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NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

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REGULATORY POLICIES AND PRACTICES SUBCOMMITTEE

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TUESDAY

MARCH 6, 2012

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., John D. Sieber, Chairman, presiding.

MEMBERS PRESENT:

JOHN D. SIEBER, Chairman

J. SAM ARMIJO, Member

SAID ABDEL-KHALIK, Member

HAROLD B. RAY, Member

JOY REMPE, Member

NRC STAFF PRESENT:

GIRIJA S. SHUKLA, Designated Federal Official

DONALD DUBE, NRO/DSRA

LAURA DUDES, NRO/DCIP

TIMOTHY FRYE, NRO/DCIP

THOMAS KOZAK, NRO/DCIP

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P R O C E E D I N G S

8:30 a.m.

CHAIR SIEBER: The meeting will now come to order. This is a meeting of the Advisory Committee on Reactor Safeguard, Subcommittee on Regulatory Policies and Practices.

My name is Jack Sieber. I'm Chairman of this Subcommittee. Subcommittee Members in attendance today are Harold Ray, Sam Armijo, Michael Ryan, Said Abdel-Khalik, and Joy Rempe. Mr. Girija Shukla, of the ACRS Staff, is the Designated Federal Official for this meeting.

The Subcommittee will hear presentations from the NRC staff regarding the New Construction Reactor Oversight Process program of Applicable Construction Oversight of New Plants.

And, I would like to point out that this applies to new plants being licensed under the Part 52 process, as opposed to the completion of Watt Bar, which is being conducted under the old construction oversight process, and that plant is being built under Part 50.

The subject for today is the cROP, which stands for Construction Reactor Oversight Process, and this is an information briefing. It's not intended to write a letter as a result of this briefing, but we will inform the full ACRS of the content of the material being presented today and the Subcommittee conclusions that we would have regarding the process.

This new version of the cROP has been jointly developed by the Office of NU Reactor Oversight and Region II personnel, and represents a risk-informed approach to construction inspection, and is similar to the current reactor oversight process that's applicable to currently operating reactors.

The cROP prototype started on January 1st of this year, and will run for one year, and will be applied to Vogtle 3 and 4 in the summer at new construction plants.

We have received no written comments or requests for time to make oral statements from members of the public regarding today's meeting. This meeting will be open to public attendance.

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

Rules for participation in today's meeting have been announced as part of the notice of this meeting, published in the Federal Register on February 13, 2012.

A transcript of the meeting is being kept and will be made available as stated in the Federal Register notice. Therefore, we request that participants in this meeting use the microphones located throughout the meeting room when addressing the Subcommittee. Participants should first identify themselves, and speak with sufficient clarity and volume, so that they may be readily heard.

Please silence your cell phones, and we will now proceed with introductory remarks from Tim Frye, who is Branch Chief of the Construction Assessment and Enforcement Branch of NRO.

Tim?

MR. FRYE: Okay, thank you, Jack.

I just briefly wanted to introduce the two staff members who are sitting at the table. Tom Kozak, has had the project lead for developing and the construction oversight process, and for implementation for the cROP pilot which has started as of January 1st of this year. And, Dr. Dube also of the Office of New Reactors, has had the lead for developing methodologies and processes for risk informing the safety significance determination of construction inspection findings. And, they will be discussing those aspects of the cROP.

So, with that I'll turn it over to the staff.

CHAIR SIEBER: Thank you.

MR. KOZAK: Thank you.

As Tim mentioned, my name is Tom Kozak. I work for Tim in the Division of Construction, Inspection and Operational Programs, and I had the lead to develop new construction assessment enforcement programs within our Construction Reactor Oversight Process.

The purpose of the meeting today is we are going to discuss our new construction enforcement programs. We are required to brief the ACRS on the results of the pilot of these programs in the beginning of 2013, and that is, you know, something we received in an SRM from the Commission. So, we wanted to be proactive and introduce the ACRS to the programs that we've developed and the pilot that we are going to be conducting, so you can provide any type of comments or thoughts on them and be familiar with what we are doing for this year, so that when we come to brief you in 2013 you are already familiar with what we've developed and what we are implementing. So, we thought that this would be a good thing to do.

Much of our presentation today is going to focus on our construction significance determination process. So, I'll go over a background on how we got here, and Don will go over the significance determination process.

When we first developed our oversight process for new construction, Part 52 construction, we took a traditional enforcement approach, which is what we used for the Brown's Ferry Unit 1 recovery, and what we are using at Watts Bar Unit 2. We presented that to the Commission in October of 2008. And, at that time the Commission, in December, gave us an SRM that said that we should develop an oversight process and include in the objective elements of the ROP, including a significance determination process. And so, that's what kicked off all of the new assessment and enforcement approach that we developed.

We formed a working group, which was a multi-office working group, including members from each one of the regional offices, NRR, NSER, and I was the head of that group and we were -- you know, we were tasked with meeting the requirements of that SRM that I just mentioned.

NEI formed a cROP task force, which was

led by Tom Houghton, who has since retired recently, but he put together a task force that included members from most of the utilities that have COL applications and Westinghouse members, Shaw members. And, there was pretty consistent membership on that task force, as well as on ours. We conducted numerous public meetings as we developed the new assessment and enforcement approaches.

There was really very little public interest in what we were doing, even though we put out Federal Register notices, we discussed this at the RIC. We really tried to reach out to our other stakeholders, but were unable to generate a lot of interest in this development, unlike the ROP when we developed the ROP, if you'll recall, there was a lot of public interest there. But, we couldn't generate the similar type of interest.

So, we pretty much --

CHAIR SIEBER: Did you try to have public meetings in, for example, the Augusta, Georgia area for Fogtle?

MR. KOZAK: Well, we did not have a meeting in the vicinity of Vogtle, but we did send letters to the State of Georgia and they did participate in one panel.

CHAIR SIEBER: Right.

MR. KOZAK: But, we will be going out to Vogtle here on March 29th, I believe it is, as part of the Operator Reactor Assessment meeting that we have. We are going to do the construction assessment meeting, because we have been assessing Vogtle up to this point under the process that we had developed, Vogtle Units 3 and 4.

CHAIR SIEBER: Right.

MR. KOZAK: And, we are going to discuss with the public on that occasion the new processes that we have developed, and see if we can get any input there, and tell them we are going to be doing the pilot that includes testing what we've done and look for any input there.

CHAIR SIEBER: Thank you.

MR. KOZAK: So, all that work culminated in the SECY paper that you see here in the first bullet, SECY paper 10-140, where we recommended to the Commission that we develop -- further develop an assessment program. We presented in that paper some approaches to the construction significance determination process. At that time, we had determined that it was a feasible approach that we could develop a significance determination process that we could use to evaluate the significance of our findings.

And, that was kind of a question going in, because there is, you know, the plant is not operating, you don't have radioactive material, you don't have the core, you don't have core damage frequencies, how are we going to develop an SDP to evaluate construction. So, a lot of our focus, as we developed it, both in our public meetings and internally, was on what is an SDP going to look like, can we really develop something like this.

We determined that we could, and we thought we should go forward. So, we recommended to the Commission, yes, we think we can do this. These are some of the approaches we have. And, in response the Commission and SRM told us to finalize the SDP, pilot it for a year, include in that a construction SDP and a construction action matrix.

CHAIR SIEBER: Now, the significance determination process for the construction program at Vogtle really depends a lot on the operating PRA.

MR. KOZAK: Correct.

CHAIR SIEBER: To determine how important each element is.

And, to what extent is the PRA finalized, and is it adequate for this purpose?

MR. DUBE: The answer is yes. What we want to do -- I'll get into it, but we wanted to, in a short answer, is keep it simple. We didn't want to have like senior reactor analysts on line, on a beeper, you know, responding 20 times a day to a construction defect. So, we kept it simple. We used the PRA license, Westinghouse's PRA for the AP1000, and our internal SPAR model, and we used it mainly to put SSCs, structures, systems and components, into buckets, four buckets, and use some judgment to move things around the buckets. And, you'll see, I'll explain that.

So, right now one can use it pretty staticly. I mean, if the PRA changes a little bit, it's not going to change what bucket things are in.

CHAIR SIEBER: So, it differs from the Part 50 type of construction inspection program, in that you have, basically, safety-related and unsafety-related classifications in the old Part 50 system. Here you are relying more on the classifications that come out of the PRA.

MR. DUBE: Right.

CHAIR SIEBER: Which are more graded in scope.

MR. DUBE: Exactly.

CHAIR SIEBER: Okay, and you'll explain all that to us.

MR. DUBE: Yes, I will, yes. I think you'll find it fascinating.

CHAIR SIEBER: Okay, thank you.

MEMBER ABDEL-KHALIK: Will you explain how you intend to handle the probably thousands of field changes that will come about?

MR. DUBE: Yes. Well, I think we'll show you the screening process.

MEMBER ABDEL-KHALIK: Okay.

MR. KOZAK: Well, the next slide, basically, states for you that the Commission approved our recommendation, and as we've already discussed part of the SRM requires us to brief the ACRS. I mentioned that in the opening, so you already know that.

One other requirement in the SRM is that this process should be applicable to oversight of plants that are under 10 CFR, Part 50 process, which includes applicability to potential small module reactors, and as you mentioned, and we discussed this with the Commission, this would not be applicable to Watts Bar Unit 2 because it is so far along in construction and it didn't make sense to implement this at this time at Watts Bar Unit 2.

But, if Bellefonte were to go like they say they are planning to do, we would adjust this to apply to Bellefonte, and either Don or I will tell you how we'll do that. I think -- we developed this so that it is adaptable to really just about anything that's under construction, as long as they have some type of a PRA.

CHAIR SIEBER: And, that includes small modular reactors?

MR. KOZAK: Yes.

CHAIR SIEBER: Okay.

MR. KOZAK: And, on the fifth slide I just -- the second bullet is probably the most important bullet here. The Commission directed the staff to assess risk using the risk important measures, with the thresholds that are comparable and technically consistent with the risk threshold levels used in ROP. So, that's kind of key to how we developed the SDP, and we'll get into that in just a minute.

So, on slide 6, I've already mentioned we developed the assessment and enforcement programs, and we are piloting. The way we decided to pilot this is, we issued a memorandum from Mike Johnson, the Director of NRO, to the regional administrators, stating that we were going to conduct a pilot, and describing draft versions of manual chapters that we developed.

We developed three manual chapters that we consider draft. They have a P designation on the end, for pilot. Manual Chapter 613 is our manual chapter that we use for screening and findings, which would kick you into the SDP, and also provides directions on how to write reports.

2505 describes our assessment program, and what we've done is aligned this with the agency action review meeting, and so we'll have mid-cycle reviews and end-of-cycle reviews, just like in the reactor oversight process. We didn't call them that before, we called them semiannual performance reviews, and it was a six-month cycle. So, we really tried to mirror the ROP as much as we could.

I think it's easier for the public to understand, it's easier for our inspectors that go from an operating site to a construction site, and it all made a lot of sense. So, we've changed a lot of our processes to line up with those in the ROP.

And then, 2519P is our construction SDP manual chapter. So, we issued those to the staff for use prior to January 1st. We trained Region 2 and

Headquarters in October/November, actually, did a training in December for the Headquarters staff.

We also issued an enforcement guidance memorandum to provide interim enforcement guidance which allows us to use the same enforcement approach that is used in the ROP, assigning colors to findings, green, white, yellow and red, getting rid of severity levels for, you know, just calling it a violation, those types of things, because in the enforcement manual and policy without that EGM it describes that we use a traditional enforcement approach to construction. So, we needed to issue an enforcement guidance memorandum for the pilot.

We also have pilot guidance and criteria to evaluate the success of the pilot, pre-determined criteria that we are going to use after we do this for a year, to determine what was successful, what changes we might need to make, and then we need to inform the Commission, it's not a notation vote, it's an information paper on the results of the pilot and how we plan to go forward.

As we've mentioned already, we implemented the pilot at Vogtle on January 1st of this year, and will implement the pilot at VC Summer Units 2 and 3 as soon as the COLs are issued. There's not enough activity for us to do it right now.

On slide 7, this simply just repeats what was in the SRM and that I've already said in one of the bullets, that we should use thresholds that are similar to those in the ROP. This is just to remind you what the thresholds are for green, white, yellow and red, and we'll show you how we applied those in just a minute.

CHAIR SIEBER: Now, those look, perhaps, in order of magnitude more safe than currently at. Is that correct?

MR. DUBE: At least, yes, generally speaking, yes.

CHAIR SIEBER: Yes, and that's consistent with the fact that the new reactors are supposed to have more features that make them safer. What you are trying to do is to achieve the advertised safety of these plants through this construction program, is that correct?

MR. DUBE: Yes.

CHAIR SIEBER: Okay.

MR. KOZAK: Ensuring that it's built in accordance with the design.

CHAIR SIEBER: Right.

MR. KOZAK: Right. So, in our

construction significance determination process, there's two different -- it's one SDP, but there's really two different categories, if you will, that we use to evaluate findings.

One thing that's different than the ROP is, in construction we are required to review the adequacy of programs, both construction programs and operational programs, and that means that they've been developed adequately with the appropriate criteria that are listed in the final safety analysis report.

That's a little different than the ROP. In the ROP, we go and we look at the implementation of programs. We don't do, you know, an evaluation of the adequacy of the program.

So, here we are just looking to make sure that licensees have developed both construction programs and operational programs that have the elements in there that they are required to have. So, there's no corresponding technical issue, if you will, when you look at the program. We just go and do, say we review their quality assurance program to make sure it has all the elements in it that they are required to have.

MEMBER ABDEL-KHALIK: So, how do you define findings in these two bullets.

MR. KOZAK: Right. Well, a finding, we use the same terms as in the ROP, a finding has to be a performance deficiency that is more than minor significance. And, a performance deficiency is the failure to meet a requirement or a standard, which was within the ability of the licensee to identify.

And then we have minor screening criteria to determine if an issue we identify is greater than minor or not. So, first you have an issue of concern. You determine if it is of more than minor significance, and you determine whether it was the failure to meet a standard or a requirement that the licensee is committed to meet. That's a finding.

MEMBER ABDEL-KHALIK: Ultimately, you have to translate that into a physical change that you can translate into, you know, a delta CDF.

MR. KOZAK: Not necessarily.

MEMBER ABDEL-KHALIK: Not necessarily?

MR. KOZAK: No. No. We'll get into that in a minute, but a finding for a program can simply be for quality assurance, the licensee has to have a corrective action program. And, it has to have certain things associated with the corrective active program, the ability to identify and promptly correct conditions adverse to quality.

MEMBER ABDEL-KHALIK: Okay.

MR. KOZAK: So, if we go on and we look at their quality assurance program, we go to the corrective action program, and they do not have in place requirements to identify and correct conditions adverse to quality, that would be a finding. That would be the failure to meet a requirement for that corrective action program.

MEMBER ABDEL-KHALIK: But, you know that that will not happen. They will have a program, the question is, they may not have --

MR. KOZAK: As a matter of fact, that example came to mind because we identified at Vogtle that one of the contractors did not have provisions in their corrective action program to identify and correct conditions adverse to quality. It's an actual finding that we had, it's a program issue.

So, you have a program, and in our requirements, and in the FSAR they describe what that program should consist of, and if we go and we identify that that program does not contain those requirements, that would be a finding.

MEMBER ABDEL-KHALIK: But, that doesn't require a significance determination based on delta CDF.

MR. KOZAK: That does not, that's a program finding. And, that's where we've used deterministic criteria. We have a flow chart right in our next slide that shows you how we screen program findings.

Now, the other type, the other -- so, that's the first bullet, that's the program, that's the deterministic SDP that we developed.

We also have a risk-informed construction SDP for technical findings, any finding that's not a program finding. So, that could be a design violation of some kind that, you know, we would put that into our SDP. It could be, you know, welding problems on a system, you know, where they are not following welding procedures.

MEMBER ABDEL-KHALIK: But, a field change that the licensee has evaluated and said it's equivalent, there is no --

MR. KOZAK: Right.

MEMBER ABDEL-KHALIK: -- risk associated, how do you check that?

MR. KOZAK: Well, you know, licensees are required to do evaluations if they are going to do a field change.

MEMBER ABDEL-KHALIK: Right.

MR. KOZAK: And, if they do an inadequate evaluation, you know, we would -- we, you know, our inspectors are trained to determine whether or not their evaluation is adequate or not, if they've considered all --

MEMBER ARMIJO: You don't do 100 percent oversight on those field changes, do you? I mean, review of their --

MR. KOZAK: We wouldn't do 100 percent. It just depends. If the field change is such that it requires a license amendment, you know, obviously, we review those. If it's within the licensee's purview to change something that's not a design change, we probably wouldn't look at 100 percent of those.

MEMBER ARMIJO: But, they inform you of all of these changes.

MR. KOZAK: Right.

CHAIR SIEBER: Well, let me give you an example. Let's say that there was a weld defect in a safety significant pipe, and it was repaired. And, when it was repaired the final configuration of the weld, materials and treatment used to make that weld, are different than standard welding practice. That requires an engineering evaluation to evaluate that, and does that engineering evaluation fall under this program, or does that go back to the design program?

MR. KOZAK: That would fall under this program.

CHAIR SIEBER: Okay, and how would you do that?

MR. KOZAK: Well, maybe we could hold that question, and we can address it when we go through the -- when we get through Don's part of this, because it will be easier to describe once we've presented the matrix that we have and the table. And, I will definitely come back to that.

CHAIR SIEBER: Okay.

MR. KOZAK: Okay? So anyway, there's two, essentially, branches to our SDP, one for program findings, and one for what we refer to as technical findings. Those are really findings that are associated with, you know, that have an actual impact on the work activities that they are conducting. Okay.

The next slide 9, this is out of our manual Chapter 2519, and is provided for the inspector's use, and screening findings through our SDP. The first thing we do with the SDP is, we check to see, you know, if there's -- if the finding is programmatic in nature.

So, I can kind of walk through this flow chart. As I mentioned earlier, you first have to use our manual Chapter 613, in order to determine that the finding is more than minor, and it has -- and it is a performance deficiency. So, we do that, and that kicks you into our significance determination process.

The first question we ask there is, is it related to an operational program, after the license condition implementation milestone, or is it related to security.

We do not handle security findings with this significance determination process. We kick those findings out to the security significance determination process.

In the license, we require, I believe there's 19 operational programs required in a license. And, for each one of those programs there's a milestone in construction, that once that milestone is met they are required to have that operational program in place.

For instance, one of the milestones is when fuel is put into the protected area. The licensee has to have their operational security program in place. So, that's an example of a milestone. And, each one of the operational programs has a milestone such as that in the license.

Once that milestone is met, and that operational program is required to be in place, we will use the ROP significance determination process to determine the significance of findings.

So, those are, really, towards the end of construction.

So, if the answer to that first block is no, we ask, is the finding programmatic in nature? And, I've just explained to you what programmatic findings are. There's no technical issue associated with the finding. It's simply a requirement for a program that has not been met.

If it is only a programmatic finding, we ask, is the finding an omission of a critical attribute of the program? And, a critical attribute is defined as a requirement that is listed in the final significance -- or Final Safety Analysis Report, FSAR. Each program has in the FSAR a listing of what's required for those programs, and if it's not in the FSAR it's referred to ASME codes or something like that.

So, the inspectors have to go and look and see if one of those critical attributes has been missed. And, if the answer to that is yes, we ask the question, did we come out and review this before and identify this problem? If the answer is no, then that finding would be green. If the answer is yes, that indicates that there's a problem with the licensee's program in developing either construction or operational programs, we would call that a white finding, and we would follow back up and look at the extent of condition, if you will, of what went wrong and why they didn't get that critical attribute into the program after it was already identified as a finding.

MEMBER RAY: Let's be clear. This is an NRC finding, not a licensee finding.

MR. KOZAK: Correct, it would be an NRC-identified finding.

So, that's the purely deterministic branch of our SDP. You can only get up to a white finding, and in order to get a white finding you would have to have a repetitive finding for the same critical attribute missing in one of the programs.

CHAIR SIEBER: What's repetitive, two?

MR. KOZAK: Two, yes.

MEMBER REMPE: So, how does that relate to the color coding on slide 7, if it's just -- I mean, finding -- okay, it does not.

MR. KOZAK: It's a purely deterministic approach, where we can assign a color, and it's similar to an approach that we would have in non-reactor safety SDPs in the ROP, something like radiation protection. You know, that's not based on delta CDF or anything like that.

So, it's not related to that.

MEMBER REMPE: Okay.

CHAIR SIEBER: Now, to follow up on my question, which is, is two enough? When a potential finding is made, does that prompt an inspector to look for more items of a similar nature?

MR. KOZAK: Sure, yes.

CHAIR SIEBER: That's part of your program, it's just not intuition for the inspector, right?

MR. KOZAK: Right. That's -- that's -- well, that's kind of part of what --

CHAIR SIEBER: Inspection is all about, right?

MR. KOZAK: -- right, yes.

CHAIR SIEBER: Right.

MR. KOZAK: Okay. So, that's the programmatic area.

So, if you go back up to box three, and

the answer is no, that it's not just a programmatic issue, there is some type of a problem that has, actually, resulted in an issue in the plant as part of construction, we ask the question again, does the finding involve a repetitive omission of a program critical attribute.

The reason we put that in there is, if we had a programmatic finding, and the licensee did not correct that. And then, we come back out and we find an actual technical problem as a result of not fixing the programmatic issue, we didn't want to just kick ourselves out of the SDP, we would get a white finding for that, because it was repetitive. And, we would process the actual issue, using our SDP. So, there is a chance to kick back, using a programmatic issue if it had been previously identified.

CHAIR SIEBER: Now, an instance like that may result in, in order to finally resolve it, rework of the systems or materials in the plant. And, I notice from looking at your manual chapters that it can take up to 90 days in order to turn that around within the Agency.

My memory of nuclear construction is a lot happens in 90 days, so that you may end up having to dismantle a good part of the plant, at least that part of that system in order to rework the finding that's 90 days old.

MR. KOZAK: It's possible, but even though it takes us, you know, up to 90 days to finalize the significance of a finding, we, you know, have a goal of doing this as quickly as possible. Plus, we are communicating the issue to the licensee right away, as soon as we find it.

MEMBER ARMIJO: They keep building.

MR. KOZAK: Kind of at their own risk, right.

So, you know, even though our final significance could take up to 90 days, we are -- hopefully, the licensee is going to be proactive in addressing the finding right away, entering into a corrective action program, determining their to their own extent, irrespective of what the final significance determination is.

CHAIR SIEBER: Okay. I recall during construction periods that these inspection meetings with the licensee would take place at a maximum time interval of one week. Do they still have the weekly meetings with the licensee, or if something serious comes up it's right then?

MR. KOZAK: My understanding is, right now our inspection exits are on a quarterly basis.

CHAIR SIEBER: Right.

MR. KOZAK: But, we are interacting with the licensee on a daily basis, and as issues come up they are discussing it with them.

I'm sure that -- or, I believe that the periodicity of our inspection reports will get smaller as construction activities pick up. I don't know that for a fact, but I'm pretty sure that's what we are looking at.

But certainly, there will be real time interactions with the licensee as issues come up, and they've been doing that in pre-COL inspections.

CHAIR SIEBER: Okay.

MR. KOZAK: Okay. So now we are over to block seven, can the finding be associated with a system or a structure? And, that's key, and we'll get into the system or a structure in just a minute.

The key is, if we cannot associate the finding with a system or a structure, and that would be a commodity type of a finding, in other words, the licensee is ordering 50 valves, or whatever, and they haven't specified the correct critical characteristics for the valves. But, they are not associated with a specific system.

CHAIR SIEBER: Right.

MR. KOZAK: We consider that to be early on that the licensee can address that, and that would be a green type of a finding, because it hasn't been put into the plant, you know, part of construction, and it hasn't really affected the construction of the plant.

However, if it can be associated with a system or a structure, then we would go further on into the SDP.

MEMBER ABDEL-KHALIK: Is there any interface between this process and the ITAAC closure process?

CHAIR SIEBER: Yes.

MR. KOZAK: Yes, there is.

MEMBER ABDEL-KHALIK: Where does it appear on this diagram?

MR. KOZAK: It doesn't appear on this diagram.

The ITAAC closure process is a separate process that we.

MEMBER ABDEL-KHALIK: I understand.

MR. KOZAK: Right, and it's in that process that it directs the people that are evaluating the ITAAC closure notifications to back and look at our inspection program results to determine if there are any open findings or not.

MEMBER ABDEL-KHALIK: So, it appears there, but not here.

MR. KOZAK: Correct.

But, in the overview -- we have a manual chapter that's No. 2506 that's our guidance and basis document. It's a real -- the idea of that manual chapter was to provide an overview of all of our construction oversight activities. And, in that manual chapter it describes the interface of those two programs.

And, this is more specific to finding significance determination.

CHAIR SIEBER: Yes, but I think somewhere in the slides you talk about that briefly, and I think what it does is distillate the level one. When we get to it you can talk about it.

MR. KOZAK: Yes.

CHAIR SIEBER: Tim wants to add something.

MR. FRYE: Yes, Tim Frye. I just wanted to add that, you know, as we are closing an ITAAC if we identify a deficiency that causes the ITAAC to not be closed properly, that possibly could be caused by a performance deficiency by the licensee that's probably in Appendix B, Performance Deficiency, and that would be an input into this, that would be a finding that could be input into this process. So, that's one of the ties.

CHAIR SIEBER: Right.

MR. KOZAK: Yes, that's a good point.

Okay, so you want to go now, Don?

MR. DUBE: Okay, thanks, Tom.

I'm Don Dube. I'm going to give you a little background.

Two years ago, maybe even three years ago, someone came to us and says, can we develop construction SDP like the reactor oversight process for current reactors. And, the quick answer was yes, but then all of the details had to be filled in.

So, what we decided to do was to develop a program or process that kind of parallels the construction ROP, but it's not exactly identical.

I'm showing on here, I mean, this is a rich colorful graph, and I'll go through blocks at a time. The first thing it's important to note is that there's no such thing as change in core damage frequency for your plant under construction.

I mean, the immediate concern when we had the meetings with stakeholders, they say, how can you equate risk for a plant under construction with a plant that's operating with fuel in the core, so on and so forth.

So, that's important to get to. Once you set that aside and say, there's no real risk here equivalent to a plant under operation, then we can explain the color scheme and what the purpose of this color scheme would be.

So, what we've shown here is, really, a graded approach to ranking the significance of construction inspection findings. Okay, so that is the ultimate goal. The ranking approach, there are findings on low importance systems that are minor in nature, or just barely more than minor in nature. And, there can be significant inspection findings on very high risk important systems which are the other end of the spectrum.

And so, what we have here is a two-dimensional rated approach, and the best way to describe it is on the x-axis is shows system or structure risk importance, going from the left, which is very low, to the low, to the intermediate and high. So, I'm going from left to right.

The importance of the SSC increases from very low in nature, to low, to intermediate, to high, and then we'll talk about the mathematical quantification. So, that's one degree of freedom, if you will. That's one measure of the graded approach.

And then, from going from row one at the bottom, to row two, to row three, to row four, we call it quality of construction, but another way of viewing it is, what's the extent of the impact of the finding. How significant, is it a trivial inspection finding that impacts one component in a particular system, or it could be a finding be so significant that if left uncorrected it would have had a significant impact on the overall performance of either a train or an entire system.

CHAIR SIEBER: Now, that appears, at least what I've read and what I see, a judgment call more than, you know, let's say that there's construction defects in putting together a system that has a relatively high risk acceptance worth, and determining where you are in that quality of construction --

MR. DUBE: Is a little more judgmental than the x-axis, correct.

CHAIR SIEBER: -- yes, that's right.

MR. DUBE: But, we do have some guidelines, and we'll go through them.

CHAIR SIEBER: Maybe you could just tell

us a little bit about what those guidelines are.

MR. DUBE: Yes, we'll do that. Yes. There's so much information on just this one slide, and it takes a long time to sink in.

So, let me go -- so the basic principle is that --

MEMBER ABDEL-KHALIK: Does the determination of which row you fall in require a detailed root cause?

MR. DUBE: No, it should not.

MEMBER ABDEL-KHALIK: Well, how would you determine the extent of the condition?

MR. DUBE: Well, we'll give you an example, but --

MR. KOZAK: Can I?

MR. DUBE: Yes, go ahead.

MR. KOZAK: In the manual chapter, in 2519, we provided system and structure design function definitions. We pulled those straight out of the DCD. And so, what we have instructed the inspectors to do is to determine -- you know, take what finding they have, and compare it to the system design function definition. For instance, if the finding affects the system, and determine if that finding, if left uncorrected, it could affect that design function, a design function of that system.

And so, it's not a detailed root cause analysis, it's meant to be a relatively quick determination. It may take some, you know, discussions with the licensee, knowledge of what the system is supposed to do, but it shouldn't be a root cause. It should be, if this weld, you know, would this system have performance design function if this weld was inadequate, you know, if it wouldn't hold, that sort of thing. It wouldn't be a complete root cause analysis on why the finding happened, what's the extent and condition of the finding, that sort of thing.

So, the focus is, the inspectors identify a problem, they go to the definitions in 2519 for that system that it's associated with, or the structure, and they take that definition and determine whether or not their finding would have affected --

MEMBER ABDEL-KHALIK: So, the rows one through four do not reflect extent of condition.

MR. KOZAK: They do to the extent that it would affect one or multiple trains, or the whole system. One train of a multi-train system, for instance, the definition for row one is, as it affects one train, but not all trains of a system. Row two is, it affects multiple trains, but not all trains of a system. Row three is it affects the entire system, including if it's a single-train system, it affects one train. So, your system would not -- so, the idea is, row one, it affects one train of that system. One train of that system could not do its design function. It's an isolated thing.

Row two is, this finding has affected multiple trains, so the extent of condition is more.

MR. DUBE: Two parallel valves.

MR. KOZAK: And then, row three is, the whole system would be unable to do its design function definition.

MEMBER ABDEL-KHALIK: But, could you also imagine an issue related to the construction of a specific system that may be equally valid to other systems?

MR. KOZAK: Yes, it could.

MEMBER ABDEL-KHALIK: So, how would that fall into your --

MR. KOZAK: In that case, we would take the most risk significant system and bound it by whatever the finding color was for that system.

But, it would encompass everything, and it would affect all those other things, and the licensee would have to fix all those things, you know, whatever the extent of condition is.

And then, row four, just for complete disclosure, it's -- the only way you can get to row four is if you had one system that's not able to do its design function, and we have a repetitive significant condition adverse to quality.

Okay?

MEMBER ABDEL-KHALIK: Yes.

MR. KOZAK: Good.

MR. DUBE: So, there's a lot of information I know on this slide. It's a snapshot, but again, the emphasis here is the graded approach, and there's several principles.

First of all, green is not good. Green still means they have to enter the corrective action process.

But, going from significant increases when you go from green to white, yellow to red, when we developed this matrix, you know, we played around, should it be a 3x3, a 2x3, a 4x whatever. In the end we decided that 4x4 will do what we wanted.

Pretend that you don't see these delta CDFs there on the top row, and pretend you don't see the risk achievement worths. The principle here is, as you go from left to right the risking points of the system or structures were increasing, and as you go from the bottom to the top the extent of the impact of the finding goes -- increases as well. So then, you go from the bottom left to the top right, you go from green through white, through yellow to red.

This is a very common kind of a plot that has been developed for like ranking motor-operated valves, or risk importance of service inspection of finding. You kind of see these in kind of two-dimensional plots. So, I won't claim creativity here. Some of those concepts were taken from that.

The idea here is, again, there's several principles. First, the graded approach. Second, a minor impact on an important system, to determine should it be screened to green. I mean, there's going to be multiple minor or just barely more than minor issues that we felt, you know, we don't want to clog the system with whites, and yellows and red, and these should just screen to green. So, as a result, row one is always green. So, there's some level at which we say, you know, the corrective action process is going to take care of it. We don't want to, you know, exercise the staff, and so there's always going to be a green bottom row.

Or, you know, the other situation, there could be a large impact, but on a very low risk important system, and that idea concept should screen to green, and so the column to the left with very low risk significant systems is always green, regardless of the row. So, you have always green at the bottom, always green on the left column.

But then you see where if you had a major impact, with repetitive significant condition adverse of quality on a very high risk important system, that would be your upper right or red. That's the worst that you can have, and it's a very rare situation. It's -- there's only a half dozen or so high risk significant systems involved. It involves failure of an entire system, and, you know, a repetitive significant condition adverse of quality. I mean, you would hope no one ever enters the red. You would hope no one even enters the yellow, but it's there.

MEMBER ABDEL-KHALIK: Okay, let's look at a situation. Programmatically, you are checking the corrective actions program, and you find that people just don't really have the propensity to write condition reports, regardless of what the severity of the deviation or the condition might be.

The worst that you can give them is a

white.

MR. DUBE: Well --

MEMBER ABDEL-KHALIK: How does that match with this?

MR. KOZAK: I think that it's different than that, because the program finding is the program not containing guidelines for doing what the program is supposed to do.

What you've described is the program would have those guidelines in it.

MEMBER ABDEL-KHALIK: Right.

MR. KOZAK: But, people --

MEMBER ABDEL-KHALIK: People aren't using it.

MR. KOZAK: -- aren't following it. That would be this part. That's not a programmatic finding. That -- say the people are not reporting, or not following their corrective action program, is I believe what you are describing.

MEMBER ABDEL-KHALIK: Well, right, they aren't writing condition reports.

MR. KOZAK: Right. So, they are not writing it, there can be little to no impact there, and that would be a green finding, because we don't have, you know, it hasn't affected a risk significant system, that sort of thing.

But, say they don't write a corrective action document for a work process, a work activity, and subsequently construction activities result in a system not being able to meet its design function. That could be a criterion 16 violation for failure to follow the corrective action program, with a significance of white, yellow or red, depending on the outcome of, you know, what happened.

So, I think it's a little different somehow. You know, that's not a programmatic finding, it can't be greater than white, because in this case, I'm assuming they have an adequate program in place, they are just not using it. That's different. So, that wouldn't be a program finding, that would be a finding that has impact that we would evaluate based on the results of them not writing that issue.

I mean, that's one way we could approach it.

MEMBER ABDEL-KHALIK: But, you would only find it after something goes wrong.

MR. KOZAK: Right. You know, but we have other means of looking at that type of thing. We have a similar inspection to the PI&R inspections that we have in the ROP. So, we are looking at that routinely. We have a routine review of their corrective action program. We try to identify, you know, we question people if they are -- you know, if they feel comfortable in reporting problems, if they are reporting problems. We have inspectors in the field that notice if problems go wrong, and if they don't write the corrective action document for that, that would be, you know, a violation that we would document and we would evaluate.

So, we have a lot of different means to find that, but if it slips through all those, you are right, it would have -- you know, maybe something went wrong during a test that, you know, we look back and say, well, what happened here, and, you know, you can put all those pieces together. That would be something we would evaluate on this matrix.

MEMBER ABDEL-KHALIK: Okay.

MR. DUBE: Okay, thanks, Tom, for filling me in.

So, again, repeating, it's a graded approach with two dimensions. On the x-axis the dimension is how risk important is that system or structure, going from very low, to low, to intermediate, to high. And then on the y-axis is, it's called the quality of construction, but what's the extent of the impact of the finding from, again, relatively low impact, going all the way up to affecting, perhaps, a system, and then, ultimately, if it's repetitive and significant condition adverse of quality you can kick it up a row.

So then the question was, okay, so how do we draw the boundaries, and I'll talk about how do we draw with the columns. And, this is where the SRM that the Commission sent us, that said -- it's on slide 7, for the SDP and the cROP staff should assess risk using risk importance measures, with selected thresholds that are comparable and technically consistent.

Again, recognizing that plants under construction there's no public risk, but how do we decide these columns. And, the way to do it was, to go back to the fundamental idea, which is red was always for operating reactor if delta CDF was greater than 10^{-4}, yellow was 10^{-5} to 10^{-4}, white 10^{-6} to 10^{05}, and green 10^{-6}. And, I'll show you the math.

So, systems or structures, or components, if they were in a completely failed state, and the plant had been -- it were operating at full power, what would the change of core damage frequency B, and that's just used to decide how important is that SSC.

Is it -- should it be in the very low bucket, the low bucket, the intermediate bucket, or the high bucket.

And, the corresponding risk achievement worth, and I'll show you some math on the next page, it's, you know, 9th grade algebra, I think they learn this now, but the risk achievement worth for a system, if one assumes the system was completely in a failed state, if it's less than 4 it would be in the very low column. A risk achievement worth between 4 and 40 would be the low, 40 to 400 intermediate, and greater than 400 would be high.

So, you already see here the robustness. We are only talking -- we are talking orders of magnitude. I mean, we don't need to have calculated this risk achievement whereas the three orders -- you know, three significant figures. We are just trying to decide in a gross sense, you know, which of these columns should the system lie in.

And, the whole idea is to -- and it was agreed with the stakeholders, we don't want senior reactor analysts, you know, on the fly, tied to a Blackberry, doing calculations, you know, like they do for operating reactors. You know, it's a big thing when an SDP calculation greater than green is done for operating plants. So, we wanted to keep it simple, so we have determined -- pre-determined structures and systems ahead of time, which column they fit in, so there's no calculations being done. Where there is some judgment is determining what's the extent of the impact.

And again, remember green is not necessarily good. You still have to enter the corrective action program and make a repair if necessary.

So, any questions on this? There's so much information in this one.

MEMBER ARMIJO: I'd like an example, and I'll just pick one that I'll just make up. Let's say somebody bought some carbon steel elbows that were supposed to be resistant to flow-accelerated corrosion, but they were the wrong composition, didn't have a lip in them, but they were installed all over the plant.

MR. DUBE: All over the plant?

MEMBER ARMIJO: Nobody checked when they came in, the chemistry requirement. Where would that be? To me, that's an important thing, people could get killed.

MR. DUBE: If it was in the reactor coolant system, it would be on the far right column.

MEMBER ARMIJO: All right.

MR. DUBE: Now the question is --

MEMBER ARMIJO: How far up the rows.

MR. DUBE: -- how far up it is. It would probably -- if there's only one train, it would be a green. If it was, you are saying it's all over the plant, that means all over the system, you are at least a yellow, and if it's repetitive significant condition adverse to quality that could be a red.

MEMBER ARMIJO: It could almost be a red. Okay.

MR. DUBE: Right?

MR. KOZAK: Yes, it's a big oversight. Somebody missed it, and --

MR. DUBE: That's the logic.

MR. KOZAK: Right, if that would the logic, that would be a significant issue.

If you have bad material installed in the plant, and you miss the critical characteristics for that material, that's a big deal.

MEMBER ARMIJO: Yes.

MR. KOZAK: and I think it reflects, you know, you can see kind of how we would get to a yellow relatively quickly if it was installed in a high risk system, and that system would be determined to be entirely unable to perform its function.

MR. DUBE: If the plant was operating, yes.

MEMBER ARMIJO: Yes. The assumption would be that it's resistant to this phenomenon, and nobody would be particularly worried about it, it failed.

CHAIR SIEBER: But, if some engineer specified the material, and the material, actually, matched the specifications --

MR. DUBE: That's even worse.

CHAIR SIEBER: -- the specification was inadequate for the application, hopefully, you would have caught that prior to its being installed in the plant.

MR. KOZAK: You would hope.

CHAIR SIEBER: Because you are supposed to be examining the design, and I consider that a design defect.

MR. KOZAK: Right, but in that case if it had gotten into the plant, that would be a procurement violation that would still result in whatever the risk significance is.

CHAIR SIEBER: So, if you do catch it in the design phase, you are going to catch it here, provided your inspector look that far.

MR. KOZAK: Right. You would hope that somebody would be looking at the design specs for that system, to say this material needs to contain --

MEMBER ARMIJO: It's supposed to be resistant material, it's just carbon steel.

MR. KOZAK: And, it's not.

CHAIR SIEBER: Well, those issues, actually, occur on construction projects.

MEMBER ARMIJO: Yes, that's the problem. A few years ago there were a number of, I believe they were valves or some other component that was purchased in China or something like that, and they were really, what do you call these things that are knock offs?

MR. KOZAK: Frauds.

MEMBER ARMIJO: Yes, but it was -- it was even the code material.

CHAIR SIEBER: That's happened in a number of cases.

MEMBER ARMIJO: So, that was fraud. They were never installed, as I understand it.

MR. KOZAK: So, in that case it would be a low significance, because it wasn't installed, but they'd still have -- you know, still document it.

MEMBER ARMIJO: There'd be a brief somewhere.

MR. KOZAK: Right.

CHAIR SIEBER: Okay.

MR. DUBE: So again, a lot of information on this, and it took a long time to derive this. But again, the principle is a graded approach, two dimensionals. One is how risk important is this system? The second is, what's the extent of the finding?

Slide 11 is just the math, but we were directed by the SRM to make it consistent, technically consistent with the current reactor oversight process.

And you say, how do you do that, you know, because the plant is not even constructed. It's not real risk.

So, I put qualifiers here. I said recognizing that the ROP delta CDF threshold represent calculated risk levels at power, how would we determine these thresholds? And, I went through one example of the high column.

So, you have to, you know, for a given new reactor design with internal events, core damage frequency, and here we kept, again, the whole idea is we kept it simple. Yes, we could have had external events, but we wanted to keep it simple and we could equate the range from the ROP to a system level risk achievement worth, the sole purpose of categorizing the risk importance of each system.

So, this map is just to decide, you know, of all the systems and structures and components, which of those four columns does it go in, and here's the math. It's simple. If internal events, core damage frequency for the AP1000, I rounded it off because 2.5 x 10^{-7} gave me a real nice answer.

The red threshold, and the red threshold is greater than 10^{-4}, you do the math on the bottom of the page, and 10^{-4} divided by 2.5 10^{-7} means greater than 400.

MEMBER ABDEL-KHALIK: So, you translated the words comparable and technically consistent to identical.

MR. DUBE: Pretty close to identical. Yes.

MEMBER ABDEL-KHALIK: Is that just to get them off your back?

MR. DUBE: No.

MEMBER ABDEL-KHALIK: Or, is that to sort of logically --

MR. DUBE: It's logical, because before the SRM came, we were toying around with the idea of having other -- looking at other importance measures, Fussell-Vesely or risk achievement work. And, we had like, you know, and/or if the SSC has a Fussell-Vesely of greater than such and such, or risk achievement work rate of such and such put in these buckets.

The SRM made it convenient to just settle upon risk achievement work, and it helped settle the issue.

MR. KOZAK: We did a logic test on this, too. We tried to look at what the systems were when they ended up into the columns, and did it make sense. Was there a system that was in the low column that we think should be in the high column, you know, logically.

And, quite frankly, this passed the smell test on that, too. It made sense, the outcome made sense.

And, this also allowed us --

MEMBER ABDEL-KHALIK: Does that tell you that the design is so fragile that any change would, actually, cause -- result in a relatively large RAW value?

MR. DUBE: If it's in a failed state, we are talking about the entire system in a failed state.

MEMBER ABDEL-KHALIK: Right. Is that true, the smell test that you apply.

MR. KOZAK: What I meant was, you know, when we got our results with the calculations, we went back and looked at what are the most, you know, risk significant systems in the plant, and looking at the plant -- you know, those systems and their effect when it's operating, it seemed like everything ended up in the right column.

MR. DUBE: I mean, we made some -- we will talk about it, we shifted things one column usually to the right, but we did do some manual adjustments. We'll talk about that.

In fact, like I said, we were -- we had done some pre-assignment to column before the SRM said make it consistent, and we almost made no change to the right-most column. Intermediate changed a little bit, but they fell in line reasonably well.

So, this was the math to assign -- that we used to back off, back calculate what the risk achievement worth for a system would be in deciding which column it would lie in.

This is one sample calculation. This is getting to PRA, you know, you might want to move over to the other -- the subcommittee in the other room, but I'll give you an example. These are basic events in the AP1000 SPAR model. The SPAR model is NRC's own

Standardized Plan Analysis Risk Model, but these are common cause events.

The risk achievement worth is, if you set that basic event to true, by what factor would the core damage frequency go up. And, you see there's some round-off error, but for two basic events in the core make-up tank you get risk achievement worths of 250-260. You choose the higher number, that means that system, as a first cut, would be in the intermediate column.

The in-containment refueling water storage tank, we picked as many basic events as we could find that would fail the whole system. These are common cause failures of check valves, of explosive valves, motor operated valves, and strainers that would fail the whole system. And, you got pretty consistent risk achievement worths. You choose the highest number, and it's clear, this is a clear example of being in the high column.

So, you do this for all the systems, and as a first cut decide is it the very low, the low, the medium, or the high.

Now, I only showed you two examples here, but we did this for every system.

So then, we did, I'll call it,

verification and adjustments. The staff took its predetermined assignment of systems to a workshop. We used the AP1000 SPAR models. Then Westinghouse came and they had their AP1000 PRA model, as documented in the design control document. And, we had, I'll call it an expert panel, because we had staff, NRC staff, we had Westinghouse representatives, and we had representatives from NEI, as well as the major COL applicants for the AP1000, and said, let's go through this, compare Westinghouse quantitative PRA results with the SPAR model, see if we can make sense and agree to what systems would go in what column.

That turned out to be the easy part. The more difficult part was the structures. But, this was the process that we went through. It's very similar to an expert panel, and maintenance rule, or 5069 or any of the other risk informed, which is, it's risk informed in that you use the PRA quantitative results as a starting point, recognizing that, you know, you may need to make some adjustments.

We reviewed the design reliability assurance program list. This is in the design control document Tier 1, and then we made manual adjustments, primarily, usually moving from the left-most column to the right-most, because we started just with internal events that power PRA. But, there are other concerns, post 72-hour safety function, examples of these that we ended up moving from the left-most columns to the right-most columns, where the ancillary diesel generators, these provide post 72 hour function. The ventilation of the nuclear island, which didn't lend itself very well to quantification of PRA, but we felt that this was a post 72 hour, so we tended to move that as much as two columns, but usually one column to the right.

Since we used a PRA that was at power, we wanted to make sure we captured shut down, significant shut down equipment, and this would, typically, be for the AP1000 service water, component cooling water, and then the normal residual heat removal system. We wanted to make sure we had the containment function and subsystems, so large early release frequency/large release frequency we took that into consideration.

And then, other important severe accident mitigation. For example, in the AP1000 they had the capability for severe accident mitigation of in-vessel retention, which is flood up the lower cavity, surround the lower head of the reactor vessel and cool it externally. It's an important function for severe accident mitigation.

The real tough ones were pipings and structures. I mean, there was a lot more -- it was less risk-informed aspects of this and more performance based, or more deterministic, if you will, but it was concluded by all parties that reactor coolant piping should be assigned the high category, because of the risk significance, the fact that, you know, it's a pressure boundary. It's one of the barriers to release. It should be assigned high.

And then, the structures were assigned based on the equipment that was within it, and some degree of judgment. So, the clear case would be if you had a very important system, and that system was in a structure, we would assign -- if that system within that structure was high risk important we'd assign the structure as well to high risk importance.

Or, the other extreme case, you had turbine building, the system, which was balance of plant system, to, generally, speaking, low, very low risk significant. The only thing that that structure contained was very low important systems, and by default that would be very low.

MEMBER RAY: Don, you guys were talking about programs earlier. What effect is this going to have on the scope of a program like an Appendix B

Quality Assurance Program?

MR. DUBE: Well --

MEMBER RAY: In other words, you know, it was -- what you are describing now has all the sophistication of the PRA involved in it. And yet, the classical Appendix B program has got a very bright line, applies to some things, doesn't apply to other things.

What is the effect of doing this when it comes to that bright line?

MR. KOZAK: I'll take a shot at that.

MR. DUBE: Yes, okay.

MR. KOZAK: Are you referring to like Appendix B being applicable to safety related?

MEMBER RAY: Of course.

MR. KOZAK: Okay. Since we've introduced the performance deficiency concept here, which means that a licensee, you know, a performance deficiency is failure of a licensee to meet either a requirement or a commitment, you know, a standard, it allows us to bring in issues into our --

MEMBER RAY: Yes, clearly, I can see that. But, the question that I'm trying to ask is, when you are evaluating programs do you expect then that the programs will include all the things of interest, not just those that are safety related. You know, I've been around AP1000 for a while, and people really do believe that there's a difference between the emergency diesel generators in AP1000 and those in an existing plant. And, from a safety standpoint there certainly is.

But, they believe that difference is going to translate into something tangible when it comes to building the plant, the scope of the safety-related complements is less, the procurement of stuff outside that scope is easier, and so on and so forth.

But, it's not clear to me that from a programmatic standpoint it isn't going to be, necessarily, the case that you have the same gradation in programmatic application to reflect the safety significance of things outside the safety realm.

I mean, we had Westinghouse sit right here and tell us, no, no, that's not safety related. Okay? They are right.

But, what difference does it make in the world that you are describing?

MR. DUBE: Well, I'll show an example.

It is possible for a non-safety system to be in an intermediate column.

MEMBER RAY: Of course, we all know that.

I'm just asking, still the question, what effect does having this systematic oversight have on the programs that the licensee is required to implement.

It seems to me, I'll tell you the answer, it seems to me now that you are about to give it, that you'd better have something that allows you to assure that the commitments you've met, safety related or not, are still met, right?

MR. DUBE: Yes.

MEMBER RAY: All right. Now, do you think the other side, I'll call it, not meaning to be pejorative, understands that?

MR. KOZAK: Yes, I do. You know, they were --

MEMBER RAY: What do they think about it.

MR. KOZAK: The other side being?

MEMBER RAY: The licensee, the manufacturers, constructors and so on, because they certainly have taken a lot of pains to try and avoid imposing programmatic quality requirements outside the much narrower scope that's now considered safety related.

MR. DUBE: Well, I think, you know, one of the answers to that question has to do with, you know, the ITAAC. ITAAC applied both safety related and non-safety related they have to meet the acceptance criteria for all of them, whether they are or not.

And so, even if they are inclined to not apply as much of their quality assurance, quality control, to the non-safety related part of the plant they still have to meet the acceptance criteria. And so, they are going to have to bring that in.

MEMBER RAY: Yes, but Appendix B is part of the regulations. It's not optional whether you have an Appendix B program, right?

MR. KOZAK: Yes.

MEMBER RAY: You must have it. And, as far as I know the regulations haven't been changed to say, well, it can exist in gradations that attract this more sophisticated way of looking at the construction of a plant, procurement and all the other things that go into that.

And, it seems to me like there's a disconnect between the regulatory requirement, as it still exists, which is the same when Jack and I built plants in the past. I was a QA manager for some time, so I have a very clear vision of what Appendix B does and doesn't apply to.

And, what is going to be called for here, and I'm looking at this not so much, are they aware of this, but do we all understand what it means given that we haven't bothered to change the programmatic requirements of the regulation when it comes to quality.

MR. KOZAK: You know, it's hard for me to speak on behalf of -- you know, I'm not going to speak on behalf of the licensees, but they were, you know, full participants in developing this process. They understand that, you know, the ITAAC requirements, they have to meet them whether or not they are safety related, whether or not Appendix B applies to them.

And, we are trying to determine the significance of a finding that we have, and if it happens to be a non-safety related, you know, component --

MEMBER RAY: But, are you still going to only, from a programmatic standpoint, I mean, what I'm trying to figure out is, you are going to assign a white finding, let's say, to something that isn't covered by Appendix B, because they didn't have some other program that effectively assured that the requirements were all met. And, it just seems to me like there's some kind of a disconnect here, because it was very easy to say you've got 18 criteria in Appendix B, and you didn't meet No. 17. God knows what we are going to say now.

MR. DUBE: There has to be a performance deficiency.

MEMBER RAY: Understood, but I'm talking about just the programmatic aspect of what you are saying. Yes, you can go and say, you said you were going to do something, it doesn't matter whether it's safety related or not, you didn't do it, and so it's a deficiency. Here's your finding.

But, I'm just trying to look at this from the standpoint of the programmatic requirements that we do apply, and I don't see how you can say somebody didn't have an adequate program to assure things were met outside of the scope of the safety related, the narrower safety related scope.

And, I don't know, it's just something that, you know, I make an observation here that the industry may think it's fine, or they don't know what to make out of it, or they are not about to build a plant so they don't care. I don't know.

But, you know, I go down to Vogtle, and you go down there, and at some point you say to the QA manager, what's your responsibility here. I did that, and their responsibility is the trunk and scope, and I guess they just sort of hope that all the other requirements are going to get met.

I'll leave it at that. It just bothers me that we are, in effect, calling for some graded QA program, and that's not the first time you ever heard that word used. We talk that way lots, but we don't have any requirements that define it, other than the results, you know. We are going to have performance-based compliance. I guess.

I'm done. Thank you.

MR. DUBE: Well, you're right. I mean, it is a paradigm shift, because if the Commission in an SRM said develop a non-risk informed, non-performance based approach, we would have just continued what we are doing on Watts Bar 2, and, perhaps, Bellefonte and Browns Ferry 1.

But, with the SRM emphasizing risk informed, performance based, this is one end of the double edge sword, which is, some safety significant -- some safety systems that have low risk importance may end up being column two, and you'll see a couple examples where DC batteries, though they are non-safety for an AP1000, are very important, and they end up in column three, intermediate.

MEMBER RAY: Yes, I don't have any problem with any of that. You understand my point.

MR. DUBE: Yes.

MEMBER RAY: My point is, you've got Appendix B, and it just says safety related, and what else do you have? All you have is what you didn't succeed. So, something is wrong.

MR. DUBE: Shall we move on to the next?

CHAIR SIEBER: Well, let me ask a question about this slide. This slide, overall, describes a collaborative effort between the staff, the NSSS supplier, the licensee, industry groups, in order to develop, basically, this structure.

Is that unique to this prototype program?

MR. DUBE: No. The RO, reactor oversight process itself was -- had a high degree of input from stakeholders, yes.

CHAIR SIEBER: Who has the final decision and what's it based on.

MR. DUBE: Well, we do. The staff developed this. We have developed this. We listened to and considered input from our stakeholders.

CHAIR SIEBER: Okay.

MR. DUBE: And, got a lot of it, and it was helpful. But, ultimately, we didn't agree on everything.

CHAIR SIEBER: Okay.

MR. DUBE: And, we -- when we didn't, we explained what our position was, and sometimes had to agree to disagree. But, it was, ultimately, our program and we developed it.

CHAIR SIEBER: And, you used their PRA, which the staff had gone through and decided that it correctly represented the safety consequences for that plant.

MR. DUBE: Well, we used the AP1000 SPAR model, so we started with the staff's own PRA.

CHAIR SIEBER: So, you started with your own.

MR. DUBE: Yes, and then we --

CHAIR SIEBER: Was that adequate for all the detail that is needed for construction inspection?

MR. DUBE: It's only good for those systems modeled in the PRA, and that's why I said we had to do some judgment.

CHAIR SIEBER: That's part of my question.

MR. DUBE: Yes. We had to do judgment, especially on the structures. But, I think, I mean, I explained the process.

CHAIR SIEBER: Right, okay.

MR. DUBE: For assigning structures.

MEMBER ABDEL-KHALIK: Now much of --

nearly all of what you've talked about pertains to the AP1000. When you try to apply this to other designs, including SMRs, is it just a simple scaling based on the --

MR. DUBE: It will work. It should work. Now, the threshold on a risk achievement worth may shift.

MEMBER ABDEL-KHALIK: Based on the baseline CDF.

MR. DUBE: Yes, they may shift.

MEMBER ABDEL-KHALIK: It's just a simple scaling.

MR. DUBE: Well, I don't know if it's simple, but it -- you could, on some plants, have more things in the intermediate and high column, because the risk achievement -- because of -- go through the mathematics of what's the baseline core damage frequency, and what's the impact of a component. A diesel generator at a plant with active safeguards, like advanced pressurized water reactor, EPR, is a heck of a lot more important than in a passive plant that has no reliance whatsoever on large diesel generators for mode of power, because you don't have big problems. You don't have typically motor-operated valves.

But, on the other hand, DC power is very important.

MEMBER ABDEL-KHALIK: Well, I'm concerned about the opposite extreme, where your core damage frequency, the baseline core damage frequency, might be 1×10^{-8}. Would you still be happy with a RAW of 1,000?

MR. DUBE: You'll find that there's still a number of systems, even on that kind of a plant, where it's going to fall in the high range, high and important, but we didn't go through it yet. There could be some shifting, I acknowledge that.

But, for the AP1000, the next high made sense to us, because we had, before we even chose the boundaries we had this thought, why wouldn't it make sense for the distribution of high, intermediate, low and very low, we didn't call it that back then.

CHAIR SIEBER: Okay. Maybe we can go to the next slide.

MR. DUBE: Next slide.

So, this is the follow. Let me start on the easy one. Upper right high systems. Again, going back, these are systems with a risk achievement worth, parental and -- powers greater than 400, yet the protection and safety monitoring system. This was high in the AP1000 SPAR model, and Westinghouse's own model, both confirmed this.

You had the IDS, which is the DC -- the Class 1E DC power system, and again, in an AP1000 DC power is extremely important, because it actuates lots of things.

Again, the Westinghouse model and SPAR model had this. You had the refueling water storage tank. PXS is the big passive heat removal system. IRWST is a subset. Both classified them as high.

We said we put the reactor coolant system piping in here for high, and said that was a judgment call, but because of the importance.

The containment sump recirculation, again, both the SPAR model and Westinghouse model had it in the high.

So, we had unanimous -- unanimous -- complete consensus on what went in the high.

The systems part was easy, so I'll continue on the system and then we'll get to the structures.

In the intermediate, we had the core make-up tank portion of the PXS, the passive heat removal. The passage residual heat removal system, the PLS, which is the non-safety control, the EDS, which is the non Class 1 EDC power. Again, DC power is important because this also provides back up to the safety related or Class 1 EDC power. And, here we went with the higher category, so we shifted some, in some case, from the low to the intermediate.

On the low, we have the accumulator portion of the passive heat removal system, the diverse actuation system, that's the DAS. ECS is AC power, and again, in a passive plant like AP1000 or ESPWR they do not have large safety-related diesel generators necessary to power large pumps and large load, because it's passive in nature and they rely more importantly on DC power. So, it kind of passed the smell test.

The containment isolation function, here we used large release frequency, and we show the delta CDF here, we used delta LERF differed by an order of magnitude. So, were consistent. So, instead of delta CDF in assigning, we used delta LERF.

We have the passive containment cooling system, that's PCS, RNS is the normal residual heat removal system. Component cooling water is CCS, service water. VLS is the hydrogen igniters. IVR is in vessel retention, and the VBS is the post 72 hour fans. Some of these quantitatively in the PRA were in the very low column, but because we didn't have a shutdown PRA we moved them over in to the low column.

MEMBER ARMIJO: Where are the reactor coolant pumps? Are they part of the RCS, in the high?

MR. DUBE: Yes, reactor coolant system Barry integrity, yes. The answer is yes.

CHAIR SIEBER: But, the pumping --

MR. DUBE: What's left is --

CHAIR SIEBER: -- the pumping function is not. It's the boundary.

MR. DUBE: The boundary would be.

MEMBER ARMIJO: The boundary, but the pump itself?

MR. DUBE: I would say that that's probably very low.

MEMBER ARMIJO: It doesn't feel good to me, but go ahead.

CHAIR SIEBER: The plant is safe, it just doesn't produce anything.

MR. DUBE: So, everything else would be very low. That's start-up heat water system, well, whatever is left. It's a whole slew of systems.

The difficult one, more difficult aspect, was structures, and here we had to use judgment. Our first cut was the intermediate and high were seismic category one structures. The low were seismic category two structures, and the very low were non-seismic structures that met -- basically, meet universal building code, if you will.

But, we wanted to further refine category one structures. We went to -- we decided to put in the high category, in the design control document, Tier 1, Section 3.3 there's a whole table there of a very specific list of SSCs, mainly structures or sub-structures, with structural integrity required to ensure functionality of systems. And, those are spelled out in Tier 1, so there's no questions asked. Those are in the high category.

In the intermediate category would be the rest of containment not in the high category, if you will. The shield building, the auxiliary building, the nuclear island, basemat, and 1E cable raceways.

The low category would be the Cat 2 buildings and the annex buildings is really the only example. This does -- this, among other things, contains the ancillary diesel generators, which are, typically, post 72 hours.

And then, all other structures are in the very low.

So again, there's some judgment call here.

We can argue one column or the next, but I think we tried to use a systematic approach in the assignment of structures to the columns.

MR. KOZAK: And, the idea here was to pre-solve these things ahead of time. We used that expert panel, so that the inspectors and licensees aren't, you know, having to debate over where things belong. It's clear cut.

As part of the pilot, we are going to evaluate the assignment of structures and systems to the various columns. Depending on what comes up, there may not be a lot that comes up in the first year, but we'll do what we can.

We wanted to eliminate a lot of the time that's taken, for instance, in the ROP to do significance evaluations when you are debating the risk numbers and that sort of thing. So, it's all pre-solved. It is what it is. We'll take feedback after, you know, we come up with issues. And, if we determine, you know, we would probably have another expert panel, if we needed to move things one way or another, but this is our -- we think we have -- at least we have a sound foundation going in. We have logic on how we got here, and we tried to make it as simple for the inspectors that use the SDP, so that it could be clear cut and we don't have a lot of debate, and we can move quickly on these issues, as, you know, construction moves quickly, like you mentioned earlier. We want to get these things out as fast as possible with as little debate, and try to bound them.

So, that's kind of what our philosophy going in was, and why we did it this way.

The next slide, slide 15, I've already pretty much gone over this earlier. It just -- this is a flow chart that we provide to the inspectors that they can follow for the technical finding SDP. WE've already -- we have some pre-screening criteria, where you don't even have to look at the design function. Those are all listed on slide 16. Those would screen to green, and then you ask is it a system in the risk importance table, or a structure in the risk importance table, and then you assign to rows one, two or three, and escalate one row if you have a repetitive significant condition adverse to quality.

And, slide 16, as I mentioned, is our Step 9, it's just a step in our SDP that has screening criteria of what would go to green. That makes it a little bit easier for the inspectors, so they don't have to go and determine if the design function is affected if the finding is going to be green anyway.

I won't go through all of those.

This is our last slide. As we, you know, we tried to portray that the approach is technically consistent with the ROP. We've already talked about reactor designs with a lower CDF, would have fewer structures in the right columns, and with the higher CDF may have more. But, we will go through the same process we did for the AP1000 for future designs, and not only use the numbers, but also use other information like Don went over to try and get the right mix of where the most important systems are. And, if nothing ends up in the furthest right column, then nothing ends up there.

MR. DUBE: Well, reactor coolant system will probably always be there.

MR. KOZAK: You are right, and we did that, but anything else we may not have anything else there. If we have a really -- you know, maybe the small modular reactors, I don't know what their PRAs are going to look like, but it may dictate that only the reactor coolant system is in the right-most column on this.

One thing we didn't mention earlier is, we reviewed numerous old findings of violations from the first round of construction, and applied it to this, and seemed to get the right results. We don't -- we know we haven't probably covered everything. We tried to think of as many things as we could, but we are going to identify some holes.

This is a living process, we may need to adjust it as we go, but we used -- we also used Watts Bar findings. We used Browns Ferry findings. And, we applied it to this, and it seemed to get the right regulatory outcome.

So, we are confident that we have a pretty robust system going in, but we, you know, will be analyzing it as we go. As we get input, we are going to make sure we are getting the right outcome, we are getting the right inspections. We want to make sure that the plant is being constructed in accordance with its design, and we think the more risk significant systems should warrant more attention from us. And, if they are not getting those right, what are they doing on the other systems? That's kind of the philosophy we've used.

CHAIR SIEBER: As I understand it, a plant like the AP1000 consists of not as much field construction as there used be, where everything was put together out in the field, but you have modules being shipped to the plant.

MR. KOZAK: right.

CHAIR SIEBER: Now, the licensee doesn't take possession of that until it's shipped to the plant, right? And so, does your vendor inspection process have to go to the module constructor and apply all these principles to the module itself, depending on its risk significance? And, can you tell me how that process works?

MR. KOZAK: For that process, the vendor inspectors are using traditional enforcement. We don't have our assessment program applied to vendors.

So, if there is a vendor finding at the modular, you know, facility, we would handle that using traditional enforcement.

However, for Appendix B licensees are required to provide oversight of those activities. And, if the vendor is working on, you know, a module that can be tied directly to a licensee, we would consider that type of a finding associated with that part of the licensee's oversight function per Appendix B, and could apply this process to that finding, even if it's not on site.

So, it's kind of a judgment.

CHAIR SIEBER: It could go either way, though.

MR. KOZAK: Right, it could.

CHAIR SIEBER: Particularly, if they were building lots of AP1000s.

MR. KOZAK: If they are building lots of those modules --

CHAIR SIEBER: You would not be able to tell which box goes to which licensee.

MR. KOZAK: -- right, if you can't tell, if you can't tie it to a licensee in all likelihood it will go to a vendor. And, we've had a lot of internal discussions about how we are going to handle this. And, I think it's going to be more of a we are learning as we go.

CHAIR SIEBER: Yes, but the licensee has got a problem, too, because he doesn't know which box is going to be his. And so, what he gets is the box and a pile of paper, okay, and you can rifle through all the paper and, frankly, you can say everything was signed off just perfect, you know. I really don't know whether that box is perfect or not.

So, is there a requirement then to go through and reinspect all kinds of stuff that's inside the module? And, if not, are we all relying on this paperwork from the Vendor Inspection Branch for a feeling of security that this module will perform its function as expected?

MR. KOZAK: Well, the Vendor Inspection Branch is, you know, it comes under NRO. CCI, the Center for Construction Inspection Region 2, are working very closely when it comes to the vendor inspection, say, at Shaw Modular Solutions. And, any findings that the vendors have will be communicated to CCI, and also the Region 2 inspectors can, and will be, accompanying vendors on what have traditionally been vendor inspections.

So, we have a really integrated inspection approach for the modular construction. But, it is a challenge to us, you know, to make sure that we communicate those types of findings, you know, to one another.

CHAIR SIEBER: Okay.

MS. DUDES: I was only going to add, I mean, to the extent -- sorry, this is Laura Dudes, Director of Division of Construction Inspection and Operation Programs. We have -- it is challenging, as you said, but in particular with modular construction, the geography, I think too often geography of these locations comes into play where it really shouldn't.

The licensee has a license, and so there are inspections that are done against that licensing basis. So, CCI could very well be at a modular facility, and executing this exact program in a different location, if they are inspecting something that's directly related to their licensing basis.

Now, you raised an issue that makes it a little more complicated. At a facility like Shaw Modular Solutions, they do know, and they have identified which, you know, components are there. So, that could be a direct inspection of the licensee in the paper trail. But, when there are broader components or things where the components, system structures or components could be constructed for a variety of the licensees, in that case we call those generic type vendor inspections, and that's where we do send our vendor team in. They don't use this program, but those findings will be fed in and that information will be captured.

It may not -- but, I think, I just want to be clear that regardless -- there are locations where our regional inspectors can do an entrance, and it's really with the licensee, regardless of where they are, if they know that they are inspecting direct components that are in the license.

I don't know if that helps or confuses things.

CHAIR SIEBER: That reminds me of the old days when you would go to some pump manufacturer. You would do an inspection at that plant, but you didn't know which pump was going to which licensee. And, you relied a lot on the receipt inspection, but half of the receipt inspection was, actually, just going through all the paper to make sure you got the right paper, it's signed off, dated, stamped and that kind of stuff.

So, I was hoping, and I think at this stage in the process you are probably in pretty good shape, and I was hoping that we could overcome some of the fuzziness of the past back in the days when you were building 20 or 30 plants at one time.

MR. KOZAK: Yes, right.

CHAIR SIEBER: I have another question. In my construction experience, one of the things that I thought personally was very important, which you put at low safety significance, or relatively low relatively low safety significance, was the ground fill on which you build the plant, how you excavate, and what kind of foundation you put under it, because that determines what the seismic response is, and to a great extent how much settlement you get, how much misalignment inside the plant.

And so, I wonder a little bit about classifying that as low safety significance.

MR. KOZAK: I don't think that's the case here. Intermediate, the nuclear island basemat was intermediate significance, and we'd have to -- a nuclear island basemat is, you know, intermediate.

CHAIR SIEBER: Yes, is that good enough? Yes, I guess that's a judgment call, but to me it was important, particularly, some of the sites aren't the world's greatest about remediation.

Okay. Does this conclude your --

MR. KOZAK: This concludes our presentation.

CHAIR SIEBER: -- presentation?

I'd like to ask the members if they have any additional questions or comments that they would like to make.

Joy?

MEMBER REMPE: You said you've implemented at Vogtle. What kind of findings, have you had any green findings, any white, any findings at all yet? How is it going?

MR. KOZAK: Well, unfortunately, you know, the COL just recently got issued. We implemented this January 1st. We haven't run any findings through VSBP yet. We haven't had any inspection reports come out. So, we are still pretty early in the process. So, we don't really have any experience yet, but we can't wait until we do.

CHAIR SIEBER: I'm sure they can't wait either.

MR. KOZAK: Yes, they can't either.

MR. DUBE: Do you want to bring up the Watts Barr?

MEMBER REMPE: I want to hear.

MR. DUBE: No, CJ, are you on the phone? I can only say in very broad terms, and I believe it was Watts Bar 2, there was an issue and a question, and they didn't know how to go about it. They used a process similar to this to make sense of whether the issue was of great significance or not.

I mean, I just can't get too much more specific than that.

MR. KOZAK: Yes, I don't know if there's a file or not, I think there were some receipt inspection issues at Watts Bar, and the feedback we received from the staff is, they were using traditional enforcement to determine the significance. That's what we are using at Watts Bar, as you know.

And, the guidance and the enforcement

policy resulted in the staff having to do a lot of internal deliberations on whether or not it was severe level 4 or 3. And, the feedback they provided us was, that if this was in place at Watts Bar it would have been clear what the color was, based on, you know, on the guidance that we have.

So, it was very positive feedback we received, because, you know, these types of new programs, when you roll them out to inspectors, aren't always received with open arms. And, we got some, you know, what I consider very positive feedback.

I don't know how that issue ended up. We'll certainly run it through our process after it's final, but to directly answer your question, we haven't -- we haven't had any findings yet.

CHAIR SIEBER: Any other questions from members?

Sam? Said?

Well, I guess in conclusion, I want to thank you for your presentation. I also, having been involved in this structure for many years, I think your process is pretty well founded.

I think that I like the structure of the program. I think we have to wait until the prototype is complete before we can make a final decision as to whether it's effective or not, but I think the groundwork has been laid, and I think you have done a lot of work, and I think it's been good work.

So, I congratulate you for that, and I also thank you for informing us of where you are and the progress you are making, and I look forward to hearing from you at the end of the prototype.

So, thank you very much.

MR. SHUKLA: And, public comments?

CHAIR SIEBER: No public comment? Okay.

With that, the meeting is adjourned.

(Whereupon, the above-entitled matter was concluded at 2:56 p.m.)

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Protecting People and the Environment

Construction Reactor Oversight Process

A Risk-Informed and Performance-Based Approach to Construction Oversight

Donald A. Dube, Division of Safety Systems & Risk Assessment, Office of New Reactors

Thomas J, Kozak, Division of Construction Inspection and Operational Programs, Office of New Reactors

Meeting Purpose

Provide the ACRS an introduction to new construction assessment and enforcement programs, including the construction significance determination process

Background

- In SECY-10-0140, the staff recommended the development of a construction assessment program that includes a regulatory framework, the use of a construction significance determination process (SDP) and the use of a construction action matrix (CAM) to determine the appropriate U.S. Nuclear Regulatory Commission (NRC) response to degrading licensee performance.

- The new construction assessment program includes:
  - Regulatory Framework
  - Construction Significance Determination Process (SDP), and
  - Construction Action Matrix
  - Pilot new program for 1 year

Background

- Commission SRM SECY-10-0140 approved the staff's recommendation
- The Commission directed the staff to provide the pilot results to the ACRS for review.
- The Commission directed the staff to ensure that the cROP is also applicable to construction oversight of plants that are under the 10 CFR Part 50 process, including applicability to potential small modular reactor activities.
- Due to the stage of Watts Bar Unit 2 construction, the new process is not applicable to this site.

Background

- The Commission directed the staff to appropriately characterize and publicly communicate the potential risk significance of a construction finding

- The Commission directed the staff to assess risk using risk importance measures with selected thresholds that are comparable and technically consistent with risk threshold levels used in the ROP

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Pilot Plans

- Issued pilot guidance document including evaluation and acceptance criteria

- Issued pilot versions of IMCs

  - IMC 0613P
  - IMC 2505P
  - IMC 2519P (Construction SDP)

- Trained staff in October and November

- Issued Enforcement Guidance Memorandum 11-06

- Implemented pilot at Vogtle on January 1, 2012; Implement pilot at Summer when significant construction activities begin

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SRM on SECY-10-0140

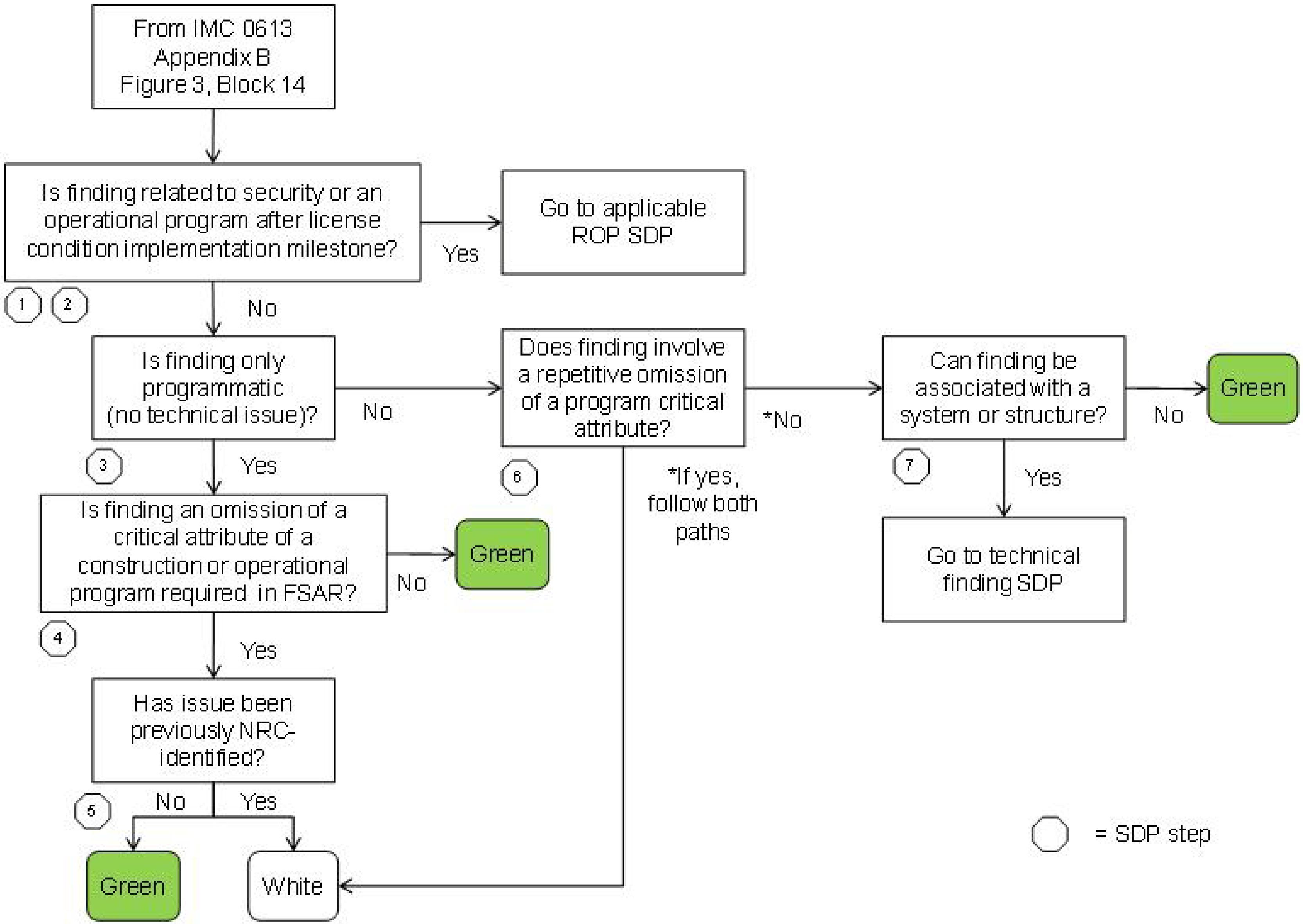
"For the SDP in the cROP, the staff should assess risk using risk importance measures with selected thresholds that are comparable and technically consistent with risk threshold levels used in the ROP."

ΔCDF > 1 E–4
1 E–5 < ΔCDF ≤ 1 E–4
1E–6 < ΔCDF ≤ 1 E–5
ΔCDF ≤ 1 E–6

Construction SDP

- The staff developed a deterministic construction SDP to evaluate findings associated with licensees’ construction and operational programs
- The staff developed a risk-informed construction SDP to evaluate all other findings identified during construction

Construction Programmatic SDP



AP 1000 Construction SDP Matrix

Assumption: AP1000 internal events baseline CDF ~ 2.5 E-7/yr

Quality of Construction					
	Row 4	**ΔCDF < 1 E-6**	**ΔCDF 1 E–6 to 1 E–5**	**ΔCDF 1 E–5 to 1 E–4**	**ΔCDF > 1 E–4**
	Row 3				
	Row 2				
	Row 1				
		Very low RAW < 4	**Low RAW 4 to 40**	**Intermediate RAW 40 to 400**	**High RAW > 400**

System/Structure Risk Importance

Determination of Risk Importance Thresholds

Recognizing that the ROP ΔCDF thresholds represent calculated risk levels at power, for a given new reactor design with an internal events CDF, equate the range from the ROP to system level risk achievements worth (RAW) <u>for the sole purpose of categorizing the risk importance of each system, </u>e.g.:

CDF (IE) ~ 2.5E-7/yr

"Red" threshold ΔCDF > 1E-4 /yr

System RAW for rightmost column > 1E-4/2.5E-7

> 400

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Example Determination of System Risk Importance (X-axis)

<table>
<tr><td colspan="3">Pilot Effort - Risk Matrix Column Assignment</td><td></td><td></td></tr>
<tr><td colspan="3">AP1000 SPAR Model, Revision 302, February 2010</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><th>System</th><th>Basic Event Name</th><th>RAW (same as RIR)</th><th>System or Function RAW</th><th>Risk Importance Column</th></tr>
<tr><td rowspan="2">Core Makeup Tanks (CMT)</td><td>CMT-CKV-CF-16AB17AB</td><td>265</td><td rowspan="2">265</td><td rowspan="2">Intermediate</td></tr>
<tr><td>CMT-TNK-CF-02AB</td><td>254</td></tr>
<tr><td rowspan="4">In-Containment Refueling Water Storage Tank (IRWST)</td><td>IRW-CKV-CF-122124</td><td>1351</td><td rowspan="4">1442</td><td rowspan="4">High</td></tr>
<tr><td>IRW-EPV-CF-ALLHP</td><td>1442</td></tr>
<tr><td>IRW-MOV-CF-V121AB</td><td>1413</td></tr>
<tr><td>IRW-STR-CF-AB</td><td>1420</td></tr>
</table>

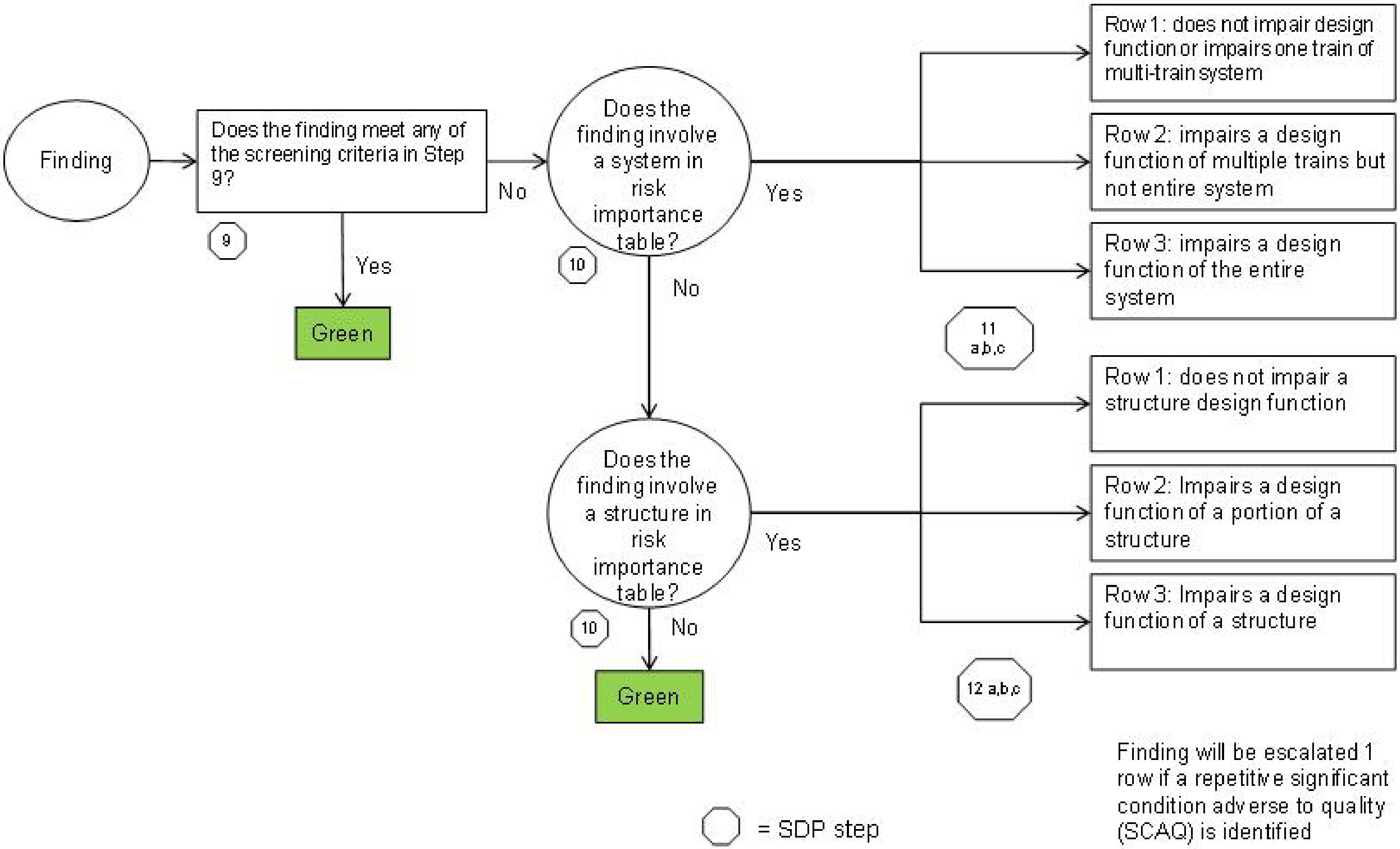
Verification and Adjustments

- Expert panel including Westinghouse PRA staff
- Review of D-RAP list (DCD Tier 1 Table 17.4-1)
- Manual adjustments
  - Post-72 hour safety function
  - Safety significant shutdown operations
  - LERF/LRF
  - Importance for severe accident mitigation
- Piping / structures
  - RCS piping assigned HIGH
  - Structures assigned based on equipment within and judgment

System/Structure Assignment for AP1000 Pilot

SYSTEMS			
VERY LOW	**LOW**	**INTERMEDIATE**	**HIGH**
ALL OTHER SYSTEMS: SFS, SGS, ETC…	PXS (ACC)	PXS (CMT)	PMS
	DAS	PXS (PRHR)	IDS
	ECS	PLS	PXS (IRWST)
	CNS (ISOLATION)	EDS	RCS
	PCS		PXS (Containment sump recirculation)
	RNS		
	CCS		
	SWS		
	VLS		
	PXS (IVR)		
	VBS (FANS)		
STRUCTURES			
VERY LOW	**LOW**	**INTERMEDIATE**	**HIGH**
ALL OTHER STRUCTURES: Turbine Building, EDG Building, Rad Waste Building, Yard, Site Grade, Non 1E Cable Raceways	ANNEX BUILDING	CONTAINMENT	STRUCTURAL SECTIONS LISTED IN AP1000 TIER 1, SECTION 3.3. TABLE 3.3-7 OR WHOSE STRUCTURAL INTEGRITY IS REQUIRED TO ENSURE FUNCTIONALITY OF SYSTEMS IN THE HIGH COLUMN
		SHIELD BUILDING	
		AUXILIARY BUILDING	
		NUCLEAR ISLAND BASEMAT	
		1E CABLE RACEWAYS	

Construction Technical Finding SDP Matrix
Quality of Construction Y – Axis Flow Diagram



Construction SDP Step 9 Screening

- If the finding is associated with a system or structure in the very low risk column of the risk importance (RI) table, its risk significance is GREEN.

- If the finding is associated with a system or structure in the low risk column of the RI table and is not a repetitive significant condition adverse to quality (SCAQ), its risk significance is GREEN.

- If the finding is associated with receipt and storage, its risk significance is GREEN.

- If the issue associated with the finding has been dispositioned as use-as-is or it appears that this determination can be made without a detailed analysis, the significance of the finding is GREEN.

- If the licensee demonstrates with reasonable assurance that the design function of the applicable structure or system would not be impaired by the deficiency, the significance of the finding is GREEN.

Summary

- Approach is technically consistent with current ROP

- Reactor designs with lower CDF will tend to have fewer systems/structures in the rightmost columns, while designs with higher CDFs may have more systems/ structures to the right

- Pilot has been implemented at Vogtle and will be soon at Summer