



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

January 13, 2011

MEMORANDUM TO: ACRS Members

FROM: Ilka Berrios, Staff Engineer */RA/*
Reactor Safety Branch B, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS SUBCOMMITTEE
ON THE U.S. ADVANCED PRESSURIZED WATER REACTOR,
NOVEMBER 29, 2010

The minutes for the subject meeting were certified on January 13, 2011. Along with the transcripts and presentation materials, this is the official record of the proceedings of that meeting. A copy of the certified minutes is attached.

Attachment: As stated

cc w/o Attachment: E. Hackett
C. Santos
A. Dias

cc w/ Attachment: ACRS Members

Certified by: John Stetkar
Certified on: January 13, 2011

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
 NOVEMBER 29, 2010
 ROCKVILLE, MD

Introduction

The ACRS Subcommittee on the U.S. Advanced Pressurized Water Reactor (US-APWR) met on November 29, 2010 at NRC headquarters in Rockville, MD. John Stetkar, Chairman, presided. The Subcommittee met with NRC staff members and members of the public. The purpose of this meeting was for the Subcommittee members to hear briefings by NRC staff members and representatives of Mitsubishi Heavy Industries (MHI) related to Chapters 8 and 13 of the US-APWR Design Certification Application and the staff's Draft Safety Evaluation Report.

Monday November 29, 2010, Conference Room T-2B1, Two White Flint North

Topic	Presenter(s)	Time
1. Opening Remarks and Objectives	John Stetkar, ACRS	8:30 – 8:35 a.m.
2. NRC Staff Introduction	NRO Management	8:35 – 8:40 a.m.
3. US-APWR Design Certification Application, Ch. 8, Electric Power [OPEN]	MHI Representatives	8:40 – 10:30 a.m.
<i>Break</i>		10:30 – 10:45 a.m.
4. SER with Open Items, US-APWR Design certification Application, Ch. 8, Electric Power [OPEN]	N. Otto, NRO	10:45am - Noon
<i>Lunch</i>		Noon – 1:00pm
5. US-APWR Design certification Application, Ch. 13, Conduct of operations [OPEN]	MHI Representatives	1:00pm – 2:30pm
<i>Break</i>		2:30pm – 2:45pm
6. SER with Open Items, US-APWR Design certification Application, Ch. 13, Conduct of operations [OPEN]	M. Takacs, NRO	2:45pm – 4:00pm
Committee Discussion [OPEN]		4:00pm – 4:30pm
Public and stakeholder Comments [OPEN]	Open	4:30pm – 5:00pm
Meeting Adjourned	All	5:00pm

Attendees (11/29/2010)

ACRS Members/Staff

John Stetkar, Chairman
Dennis Bley
Mario Bonaca
William Shack
Neil Coleman (DFO)

NRC Staff

Jeff Ciocco
Hossein Hamzehee
Edward Robinson
Ngola Otto
Tania Martinez-Navedo
Om Chopra
Bob Fitzpatrick
Mike Miernicki
Richard Smith
Chandu Patel
Stephen Monarque
Peter Lee
Tarun Roy
Kevin Williams
Anthony Bowers
Mark Lintz
Royce Beacom
Rick Pelton
Richhard Clement
Mike Junge
Michelle Hart
Dan Barss

MHI

Shinji Niida

MNES

Shinji Kawanago
Kanji Mashio
Richard Barnes
Russ Bywater
Ryan Sprengel
Hiroshi Hamamoto
Shinji Kinchi
Hideki Tanaka
Ron Reynolds

Bechtel

Lynn Van-Derpael

Luminant

John Conly

The presentation slides used by presenters are attached to the transcript of this meeting at the following website: <http://www.nrc.gov/reading-rm/doc-collections/acrs/tr/subcommittee/>. The presentations to the Subcommittee are summarized below. There were no requests by members of the public to make written or oral statements.

OPENING REMARKS BY CHAIRMAN STETKAR

Chairman Stetkar brought the meeting to order and announced that other ACRS members in attendance are Bill Shack and Dennis Bley. Neil Coleman of the ACRS staff is the Designated Federal Official for this meeting. He stated that the purpose of the meeting is for the Subcommittee to review Chapters 8 and 13 of the NRC Safety Evaluation with Open Items associated with the US-APWR Design Control Document. Chapter 8 addresses electric power systems, and Chapter 13 covers conduct of operations. Chapter 8 examines onsite and offsite power systems and handling of station blackout conditions. Chapter 13 covers broad topics that include plant procedures, training, organization, and operational program implementation and security. The Subcommittee will gather information, analyze relevant issues and facts, and will

formulate proposed positions and actions for the full Committee to deliberate. The rules for participation have been announced in the notice of this meeting previously published in The Federal Register. Later in the day there will be an opportunity for stakeholder comments. We have received no additional written comments or requests for time to make oral statements from members of the public. We have received no requests for people to participate via a bridge phone line regarding today's meeting. A transcript is being kept and will be made available, as stated in The Federal Register notice. We will request that participants 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 they may readily be heard.

Chairman Stetkar noted that due to our late receipt of supporting documents, detailed discussions regarding the Gas Turbine Generator (GTG) reliability and acceptance testing programs will be postponed to a later Subcommittee meeting date.

Chairman Stetkar reviewed several additional items, the last of which is that the Subcommittee is going to initiate an action items list, like the one that has worked well for some of the other design center subcommittees. The action items list is an internal list for the Subcommittee to note substantive questions that arise during the meetings. It provides a vehicle for communication among the Subcommittee, the staff, and the applicant, so that we are sure to have all of our questions answered. Mitsubishi has been providing timely and very detailed answers to questions that arise in the Subcommittee meetings. The action item list is for our internal use at ACRS, so that as the meetings proceed through the next several months we have the ability to revisit the list, make sure that if items have not been closed, we see progress and have reasonable assurance that, by the time we visit the Final SER with No Open Items, at least all of the questions that we have raised internally have been closed out. So, at the end of the day we will try to highlight items that will be added to the action item list.

Mr. Hossein Hamzehee (NRC staff) stated that they are here to present the results of the staff's Safety Evaluation with Open Items for Chapters 8 and 13. The staff does not intend to cover physical security.

US-APWR Design Certification Application, Tier 2, Chapter 8, Electrical Power

This presentation was given by Richard Barnes (MNES), Shinji Kawanago (MNES), and Shinji Niida (MHI). Below is a summary of the NRC staff's major requests for additional information (RAIs):

RAI: Supply Power to the Onsite Class 1E Power System (SECY-91-078 requirement)

An evolutionary plant design should include at least one offsite circuit to each redundant safety division supplied directly from one of the offsite power sources with no intervening non-safety buses in such a manner that the offsite source can power the safety buses upon a failure of any non-safety bus.

RAI: Redundancy of Onsite Power System

Any 2 of the 4 trains is adequate to meet electrical load requirements during LOOP, and LOOP & LOCA occurring simultaneously. Any two out of four trains can achieve the Emergency Power System's safety function with one train out of service and with a single failure on another train.

RAI: GTG Reliability

The staff requested detailed GTG reliability data and calculations as applied to US-APWR. The staff required the test condition of starts and load acceptance tests in IEEE-387.

RAI: Operation for coping with Station Blackout

Since the power from the AAC GTG to Class 1E buses would not be restored until 60 minutes into an SBO, how would the following functions be maintained?

- RCP seals
- Capability to remove decay heat
- Compressed air capacity
- Battery capacity
- Effects of the loss of ventilation

RAI: Capability of Alternate AC Power Source

The US-APWR is designed to have two independent off-site power sources. Each has sufficient capability to operate the plant safety under normal conditions or in response to any DBE. Class 1E onsite power system consists of four 50% trains. Any 2 trains can maintain the safety function. The Class 1E onsite power system can maintain its safety function with any one train in maintenance and tolerate a single failure. Independence and separation within Class 1E onsite power systems complies with requirements. Class 1E qualification work is ongoing. US-APWR has diverse AACs to minimize common mode failure and respond to a SBO.

SER with Open Items, US-APWR Design Certification Application, Tier 2, Chapter 8, Electrical Power

This presentation was given by three members of the NRC staff: Ngola Otto, Robert Fitzpatrick, and Tania Martinez Navedo. Mr. Otto is the NRC Chapter 8 Project Manager for the US-APWR design. Below is a summary of the NRC staff's major requests for additional information (RAIs):

<u>SRP Section/Application Section</u>	<u>No. of Questions</u>	<u>No. of OI</u>
8.1 Introduction	0	0
8.2 Offsite Power System	16	0
8.3.1 Alternating Current (AC) Power Systems (Onsite)	38	2
8.3.2 Direct Current (DC) Power Systems (Onsite)	22	1
8.4 Station Blackout	14	2
Total	90	5

Station Blackout Confirmatory Items of Interest

- Confirmatory Item 08.04-1: During the August 6, 2009 US-APWR Public Meeting, MHI described a plan to use different manufacturers for the Class 1E GTGs and non-safety AAC GTGs. This would minimize common cause failures by using different manufacturers, designs and components.
- Confirmatory Item 08.04-2: In a letter dated August 21, 2009, the applicant committed to add a description of the manner in which both AAC-GTGs would be used to achieve cold shutdown if required.

Open items

Chapter 8, Electric Power Systems Safety Evaluation (SE) has 5 Open Items

- Open Item 08.03.01-1 - Maintenance and Testing of Inaccessible Cables
- Open Item 08.03.01-2 – GTG Reliability
- Open Item 08.03.02-1 – Battery Sizing Calculations
- Open Item 08.04-1 – RCP Seal Leakage Rate During SBO
- Open Item 08.04-2 – AAC GTG Periodic Testing

Open Item 08.03.01-1: Maintenance and Testing of Inaccessible Cables

Generic Letter 2007-01 guidance on preventing the degradation of medium voltage cables that are installed in underground duct banks. MHI's proposed resolution consists of describing a method to mitigate water intrusion into the underground conduits. Duct banks are sloped for water drainage into the manholes. Temporary sump pumps will be available for removing the water from the manholes. Periodic testing of underground cables includes tests such as partial discharge testing, time domain reflectometry, dissipation factor testing, and very low frequency AC testing. The applicant has not provided a COL Information Item for this.

Expected Resolution - The applicant needs to include a COL information item identifying the responsibility of the COL applicant to maintain a program to monitor and mitigate the degradation of inaccessible cables in accordance with the guidance of GL 2007- 01 after the plant is licensed.

Open Item 08.03.01-2 – GTG Reliability

MHI has chosen a 95% reliability target with a 95% confidence level as the minimum requirement for reliability of emergency power source. This is a first-of-a-kind application of GTG to Class 1E sources in nuclear plants. Therefore there is no operating experience data available. Technical Report MUAP-07024-P, Rev. 2, provides technical information about the GTG and their qualification plan, but does not provide type test data that supports the 95% reliability and 95% confidence level targets chosen by the applicant.

Expected Resolution - Currently, the applicant is performing qualification testing on a prototype of the Class 1E GTG intended to be used in the US-APWR design. Test results will allow the staff to determine the suitability and acceptability of the proposed GTGs for use as NPP emergency onsite power sources.

Open Item 08.03.02-1 – Battery Sizing Calculations

The applicant reports in its DCD a load current requirement of 1 Ampere for the Class 1E 480V Load Center. Compared to operating experience data for Class 1E 480V load centers, a load current requirement of one Ampere appears to be too low in terms of battery loading. The applicant indicated that its assumptions for the types of loads were made based on Japanese experience and products. The applicant agreed to provide a more in-depth explanation of this issue which will be incorporated in the upcoming DCD revisions.

Expected Resolution - The applicant has committed to provide more detailed information regarding load current requirements for all of the loads included in the battery sizing calculations in a future revision to the DCD.

Open Item 08.04-1 – RCP Seal Leakage Rate

The applicant has stated that the leakage of reactor coolant through the seals of each RCP is assumed to be 0.2 gpm. Therefore, the total loss of coolant inventory within 1 hour from the seals on all four RCPs is expected to be 48 gallons. Because of the uncertainty of RCP seal leakage during SBO, industry guidance was developed in NUMARC-8700 for use in coping analyses. The assumed seal leakage per RCP in all PWRs was established as 25-gpm. The use of 0.2-gpm-per-pump leakage deviates by over 2 orders of magnitude from this industry position. The applicant needs to justify the deviation from industry standards for its RCP design by actual test results or demonstrate that the design can cope with the higher leakage rate.

Expected Resolution - The applicant is expected to provide NRC staff with its planned approach to resolve this issue and then to follow through accordingly.

Open Item 08.04-2 – AAC Power System Periodic Testing

The applicant's DCD states that the AAC power system will be inspected and tested periodically to demonstrate operability and reliability. The inspection and testing will be conducted by the COL applicant over the lifetime of the NPP, therefore, the DCD should include these inspection and testing requirements as a COL Information Item.

Expected Resolution - The NRC staff requested that the applicant add a COL Information Item in a future revision of the DCD to ensure that the AAC power system will be inspected and tested periodically to demonstrate operability and reliability in accordance with RG 1.155.

Conclusions

The applicant has provided sufficient information to support the offsite power system with regard to the interrelationship among the nuclear unit, utility switchyard, and the interconnecting grid. With the exception of the 3 open items identified by the NRC staff, the applicant has provided adequate information on the onsite power system with regard to the availability of sufficient power to mitigate design-basis events given a loss of the offsite power system and a single failure in the onsite power system. With the exception of the 2 open items identified by the NRC staff, the applicant has provided necessary analyses to determine the capability of the design to withstand and recover from an SBO of 8 hours duration.

US-APWR Design Certification Application, Tier 2, Chapter 13, Conduct of Operations

This presentation was given by three MNES representatives: Kenji Mashio, Ron Reynolds, and Russ Bywater. The purpose of Chapter 13 is to provide adequate assurance that the COL applicant establishes and maintains a staff of adequate size and technical competence and that operating plans will ensure public health and safety is maintained. Chapter 13 addresses a variety of topics, including the preparation and plans for the US-APWR plant design, construction, and operation. Topics include training, emergency planning, program implementation, plant procedures, security, and fitness for duty. The following topics were discussed:

13.2 Training

60-1101, Revision 0, 8/27/2008, Training Program Requirement

13.3 Emergency Planning

46-215 Revision 0, 7/31/2008, Technical Support Center (TSC) Floor Space; TSC Power Source, and Decontamination Facility

108-1515, Revision 1, 12/01/2008, Capability and Impact of Main Control Room (MCR) to accommodate TSC's plant management function

13.5 Operating And Emergency Operating Procedures

61-1102, Revision 0, 8/27/2008, Added procedures development assurance consistent with NUREG-0800

13.6 Security

282-1984, Revision 1, 3/18/2009

283-2200 (Safeguards Related Information), 3/19/2009

613-4912, Revision 1, 8/6/2010 Physical security

SER with Open Items, US-APWR Design Certification Application, Tier 2, Chapter 13, Conduct of Operations

This presentation was given by Mike Takacs, NRC's project manager for Chapter 13, "Conduct of Operations." and Ed Robinson, who discussed the emergency planning portion of the Safety Evaluation. The following table shows the number of questions that were asked in each section and the number of open items left to be addressed by the applicant. The remaining open items are in the area of Security.

SRP Section/Application Section	No. of Questions	No. of OI
13.1 Organizational Structure of Applicant	0	0
13.2 Training	1	0
13.3 Emergency Planning	4	0
13.4 Operational Program Implementation	0	0
13.5 Plant Procedures	1	0
13.6 Security	129	8
13.7 Fitness for Duty	0	0
Total	135	8

The staff has identified seven COL Information Items:

- Develop interfaces of design features with site-specific designs and site parameters.
- Develop a comprehensive emergency plan as a physically separate document.
- Develop an emergency classification and action level scheme.
- Develop the security related aspects of emergency planning.
- Develop a multi-unit site interface plan depending on the location of the new reactor on, or near, an operating reactor site with an existing emergency plan.
- Develop emergency planning ITAAC.
- Develop the description of the operation support center.

Action Items

The following table shows the action items identified during the November 29, 2010 meeting. These action items are open and will be tracked for resolution in future meetings.

DCD Chapter	Action Item
8	Safety bus power transfers and ECCS equipment sequencing for LOOP/LOCA (response to these simultaneous events)
8	Do the electrical rooms contain any chilled water piping for HVAC (DCD indicates no, but this needs to be confirmed)
8	Obtain interim presentation for the subcommittee on the GTG testing when available, rather than wait for the final SER. Check how much info is available by the 3rd week in January to decide what GTG info to cover in the Feb. subcommittee
8	Does the DCD scope of underground cable monitoring and testing include low voltage cables (e.g., > 400 VAC), and no distinction for normal loading?
8	Justification for claims that RCP seals will retain integrity for at least one hour without cooling
8	Justification for claims that electrical equipment rooms and internal cabinet temperatures will remain acceptable for at least one hour without HVAC
8	2/4 success criteria - can safe shutdown be achieved with any two operable safety trains for every design-basis event (in particular, only safety buses B and C, without realignment of Train A and D equipment)?
8	More details are needed on station blackout (SBO) recovery procedures.
8, 13	Discrepancy between 30-minute stated availability of TSC power and 60-minute rated life of non-safety batteries; are TSC loads shed at 30 minutes?
13	Is habitable space provided for emergency use by plant management and is near but outside the main control room?
13	Obtain a copy of ISG-21 for the subcommittee