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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS

(ACRS)

SUBCOMMITTEE ON AP1000

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TUESDAY

OCTOBER 5, 2010

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ROCKVILLE, MARYLAND

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The Subcommittee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B1, 11545 Rockville Pike, at 8:30 a.m., Harold B. Ray, Chairman, presiding.

COMMITTEE MEMBERS:

HAROLD B. RAY, Chairman

SANJOY BANERJEE, Member

MARIO V. BONACA, Member

MICHAEL CORRADINI, Member

MICHAEL T. RYAN, Member

WILLIAM J. SHACK, Member

ACRS CONSULTANTS:

THOMAS S. KRESS

GRAHAM B. WALLIS

ACRS STAFF PRESENT:

WEIDONG WANG, Designated Federal Official

DANNY CHIEN

PATRICK DONNELLY

JOE DONOGHUE

CHRISTOPHER JACKSON

EILEEN McKENNA

JOHN MCKIRGAN

ALSO PRESENT:

CHUCK BROCKHOFF, Westinghouse

NICK SALKELD, Westinghouse

A G E N D A

P R O C E E D I N G S

(8:30 a.m.)

CHAIRMAN RAY: The meeting will now come to order. This is a meeting of the AP1000 Reactor Subcommittee, standing Subcommittee of the Advisory Committee on Reactor Safeguards, and I'm Harold Ray, Chairman of the Subcommittee.

ACRS members in attendance are Bill Shack, Sanjoy Banerjee, and Mario Bonaca. We expect Michael Corradini and perhaps Mike Ryan later on. ACRS Consultants, Tom Kress and Graham Wallis are present. Weidong Wang is the Designated Federal Official for this meeting.

This meeting is a part of the ongoing delivery of a proposed amendment to the AP1000 Pressurized Water Reactor Design Control Document. In the past, we have had eight AP1000 Subcommittee meetings in July, October, and November of 2009, and in February, April, June, July and September 2010.

This AP1000 Subcommittee meeting will continue to review the Safety Evaluation Reports, or Revision 17 to the AP1000 DCD. We will review Chapter 6, which includes Generic Safety Issue 191 and long-term core cooling issues. If times permits, we will review Chapter 15, and Action Items from the past

AP1000 Subcommittee meetings.

We will hear presentations from the DCD applicant, Westinghouse, and from the NRC Staff. We have received no written comments, or requests for time to make oral statements from members of the public regarding today's meeting.

Presentations on GSI-191 will be closed, and that will occur shortly, in order to discuss information that is proprietary to the applicant and its contractors pursuant to 5 USC 552BC-3 and 4.

Attendance at the closed portion of the meeting dealing with such information will be limited to Westinghouse representatives, the NRC Staff and its consultants, and those individuals and organizations who have entered into an appropriate confidentiality agreement with them. Consequently, we will need to confirm shortly that we have only eligible observers and participants in the room for the closed portion of the meeting.

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

The rules for participation in today's meeting have been announced as part of the notice of

this meeting previously published in the Federal Register. 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. The participants should first identify themselves, and speak with sufficient clarity and volume so that they may be readily heard.

With that, we'll proceed with the meeting, and I'll ask first, still in the open meeting portion, Eileen, do you have anything you want to start with? Okay. Fine. Then I believe we're ready to proceed into the closed portion of the meeting, unless any member has anything they'd like to say before. Okay. If not, then I'll turn to Salon and ask if we can close the open phone line, and verify what that the attendance is as I indicated.

(Whereupon, the proceedings went off the record at 8:34 a.m. to begin closed session. Open Session resumed at 6:08 p.m.)

CHAIRMAN RAY: Eileen do you really want to go forward with this next section?

MS. MCKENNA: Well we really would like to because I think as we had indicated we had a staff member who is here in town and is intimately involved in this review and we would really like to benefit from his participation. So if the committee will indulge us we would like to try to get through this.

CHAIRMAN RAY: We have to go with the applicant first though right?

MS. MCKENNA: That's what we are going to process and we think that's still a good idea, yes.

CHAIRMAN RAY: All right.

MR. WANG: This session is open to the public.

(Closed Session)

MR. JACKSON: Thank you very much. I appreciate it. It's good to be back. I don't live here and I would hate to make another trip. I will just get started.

Good morning. It's a pleasure to be here. We are here to discuss AP1000 amendments on control room habitability. This is an exciting review and we look forward to sharing our findings with you.

My name is Christopher Jackson. I am a senior reviewer in the containment systems branch. This is my colleague Danny Chien, who participated in the review and this is Patrick Donnelly, our project manager.

Third slide please. Regulatory guidance on this. GDC 19 is the overarching requirement, which covers control room habitability. We have SRP 6.4 addressing control room habitability. In this review we used Reg Guide 1.52 for the safety related filters, Reg Guide 1.197 for demonstrating control room integrity.

We also have Reg Guide 1.195 and 1.196 on dose analysis and habitability.

The Rev 15 design which was certified had no fission product removal in the control room, canister there was only supplied to replace stale air.

There was no AC power for the system. The applicant wanted to expand the Chi over Q values, encompass more sites.

The control room integrity program in Rev 15 was the responsibility of the COL under a COL information item and the applicant wanted to address it in the DCD.

The applicant had a difficult time developing a design basis in-leakage that could be demonstrated through an integrity program. As a result, increased margin, increased in-leakage and to expand the Chi over Q values in the certified design fission product removal system was added to the design.

Next slide please. Are we on 5?

A filter train was added and an integrity program was developed. Additionally design changes were made to reduce in-leakage. Unrelated changes were made to increase operational flexibility, including changes to the design of the technical support area.

MEMBER RYAN: You are going pretty quick. Just back up this slide 4 for a second.

MR. JACKSON: Certainly.

MEMBER RYAN: The system did not clean the

air it just replaced the stale air with fresh air.

MR. JACKSON: Yes.

MEMBER RYAN: What does that have to do with contamination control? Does that link in some way, can you tell me?

MR. JACKSON: It had nothing to do with --

MEMBER RYAN: Have you got positive pressure going out away from the source --

MR. JACKSON: That was the only thing. It pressurized the control room.

MEMBER RYAN: Okay.

MR. JACKSON: But what they wanted to do was bring in new air to keep the carbon dioxide levels down.

MEMBER RYAN: How long does it stay pressurized with this new system?

MR. JACKSON: 72 hours under the old system, 72 hours under the new system.

MEMBER RYAN: Okay. Thank you.

MR. JACKSON: That part of the design basis didn't change.

Slide six. Once again a simplified drawing. You got the four banks on the left. You got two flow paths into the system. You got the eductor. And then if you look right here you have a bypass

around the eductor in case the eductor gets clogged.

Slide seven please. Because there was limited nuclear experience with eductors, the staff asked the applicant for operating experience on eductors. They provided it. Eductors have been used in industrial applications for many years. They are rugged, passive components that have been used in non-nuclear applications for many years.

That was one aspect of the review. We also looked at the HEPA absorber and combined filter testing and we made sure that it met the requirements of Reg Guide 1.52 or the intent of Reg Guide 1.52.

With regard to flow instrumentation, we verified that the appropriate aspects of the system are safety related. Obviously the flow going into the control room was in fact safety related flow, so the operators could take action if something was wrong. The flow out of the eductor out of the filter trains was not safety related and we were satisfied that these would not be used in an accident by the operators.

And last, single failure. The applicant eliminated all single failures. You saw by the drawing. However that postulated a passive failure clogging the eductor, somehow damaging the eductor and

the applicant address this concern by demonstrating that filtration wasn't actually needed after 24 hours. The principle dose impact was in the first 24 hours and we don't postulate a passive failure in the first 24 hours.

I'm sorry, with the addition of the bypass line the operators could take manual action to bypass the filter train if it should become clogged. They meet the single failure criteria.

Slide eight. Control room in-leakage testing. The program used tracer gas testing and meets Reg Guide 1.197. Tech specs meet the TSTF standard technical specifications which were generated after the generic letter on control room habitability. They have allotted 10 SCFM for in-leakage which is demonstrable through in-leakage testing. They have allotted five SCFM for ingress and egress.

5 SCFM for ingress and egress is the standard assumption for control room with a vestibule. It's common.

Slide nine. The applicant made changes to reduce unfiltered in-leakage as well. They have provided a continuous vestibule purge which improves the system. They have eliminated duct work entering the control room envelope, they've dealt with the pipe

there and they have actually added isolation capability for some of the various control room penetrations.

Once again the vestibule is a common assumption, a standard assumption. The in-leakage that they have used is standard for the vestibule. And all of the other design features just improve this from what we would typically see in an operating reactor control room.

Slide 10 please. There are changes to improve operational flexibility. They have redesignated in chapter 6 the technical support center. Technical support center is obviously a requirement in emergency preparedness. It's not typically described in chapter 6. It's not required to be described in chapter 6. It's in chapter 18 or 13, so this removal from chapter 6 is fine.

They have also changed the tech spec on fuel handling. Obviously the fission product, inventory and the fuel assembly is based on the time after shutdown. The applicant redid the dose analysis with new outage times to justify a change in the tech spec, which allowed them to begin moving fuel a little bit earlier.

They have created four isolable banks of

canistered air rather than one gigantic bank. This allows them to remove one bank. They have created a tech spec which we are satisfied will allow them the flexibility to remove one bank, put it back into service with compensatory actions in place.

Slide 11 please. In conclusion we think this is an innovative, highly-reliable ESF filter system, meets the requirements and conforms to applicable portions of Reg Guide 6.4, Reg Guide 1.52 and Reg Guide 1.197.

There are ITAAC place to demonstrate that the system works. The performance characteristic in both ITAAC and tech specs verify that the system will perform its function and the applicant did do proof of concept testing which showed that it is in fact constructable and buildable.

And with that, that concludes my presentation.

CHAIRMAN RAY: All right. Well done. Any questions? Thank you very much and have a good trpi home.

MR. JACKSON: Thank you so much. I appreciate you taking time out of your schedule to -- coming back would have been a hassle.

CHAIRMAN RAY: Well, I thank everybody for

the very, very long day. I think most of the time -- I won't say all of it -- was constructively applied to trying to make life easier. At thee end of the day we still have some outstanding items. I won't say they are all closed. I think we have made them clear thus far.

It is projected that we will try and craft a recommendation to the full committee for consideration at the November meeting to the extent that other things occur before then, which allow us to even further narrow the issues that may be identified at that time, that will certainly be in everybody's interests to do.

But the next occasion when we address AP1000 will be just prior to the November full committee meeting. We will see what has to be taken up at that time and I would ask Eileen, do you have any comments further?

MS. MCKENNA: No, I think we thank you for your indulgence, staying late. I think we managed to cover what we were thought were the major items in chapter 6. There were some other more minor ones that you can read at your leisure, but we did want to make sure that we covered the GSI 191 in whatever depth the committee wanted and to have you all have the

opportunity to hear about 6.4 because as Chris said, this is again -- you ask about innovative and unique things, and we saw that element in this design.

CHAIRMAN RAY: I doubt we will see any leisure in the future but nevertheless. Anyway Ed did you have anything you wanted to say?

MR. CUMMINS: No thanks. Thank you.

CHAIRMAN RAY: We stand adjourned.

(Whereupon the above-entitled matter went off the record at 6:35 p.m.)

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Presentation to the ACRS Subcommittee

Westinghouse AP1000 Design Certification Amendment Application

AFSER Section 6.4
Control Room Habitability Systems

October 5, 2010

Staff Review Team

- Technical Staff
  - Christopher Jackson
  - Danny Chien
- Project Management
  - Patrick Donnelly

Regulatory Guidance

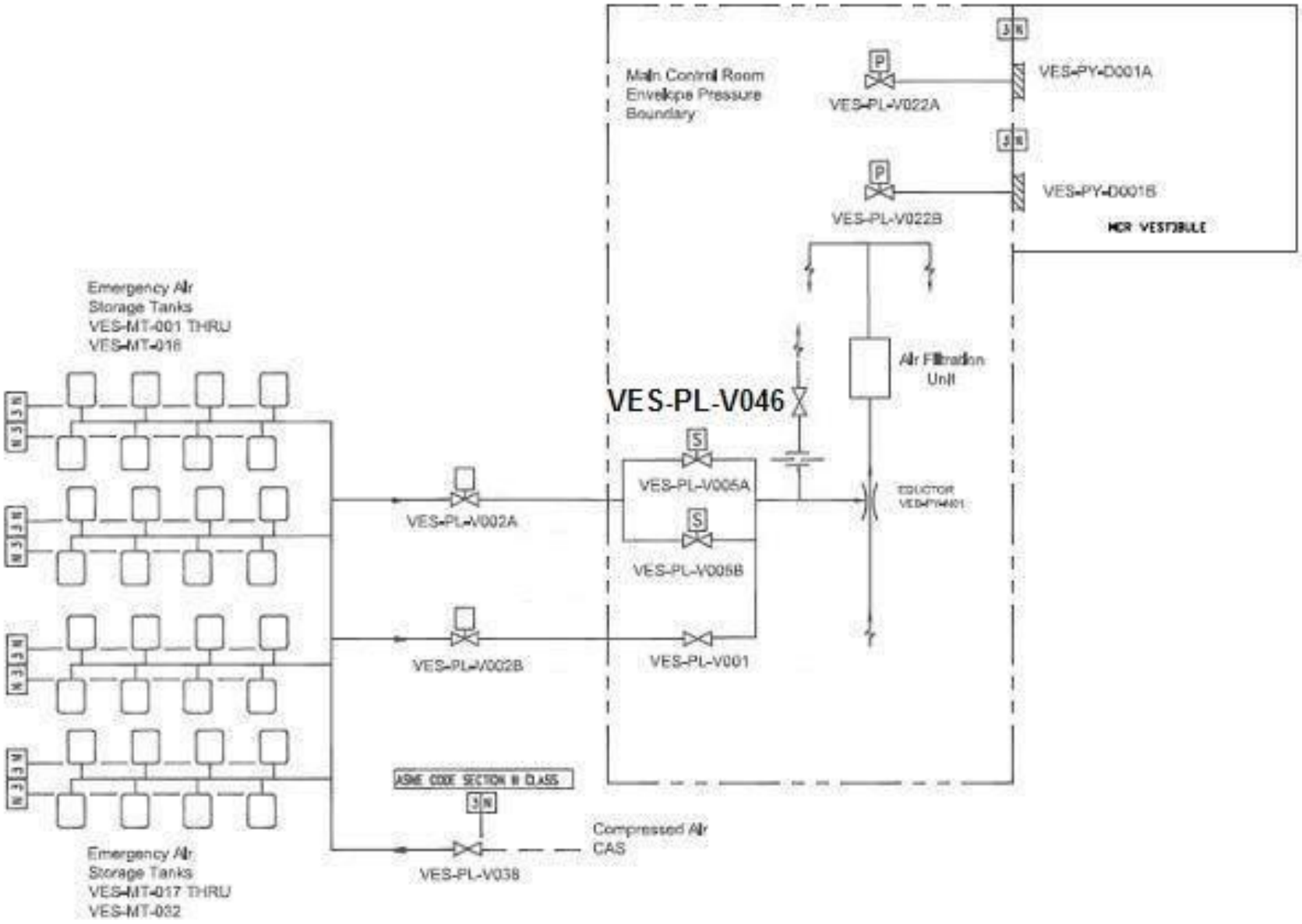
- General Design Criterion 19 - Control Room
- SRP 6.4 – Control Room Habitability System
- Regulatory Guides 1.52, 1.195, 1.196 and 1.197

Overview

- The certified design uses canisterd air tanks to provide control room with breathable air
- The system did not clean the air it just replaced the stale air with fresh air
- The passive system doesn't use AC power
- Additional dose margin was needed so a passive filter train was added

Overview (cont'd)

- Chapter 6.4 changes included --
  - An eductor driven filter train
  - A control room integrity program
  - Changes to reduce the unfiltered in-leakage
  - Redesignation of the technical support center
  - Changes to improve operational flexibility
  - Editorial changes


Main Control Room
Envelope Pressure
Boundary
VES-PL-V022A
VES-PY-0001A
VES-PL-V022B
VES-PY-0001B
MCR VESTIBULE
Emergency Air
Storage Tanks
VES-MT-001 THRU
VES-MT-016
VES-PL-V046
Air Filtration
Unit
VES-PL-V005A
VES-PL-V005B
VES-PL-V002A
VES-PL-V002B
VES-PL-V001
ASME CODE SECTION III CLASS
Compressed Air
CAS
VES-PL-V038
Emergency Air
Storage Tanks
VES-MT-017 THRU
VES-MT-032

Passive Filter Train

- Eductor in the Passive Filtration Line
- HEPA Filter in the Passive Filtration Line
- Adsorber in the Passive Filtration Line
- Combined Filters Pressure Drop Test Frequency
- Passive Filtration Flow Instrumentation Safety Class
- Single Failure of the Passive Filtration Line

Control Room In-Leakage Testing

- Program that used tracer gas testing and meets RG 1.197
- Technical specification TSTF-448 Rev 3
- 10 SCFM allotted to in-leakage
- 5 SCFM allotted to ingress/egress

Reduce Unfiltered In-Leakage

- Continuous vestibule purge
- Eliminated ductwork penetrating the CRE
- Isolation capability for various control room penetrations

Improve Operational Flexibility

- Re-designated in Chapter 6 the TSC to the operational support center
- Revised fuel handling TS
- Created four isolable banks of canisters rather than one large bank
- TS actions included for one bank of canisters out of service

Conclusions

- Innovative and highly reliable ESF filter system that meets the requirements and conforms to SRP 6.4, RG 1.52 and RG 1.197
- ITAAC and TS programs verify the system performs consistent with accident analyses
- Proof-of-concept scale testing demonstrates functionality