



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

August 20, 2010

MEMORANDUM TO: ACRS Members

FROM: Derek A. Widmayer, Senior Staff Scientist /RA/  
Reactor Safety Branch B, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES FOR THE MEETING OF  
THE US EPR SUBCOMMITTEE, NOVEMBER 3, 2009 –  
ROCKVILLE, MARYLAND

The minutes of the subject meeting have been certified on August 18, 2010, as the official record of the proceedings for that meeting. A copy of the certified minutes is attached.

Attachment: Certified Minutes

cc: ACRS Staff Engineers



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

MEMORANDUM TO: Derek A. Widmayer, Senior Staff Scientist  
Reactor Safety Branch B, ACRS

FROM: Dr. Dana Powers, Chairman  
U.S. EPR Subcommittee

SUBJECT: CERTIFICATION OF THE MINUTES FOR THE MEETING OF  
THE U.S. EPR SUBCOMMITTEE, NOVEMBER 3, 2009 –  
ROCKVILLE, MARYLAND

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting on November 3, 2009, are an accurate record of the proceedings of that meeting.

***/RA/***

***19/Aug/2010***

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Dana Powers, Chairman  
U.S. EPR Subcommittee

Date

Certified on: August 18, 2010  
By: Dana A. Powers

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
U.S. EPR SUBCOMMITTEE  
MEETING MINUTES  
November 3, 2009  
Rockville, MD**

**INTRODUCTION**

The Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on the U.S. EPR met on November 3, 2009, at 11555 Rockville Pike, Rockville, MD. The purpose of the meeting was to hear presentations and discuss the information contained in the Final Safety Analysis Report (FSAR) and the Safety Evaluation Report (SER) with Open Items concerning the reviews of Chapters 2, *Site Characteristics*, and Chapter 8, *Electric Power*, of the US EPR Design Control Document (DCD).

The Subcommittee planned to gather information, analyze relevant information and facts to formulate inquiries, as appropriate, for further deliberation. The Subcommittee planned to combine the results of the Subcommittee Meeting with future Subcommittee Meetings concerning other chapters of the EPR DCD and report findings and conclusions to the full ACRS at that time.

The meeting was open to the public. Mr. Derek A. Widmayer was the cognizant ACRS staff scientist and the Designated Federal Official for this meeting. The Subcommittee received no written comments or requests for time to make oral statements from any members of the public regarding this meeting. The meeting was convened at 8:30 am and adjourned at 3:36 pm.

**ATTENDEES**

**ACRS**

D. Powers, Chairman  
W. Shack, Member  
J. Stetkar, Member  
M. Ryan, Member  
D Widmayer, ACRS Staff

**Areva NP**

S. Sloan  
G. Pannell  
B. Gardes  
J. Reddy  
V. Fregonese  
Z. Salami  
T. Oswald  
T. Messier

**NRC Staff**

G. Tesfaye, NRO/DNRL  
J. Colaccino, NRO/DNRL  
J. Steckel, NRO/DNRL  
R. Jenkins, NRO/DE  
P. Kang, NRO/DE  
C. Munson, NRO/DSER  
K. See, NRO/DSER  
B. Harvey, NRO/DSER  
W. Wang, NRO/DSER

## **SUMMARY OF MEETING**

### **(Reference to Transcript Page Numbers and Presentation Slide Numbers)**

#### **Introduction**

Dr. Dana Powers, Chairman of the U.S. EPR Subcommittee, introduced the Subcommittee Meeting and explained that the Subcommittee would begin its review of the US EPR DCD FSAR and SER with Open Items at today's meeting. (Transcript Pages 5 – 8)

#### **PRESENTATIONS**

##### **NRO Opening Remarks on EPR DCD Status**

Mr. Getachew Tesfaye, the US EPR Design Certification Document (DCD) Project Manager in NRO provided a brief introduction to the NRO staff presentations for this Subcommittee meeting, and a brief overview of the staff's review of the EPR DCD and the schedule of presentations on chapters of the Safety Evaluation Report (SER) with Open Items planned for future Subcommittee meetings. (Transcript Pages 8 – 11)

##### **AREVA Opening Remarks on EPR DCD**

Ms. Sandra Sloan, the AREVA NP introduced the purpose for AREVA NP providing information on the DCD FSAR and introduced the first AREVA NP presenters. . (Transcript Pages 11 – 14)

##### **AREVA, NP Presentation on DCD, FSAR, Chapter 8, Electric Power**

Mr. George Pannell and Mr. Brian Gardes, of AREVA NP, provided the initial presentation on the U.S. EPR DCD FSAR Chapter 8, "Electric Power." The presentation gave a very brief overview of the main components of the nuclear power plant and a more detailed overview of the main systems and components of the US EPR design that generate electricity. There was a lot of discussion on the diesel generators for each safety train and the station blackout generators and how they operate, as well as the switchyard layout. A number of questions and answers were exchanged concerning the operation of the emergency electric system. Also, a lot of discussion took place on the operation of the plant when it is in a power alignment different from the normal alignment. There was a discussion about the maintenance and inspection of electrical cables that are housed in underground conduits. (Transcript Pages 14 – 61; AREVA Slides entitled, "*Chapter 8 Electric Power*," Numbers 1 – 28)

##### **AREVA, NP Presentation on EDS Model Development and System Analysis**

Dr Zia Salami, of AREVA NP provided a brief discussion of the electrical distribution system model, how it was developed, and insights from analysis of the system using representative assumptions developed by AREVA at this time. (Transcript Pages 61 – 83; AREVA Slides entitled, "*EDS Model Development and System Analyses*," Numbers 1 – 11)

##### **NRO Presentation on DCD, SER, Chapter 8, Electric Power**

Mr. Jim Steckel of the NRO staff introduced the speakers for this part of the meeting. Mr. Peter Kang of the NRO staff presented discussions of several technical topics that the staff

determined would be of interest to the Subcommittee. These topics included: inaccessible power cables and maintenance and inspection of the cables; onsite power system and the alternative feed configuration; the adequacy of a electrical system voltage analysis and branch technical position 8-6, and; the sizing of the station blackout diesel generators. Mr. Kang provided information on the NRO staff review and the reasons the conclusions were reached by the staff in the SER. The SER for Chapter 8, "Electric Power," has no open items. (Transcript Pages 84 – 119; NRC Slides entitled, "US EPR *Electrical Distribution System (EDS) Model Development and System Analyses*," Numbers 1 – 11)

### **AREVA, NP Presentation on DCD, FSAR, Chapter 2, Site Characteristics**

Mr. Todd Oswald and Mr. Ted Messier, of AREVA NP, presented information from the US EPR DCD, FSAR Chapter 2, "Site Characteristics." They explained that the design in the DCD was made based on values for site characteristics which represent conservative values for parameters and briefly discussed these conservative values and their sources for the sections of Chapter 2. They also explained that Chapter 2 contains instructions for the COL applicant to identify specific matters in their application that help explain why their site characteristics fit within the design boundaries or don't and what evaluations are needed if they don't. (Transcript Pages 121 – 167; AREVA Slides entitled, "*Chapter 2, Site Characteristics*," Numbers 1 – 12)

### **NRO Presentation on DCD, SER, Chapter 2, Site Characteristics**

Mr. Brad Harvey, Mr. Weijun Wang, Mr. Ken See, and Mr. Seshagiri Tammara of the NRO staff provided the staff's presentation of the SER with open items for Chapter 2 based on its review of the DCD FSAR Chapter 2. They explained that the staff review entailed mostly understanding the range of values used to bound all of the site parameters for the design, finding them reasonable, and determining if a reasonable number of proposed sites in the US would fit into the design envelope proposed. They explained that there are a fair number of open items (13) due to the nature of the issues being site-specific. They explained the changes staff proposed to the applicant to the Site Characteristics chapter and approach due to the non-coincident wet bulb site parameter open item. (Transcript Pages 167 – 204; NRO Slides entitled, "*Chapter 2, Site Characteristics*," Numbers 1 – 21)

### **SIGNIFICANT DISCUSSION ITEMS**

The following summarize the most significant discussion items from the Subcommittee Meeting:

#### **Isolation of Steam Generator Signal for Divisions 1 and 2**

Member Stetkar discussed his doubts concerning whether or not there was isolation of signals to load the diesel generators between safety trains 1 & 2, and how those signals worked and how the Digital I&C system controlled the signals. Member Stetkar said that an isolated signal to the appropriate breaker might be a solution, however, no design details are included in the FSAR at this point. Also, the discussion indicated that the Digital I&C presentation (Chapter 7) could address this confusion.

The discussion continued when the staff presented their Chapter 8 materials. Member Stetkar asked the same questions of the staff that he asked of AREVA staff, and the NRO staff stated that they considered part of the answer to lie with treating the safety systems of the EPR as a two-train system with lots of backup, as opposed to a four-train system. Member Stetkar was still not satisfied that the risk implications of the alternative configuration were appropriately

addressed. Staff stated that AREVA addressed this in an RAI response that the risk implications were negligible and staff was satisfied with this response.

#### Inaccessible and Buried Electric Cables

Members Stetkar and Ryan discussed with AREVA Chapter 8 presenters the issue of inaccessible and buried cables in the context of whether the electric power systems would continue to operate properly. AREVA said that in response to an RAI, they are including a COL Item for the licensee to periodically inspect these cables. The discussion also considered how the design document takes into account the changing nature of the groundwater at the site over time and particularly after construction is complete. Member Ryan pointed out that cables could be underwater in areas not originally designed for and therefore, are not being inspected and that this needed to be accounted for also. He asked if waterproof cabling should be specified as a COLA item for plants who would have groundwater above a certain level and that this level be specified in the COLA Items. Member Stetkar pointed out that the duct bank designs are locked in by the DCD, so if a COL applicant wanted to move them on account of groundwater issues, this would be an exception to the DCD.

Members Stetkar and Ryan also discussed this subject with AREVA Chapter 2 presenters. Member Stetkar pointed out that the DCD contains a maximum groundwater elevation of 3.3 feet (1 meter) below grade for design purposes. The pointed out that many areas of the plant are being built below this maximum ground water level and the design of the electric cables and ducts needs to be considered either in the DCD or at the COL stage. Also, the issue of what the post-construction hydrology would actually be after the weight of the reactor buildings is added to the site, and its impact on the design would also need to be considered.

When the staff gave its presentation on Chapter 8, the discussion on inaccessible and buried cables continued. Staff pointed out that they referenced Generic Letter 2007-01 in their RAI and the applicant is now including a COL Item that addresses the need for implementation of a site-specific inspection program. The COL Item will specify the types of testing that must be done. The staff said that part of the answer to the Subcommittee's concerns are being addressed in the operating reactor programs and that much of that newly designed inspection program will become status quo for the new reactors. Member Ryan conceded that the issue resolution is still sometime off but stressed that having sumps and pumps in the DCD does not fully address the issue of damage to cables from groundwater intrusion at one of the new plants.

#### Station Blackout Diesel Initiation

Member Stetkar discussed his uneasiness with the 10 minute SBO diesel generator initiation time being manual and that the staff accepts this is possible without some analysis. Staff stated that there is an ITAAC for the applicant to demonstrate this timeframe can be met.

#### Control Room X/q

The staff discussing Chapter 2 mentioned that two open items remain concerning meteorological data and the control room air intake X/q values. One of these is the source receptor plant configuration information. The staff pointed out there is a confirmatory item of the EPR-specific controlling X/q values which will be calculated using meteorological data from the four approved Early Site Permit sites to see if the controlling X/q value bounds a reasonable number of sites that may be considered in a COL application after AREVA closes the open items. .

## Design and Recurrence Intervals for Natural Events

Chairman Powers and Members Stetkar, Ryan and Shack had questions about whether any consideration is given to future variation of the meteorological, hydrologic, and seismic parameter values used in the design since the reactor could be still operating close to 100 years in the future. They also questioned how the data is used in the risk assessment if an external events calculation has been done, and how specific values such as recurrence intervals are calculated and used in the assessment, particularly for tornadoes, hurricanes, and tsunamis.

## **FUTURE SUBCOMMITTEE ISSUES**

The following topics were identified by the Subcommittee Chairman or Members as items that should be considered in the FSAR, SER or to be discussed in detail in future Subcommittee based on discussions during this Subcommittee meeting:

### SBO Coping Duration - COL Item

Member Stetkar pointed out that the station blackout (SBO) coping duration for the batteries needs to be specified and to be included as an item that the COL applicant accounts for in the COL application.

### Risk Implications of Alternate Power Configuration

Member Stetkar said he would take note to look at the risk implications of the alternate power configuration within the 1 and 2 safety systems for diesel generator when the risk assessment was reviewed.

### Control Room X/q

Chairman Powers pointed out that he would like to discuss the issue of the control room X/q value and how it is calculated more when that chapter is brought to the Subcommittee.

### Recurrence Intervals

Members Powers, Stetkar, and Shack's questions about the recurrence intervals for many items that will be considered in the risk assessment will have to be discussed when Chapter 19 is brought to the Subcommittee.

### Response of Components to Seismic Events

Member Shack pointed out that a discussion will be needed to understand the response of components inside the structures when the appropriate chapter comes to the Subcommittee, as the Site Characteristics discussion seems to be limited to the basemat response and whether its response is within the bounding seismic limits that were calculated.

## **SUBCOMMITTEE CONCLUSIONS**

Chairman Powers concluded the meeting by indicating that some items would need to be brought back to the Subcommittee and that no schedule to bring these chapters to the Full Committee had been established yet.

## **REFERENCES**

1. AREVA, NP, U.S. EPR Design Certification Application, Final Safety Analysis Report, Chapter 2, "*Site Characteristics*," Revision 1, May 2009. (ML091670698 through ML091670706)
2. AREVA, NP, U.S. EPR Design Certification Application, Final Safety Analysis Report, Chapter 8, "*Electric Power*," Revision 1, May 2009. (ML091670837 through ML091670848)
3. Memorandum Matthews, NRO to Ed Hackett, ACRS, transmitting EPR Design Certification Application – Safety Evaluation Report with Open Items for Chapter 2, "*Site Characteristics*," September 3, 2009 (ML091950194)
4. Memorandum Matthews, NRO to Ed Hackett, ACRS, transmitting EPR Design Certification Application – Safety Evaluation Report for Chapter 8, "*Electric Power*," August 20, 2009 (ML091760963)