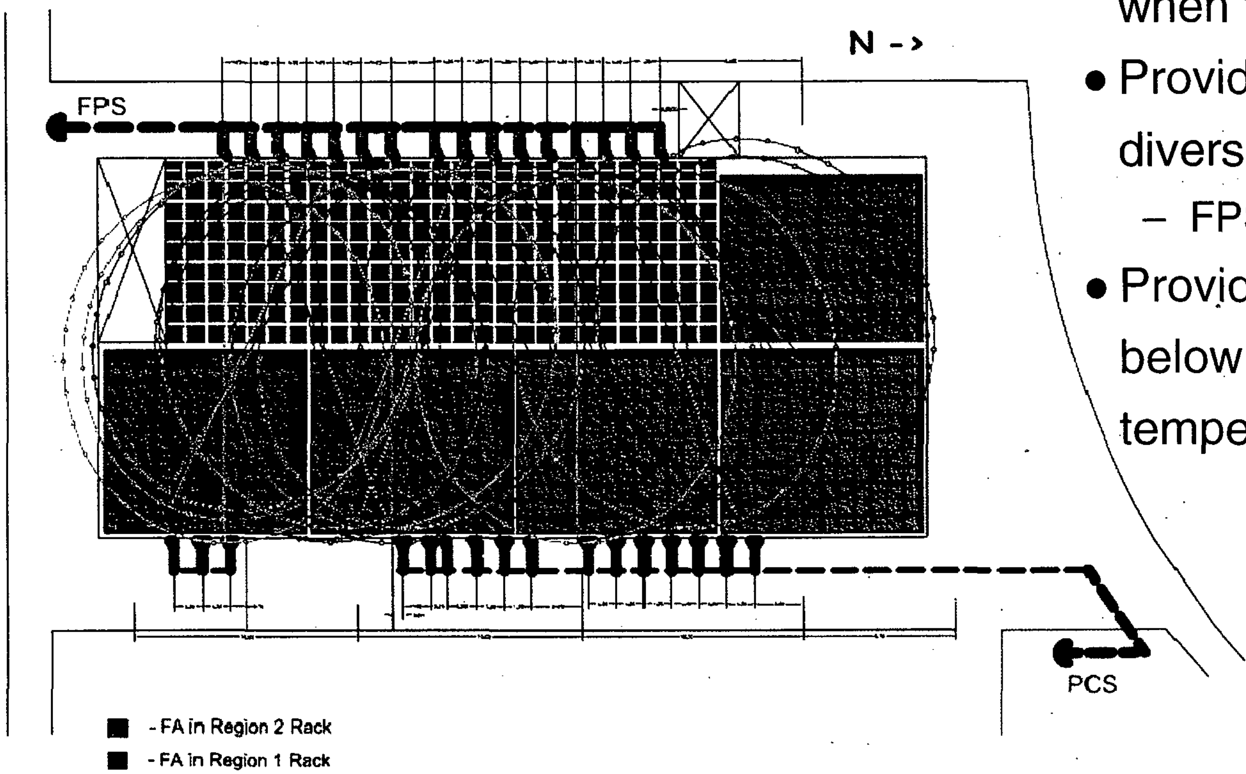

- Beyond design basis event B5B
  - Pool assumed to completely drain
- Event assumed to occur just when full core is placed in SFP
- Provide redundant sprays with diverse water supplies
  - FPS and PCS used for water
- Provide sufficient spray to keep below zirconium ignition temperature

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AP1000 Provides More Levels of Defense

AP1000

- First Level is Usually Nonsafety Active Features
  - Automatically actuated before passive features
  - High quality industrial grade equipment
- Another Level is Safety Passive Features
  - Provides safety case for licensing
  - Highest quality nuclear grade equipment
- Other Passive Features Provide Additional Levels
  - Example; passive feed/bleed backs up PRHR HX
- Available for All Shutdown and At-Power Conditions
  - More likely events have more levels of defense

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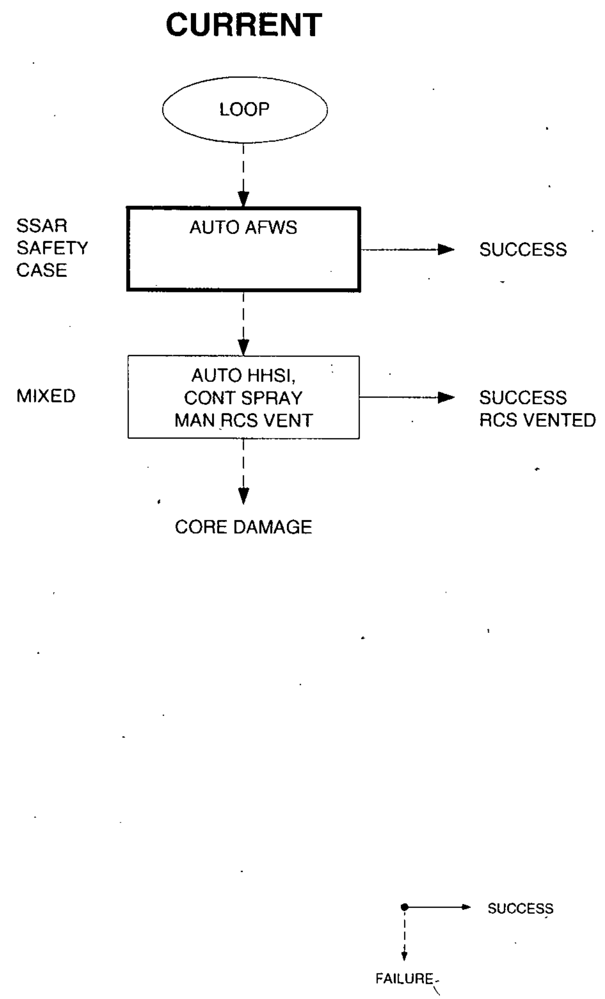
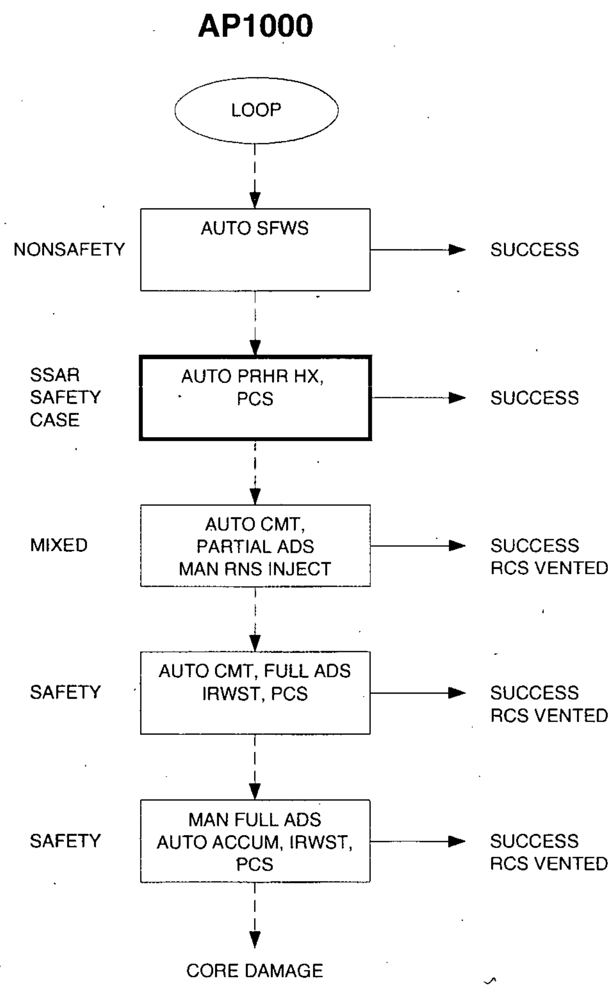
Loss of Offsite Power
Levels of Defense

AP1000





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AP1000 Importance of Non-Safety Systems

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- Determined Safety Importance of Non-Safety Systems
  - Part of the resolution of Regulatory Treatment of Non-Safety Systems (RTNSS) Policy Issue
  - Included PRA sensitivity studies / evaluations
    - Initiating event frequency evaluations
    - Mitigation importance evaluations, calc CMF/LRF without NNS
      - CDF and LRF less than NRC safety goals
  - Also included deterministic evaluations
    - ATWS rule, long term shutdown (> 72 hr), seismic
  - DCD contains availability controls for selected NSS features
    - Similar to Tech Spec, but without plant shutdown requirements

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Importance on Nonsafety Systems

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	Base AP1000	w/o NNS Systems (1)	NRC Safety Goal
Core Damage Frequency			
Internal Events at Power	2.40E-07	2.10E-06	
Internal Events at Shutdown	1.20E-07	9.70E-07	
Total	**3.60E-07**	**3.07E-06**	**1.0E-04** /yr
Large Activity Release Frequency			
Internal Events at Power	1.90E-08	4.30E-07	
Internal Events at Shutdown	2.00E-08	3.80E-07	
Total	**3.90E-08**	**8.10E-07**	**1.0E-06** /yr

Notes:

(1) Sensitivity study with same IE frequencies but no mitigation credit for nonsafety systems (CVS, SFW, RNS, onsite / offsite AC power, DAS).

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AP1000 Instrumentation & Control

Andrea Sterdis

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I&C Systems

AP1000

- **I&C systems are included in the Certified Design**
  - Functional requirements
  - The design process
  - Test and acceptance criteria
  - A conceptual design

A detailed I&C design is being developed based on the functional requirements, using the certified design process, and meeting the certified acceptance requirements.

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AP1000 I&C

- Control System
  - Plant wide non-1E system for all normal displays & controls
  - Microprocessor / software based, multiplexed communications
- Safety System
  - Plant wide 1E system for all safety displays & controls
  - Microprocessor / software based, multiplexed communications
- Diverse System
  - Limited scope non-1E system, PRA based displays & controls
    - Backs up Safety I&C where common mode failure a risk
  - Different microprocessor & software than Safety I&C
    - No multiplexing

AP1000 Major I&C Systems

AP1000

- **Protection and Safety Monitoring System (PMS)**
  - RT, ESF, NI, QDPS, and component control (Westinghouse Common Q)
- **Diverse Actuation System (DAS)**
  - Backs up PMS (Platform/Vendor Selection in Progress)
  - Different architecture, hardware & software from PMS
- **Plant Control System (PLS)**
  - BOP, NSSS, rod control, rod position indication (Emerson Ovation)
- **Data Display and Processing System (DDS)**
  - Non-Class 1E displays, alarms, analysis, logging, archiving (Emerson Ovation)
  - Non-Class 1E communication network

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Architecture

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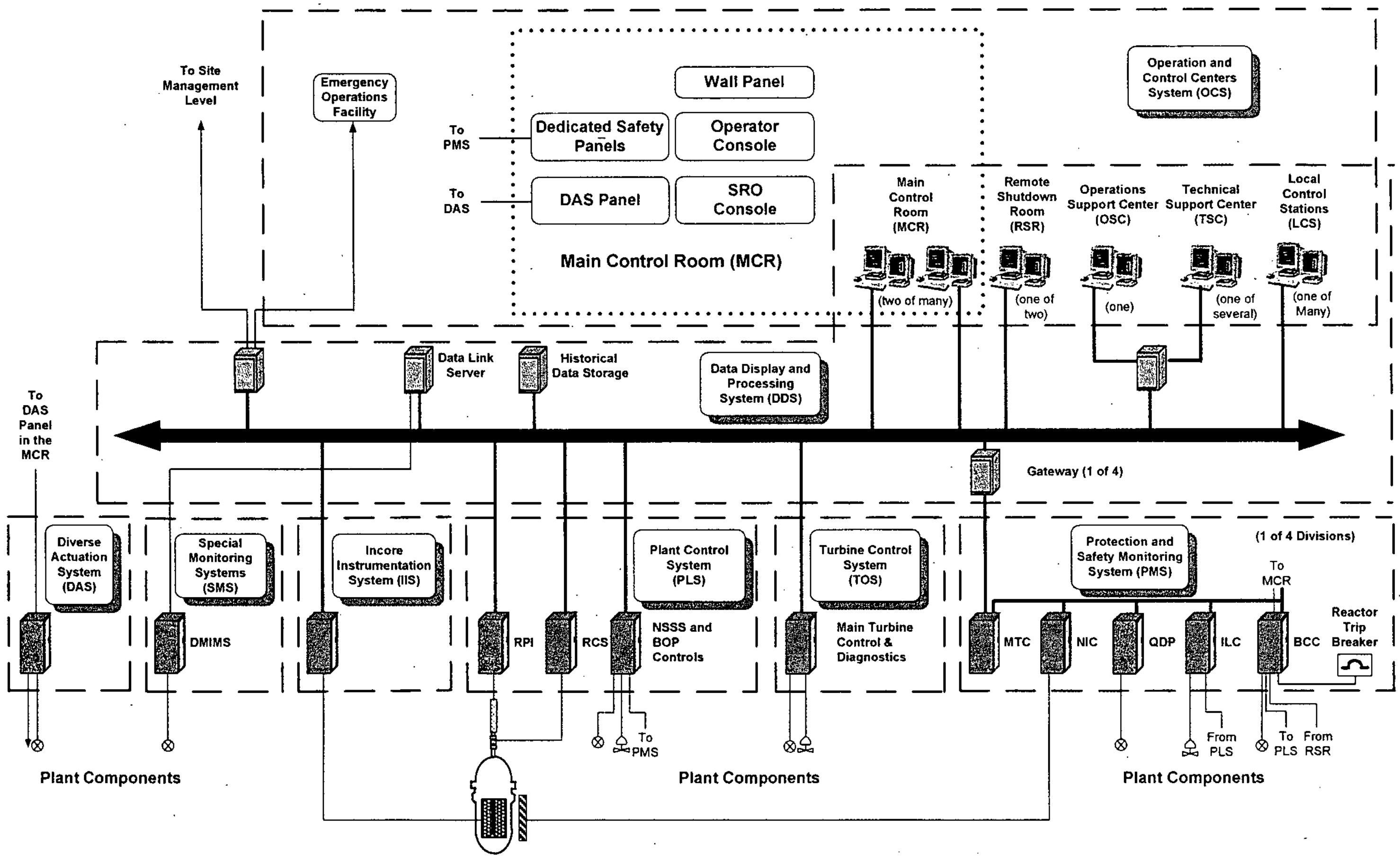

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Human Factors Engineering

AP1000

- Compact Control Room
  - Designed for 1 Reactor Operator and 1 Supervisor
- Displays
  - Plant status / overview via wall panel (non 1E)
  - Detail display via workstation video displays (non 1E)
  - Small number dedicated displays; safety (1E) & diverse (non 1E)
- Controls
  - Soft controls (non 1E) for normal operation
  - Small number dedicated switches; safety (1E) & diverse (non 1E)
- Advanced Alarm Management
- Computerized Procedures

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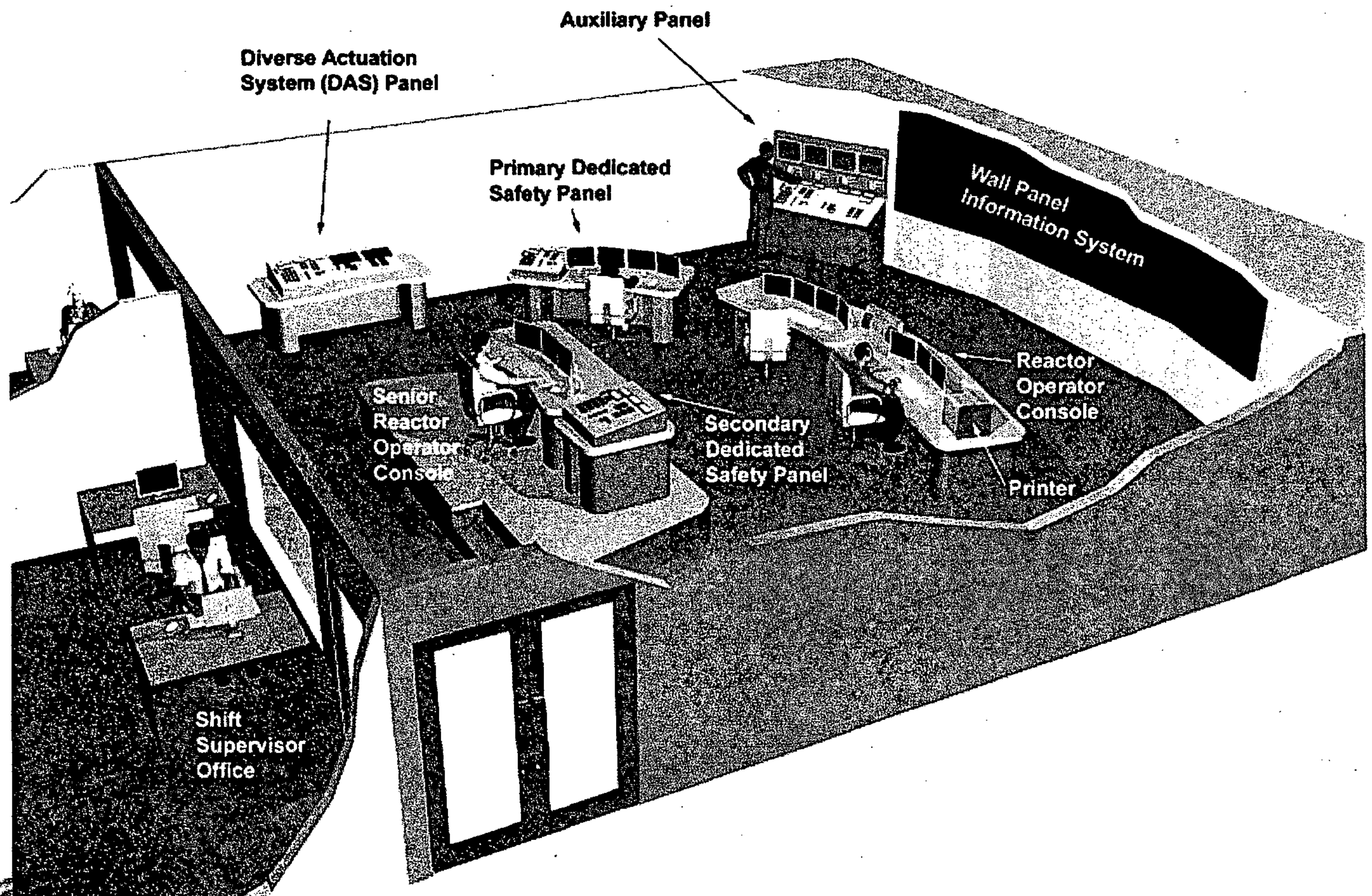
AP1000 Compact Control Room

AP1000



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AP1000 Structures

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AP1000 Structures

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- All safety related and seismically qualified equipment is on a single basemat for Auxiliary and Shield Buildings
- Current Design Certification is for conditions consistent with a rock site
- Current Design Certification is for external hazards as required by current regulations

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AP1000 Structures Changes

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- Pressurizer changed to allow valves to meet seismic accelerations
- Seismic input envelop changed to encompass soil sites
- Seismic analysis redone to reflect new seismic input (no design changes)
- Shield building changed to reflect new external hazards concerns
- NRC staff is currently reviewing our submittals

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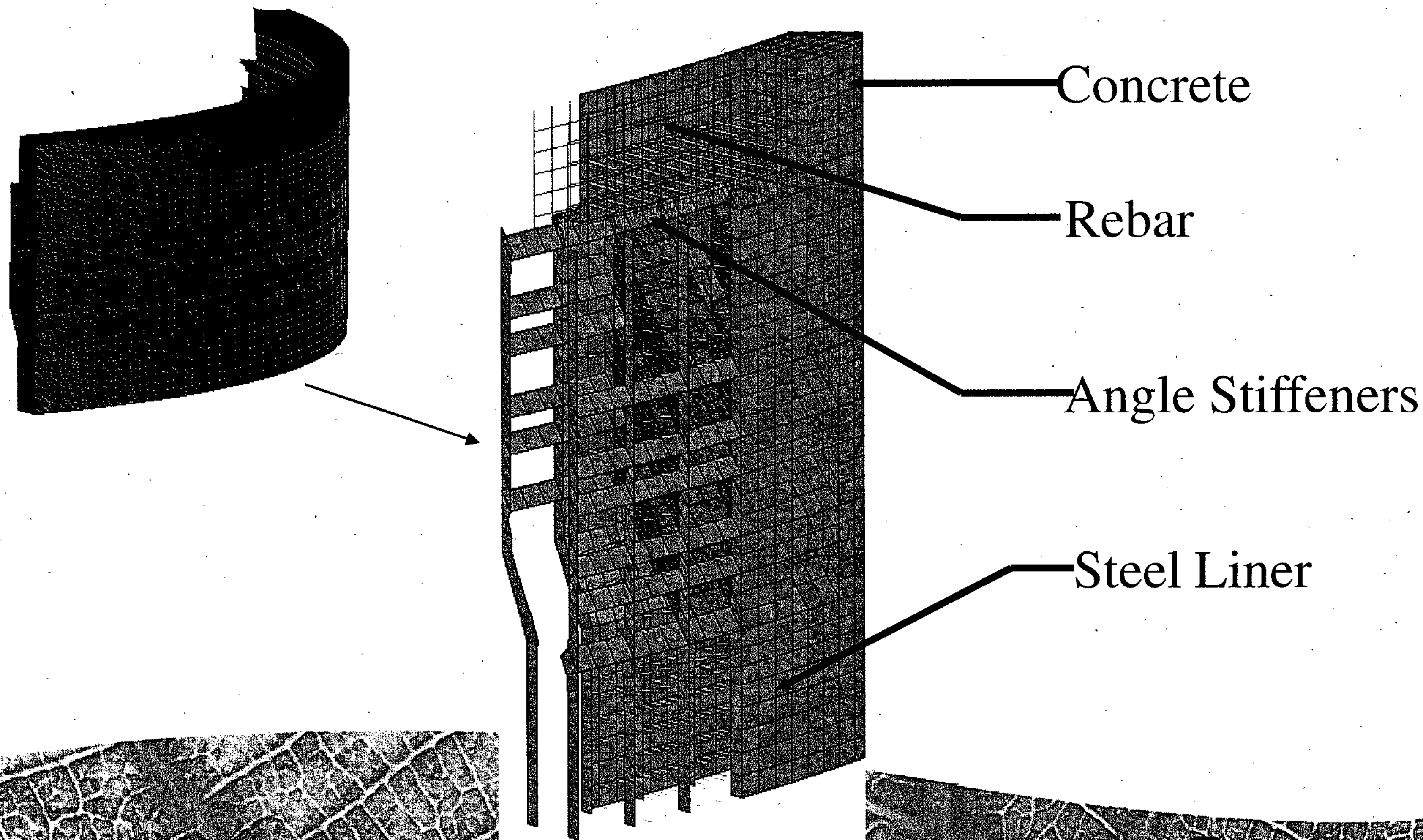
Shield Building Enhancements

AP1000



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Shield Building Roof Enhancements

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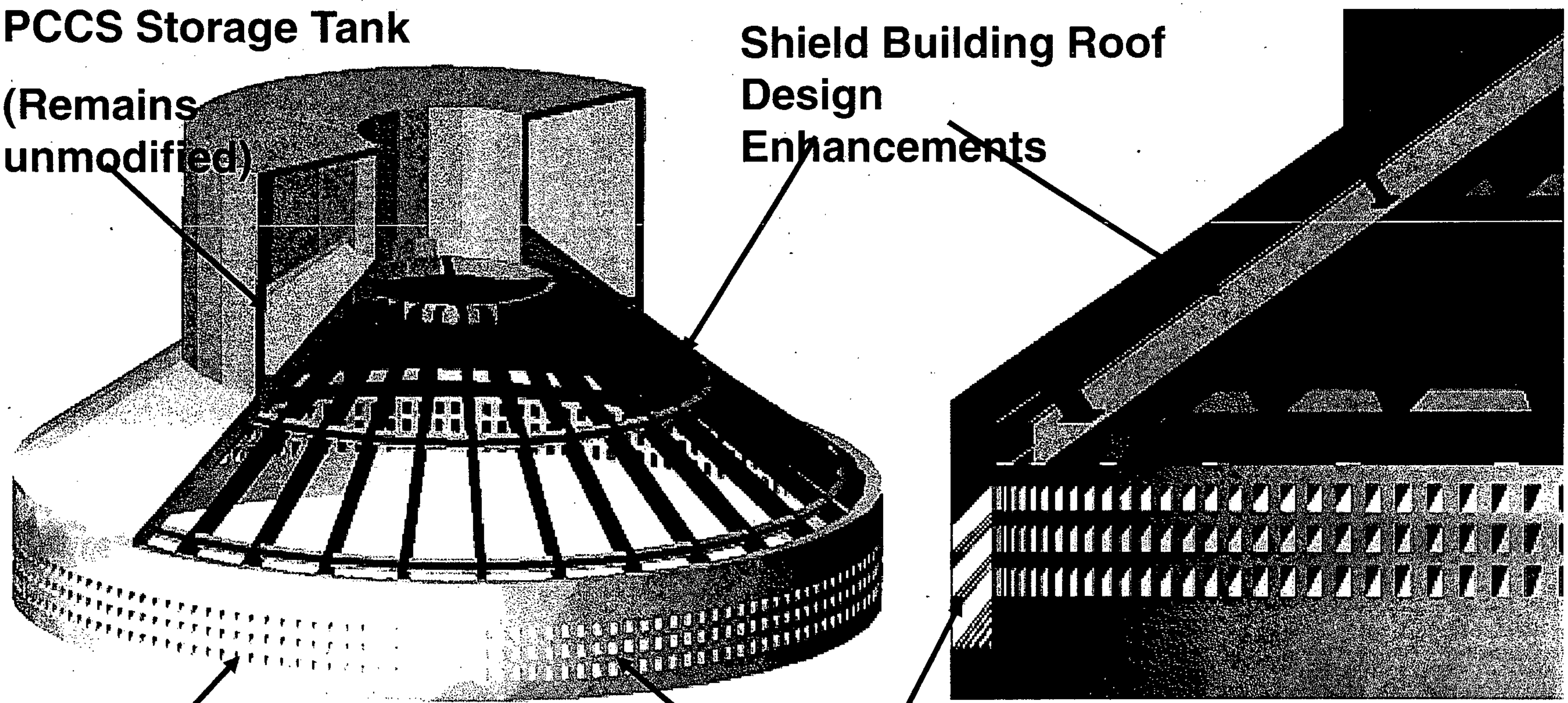

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AP1000 Secondary Systems

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AP1000 Secondary Systems

- AP1000 secondary systems are non safety related
- Current Design Certification is based upon an MHI turbine
- Change is to a Toshiba turbine with attendant information changes to Chapter 10
- Items with potential impact on safety were investigated and found acceptable:
  - post trip behavior
  - overspeed trip initiator
  - blade attachments

AP1000 Electrical Systems

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AP1000 Electrical Systems

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- AP1000 has only 3 electrical systems
  - 1E DC
  - Non-1E DC
  - Non-1E AC
- Only changes were to incorporate Operating Experience to increase unit availability
  - Add a Reserve Auxiliary Transformer
  - Add Fast Bus Transfer

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AP1000 Fire Protection

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AP1000 Fire Protection

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- Same as Certified AP1000 design
  - Division separation designed in
    - Firewalls outside containment
    - Separation inside containment
- No changes
- Adequate protection from externally induced fires

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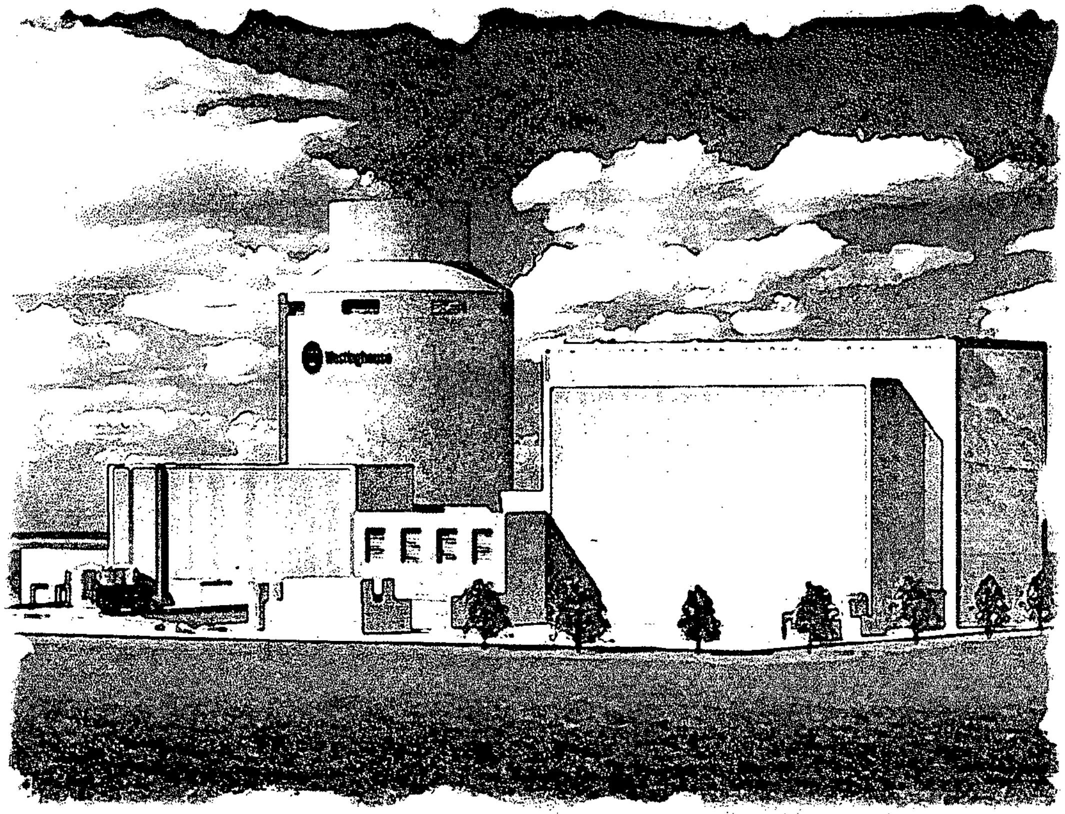
AP1000
Presentation to the ACRS

October 31, 2007



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