



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

August 26, 2009

MEMORANDUM TO: ACRS Members

FROM: Christopher L. Brown, Senior Staff Engineer */RA/*
Reactor Safety Branch A, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES OF THE ACRS ESBWR
SUBCOMMITTEE MEETING ON THE NORTH ANNA COLA,
JUNE 18, 2009 – ROCKVILLE, MARYLAND

The minutes of the subject meeting were certified on August 21, 2009, as 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
K. Weaver

CERTIFIED by: M. Corradini
On: August 21, 2009

Issued on: 08/21/2009

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF ACRS ESBWR SUBCOMMITTEE MEETING ON THE NORTH ANNA COLA
JUNE 18, 2009
ROCKVILLE, MARYLAND**

The ACRS Economic Simplified Boiling Water Reactor (ESBWR) Subcommittee held a meeting on June 18 2009, in Room T-2B1, 11545 Rockville Pike, Rockville, MD. The purpose of this meeting was to review selected Chapter of the draft safety evaluation report associated with the North Anna reference combined license application referencing the ESBWR design. Christopher Brown was the designated Federal Official for this meeting. The Subcommittee received no written statements or requests for time to make oral statements from the public. The Subcommittee Chairman convened the meeting on June 18, 2009 at 8:30 a.m. and adjourned at 3.10 p.m.

ATTENDEES:

ACRS Members

M. Corradini, Chairman
J. Sam Armijo
S. Abdel-Khalik
T. Kress, Consultant
G. Wallis, Consultant

M. Ryan
D. Bley
M. Bonaca

ACRS Staff

Christopher Brown, Designated Federal Official
Kathy Weaver, ACRS staff

NRC Staff

A. Cabbage, NRO
Joe Ashcroft, NRO
Joe Sebrosky, NRO
Jeffrey Cruz, NRO
Ian Jung, NRO
Mike Jung, NRO
Manny Comar, NRO
David Terao, NRO
Charlie Ader, NRO
Paul Pieringer, NRO

Eileen McKena, NRO
Edward Fuller, NRO
James Gilmer, NRO
Gary Hammer, NRO
Laura Dudes, NRO
George Thomas , NRR
Michelle Hart, NRO
Raj Goel, NRO
Michael Junge, NRO
Ilka Berrios, NRO

General Electric-Hitachi (GEH) and Dominion Staff

Frostie White, GEH
Patricia Campbell, GEH
Eugene Grehcheck, Dominion
Gina Borsh, Dominion
R. Wachowiack, GEH

Tom Hicks, Dominion
Joe Hegner, Dominion
Rick Kington, Dominion

Other members of the public attended this meeting. A complete list of attendees is in the ACRS Office File and is available upon request. The presentation slides and handouts used during the meeting are attached to the office copy of these minutes.

Opening Remarks and Objectives:

Dr. Michael L. Corradini, Chairman of the ACRS ESBWR Subcommittee, convened the meeting at 8:30 a.m. The purpose of the meeting was to review and discuss the safety evaluation report for Chapters 1, 7, 4, 18, 6, 15, 17, 19, and 8 for the North Anna Combined Operating License (COL). The presenters included representatives from the NRC's Office of New Reactors (NRO) and GE Hitachi (GEH) and Dominion (the applicant).

Mr. Thomas Kevern, Lead Project Manager for North Anna COL application, gave a few opening remarks. He indicated that the staff's SER is based upon the latest revision that was provided to the NRC by Dominion, December of last year. He stressed the fact that the Subcommittee members were going to hear a phrase referred to as, incorporated by reference (IBR). He noted that Revision 1 of the COL application does incorporate by reference Revision 5 of the ESBWR RCD, which is the current revision of the DCD.

Mr. Gene Grecheck, Vice President for Nuclear Development for Dominion, describe the location for the future plant and the early site permit process.

Dominion's Presentation of COL Chapter 1:

Ms. Gina Borsh described the application structure and the concept of incorporated by reference. She also explained two minor exemption requests relating to technical specifications. In terms of IBR, she indicated that 10 CFR 52.79(d) states that the final safety analysis report need not contain information or analysis submitted to the Commission in connection with the design certification provided, however, that the final safety analysis report must either include or IBR the standard design certification final safety analysis report. This is what was done in the FSAR for North Anna. Dominion recognized that there is a risk associated with adopting a design that has not yet been certified. The SER for chapter one has four open items related to tracking, i.e., RAIs and construction impacts.

NRC Staff's Presentation of COL Chapter 1:

Ms. Janelle Jessie presented the staff's evaluation of chapter one. She highlighted the regulatory guides and NUREG used during the staff's evaluation of the application. She also discussed the open items related to concerning receipt, possession, and use of special nuclear material and issues related to onsite storage, e.g., dry cask storage.

Dominion's Presentation of COL Chapter 7:

Ms. Borsh discussed Chapter 7, instrumentation and control systems. She indicated that Dominion incorporated the entire Chapter 7 of the DCD. There were no departures, no exemptions, no additional information added to the application. There were no open or confirmatory items for this chapter.

NRC Staff's Presentation of COL Chapter 7:

Mr. Kevern indicated that the staff reviewed Chapter 7 of the FSAR and identified that Dominion IBR, Revision 5 of the DCD with no supplemental information. He indicated that the NRC staff found this acceptable.

Dominion's Presentation of COL Chapter 4:

Ms. Borsh presented Chapter 4 on the Reactor. She indicated that supplemental information was added to the nuclear design and control rod patterns and associated power distribution for the ESBWR. Dominion essentially confirmed no changes to the fuel, control rod, or core design from that described in the DCD for both. In addition, Dominion confirmed no open or confirmatory items for the chapter.

NRC Staff's Presentation of COL Chapter 4:

Mr. James Gilmer presented staff's evaluation of Chapter 4. He indicated that the staff verified that the mechanical, nuclear and thermo-hydraulic designs were identical to the ESBWR DCD. He also indicated that Dominion's application stated that there are no changes to the fuel control rods or core design and that the NRC staff agrees with the statements made in the application. No site specific items required staff's attention in this section. All of the regulatory guidance that the staff used to evaluate the COL application is identical to what was used during the DCD review. Further, no RAI's were asked since all the content of the chapter was IBR.

Dominion's Presentation of COL Chapter 18:

Ms. Borsh presented Dominion's chapter on human factors engineering. She indicated that in Section 18.13, Human Performance Monitoring, there is a DCD COL item that Dominion addressed concerning implementing of the human performance monitoring program. She said that Dominion has committed to implement the program prior to beginning the first licensed operator training class. This chapter contained no open or confirmatory items.

NRC Staff's Presentation of COL Chapter 18:

The staff indicated that the DCD specifies that a milestone for the implementation of the Human Performance Monitoring Program would be provided. The applicant committed to implement the program prior to the beginning of the first licensed-operator training class. The applicant also committed to begin collecting performance information at the earliest opportunity subsequent to completing the HFE design verification and validation. The staff indicated that the proposed milestone is acceptable.

Dominion's Presentation of COL Chapter 6:

Ms. Borsh presented the chapter on engineered features materials. She discussed the DBA Engineered Safety Features Materials. In particular, she discussed the containment systems, emergency core cooling systems, control room habitability systems, atmosphere cleanup systems, and pre-service and in-service inspection and testing of Class 2 and 3 components and piping. She did mention that Dominion is committed to determining the pipe length from containment to inboard/outboard isolation valve as part of the ITAAC process. In addition, she

indicated that there were no open items in this chapter; however, there are two confirmatory items.

NRC Staff's Presentation of COL Chapter 6:

Mr. Syed Haider and George Georgiev presented that staff's evaluation of Chapter 6. They indicated that the isolation valves should be located as close to the containment as practical. Mr. Haider indicated that the pipe length was not provided to the staff. There was also a discussion concerning procedures for inspections to prevent debris inside of containment. For example, the PCCS cooling pumps are cooling pumps which may get clogged and may adversely affect the long term cooling safety functions. Mr. Haider discussed the types of debris that could get into systems, such as, the pool and drywell/wetwell. Staff indicated that Dominion made a commitment to develop and implement procedures and operator training program for control room habitability, according to Section 13.2 and 13.5, to meet the applicability aspects of an NRC Generic Letter 2003-01, and Generic Issue 83. Mr. Haider said that the staff considers this applicant information to be adequate on this issue. He also said that the applicant provided an evaluation of the toxic gas to the control room off Unit 3. They analyzed carbon dioxide and nitrogen and found that the concentration of carbon dioxide and nitrogen inside the control room did not exceed the toxicity limit and were aligned with the Regulatory Guide 1.82. He also mentioned that the applicant made a commitment to identify potential site-specific toxic or hazardous materials that may affect control room habitability, in order to meet TMI Action Plan III.D.3.4 and GDC 19. Mr. Georgiev discussed the PSI/ISI Program and Augmented Inspection Flow Accelerated Corrosion (FAC) Program. He indicated that Dominion's ISI program would conform to latest edition and addenda endorsed by 10 CFR 50.55a on a date 12 months prior to fuel load. The FAC Program would follow the recommendations of EPRI NSAC-202L to identify susceptible components with the PSI baseline being performed prior to plant startup. He further stated that the PSI, ISI and FAC programs will be implemented prior to initial plant startup. He indicated that what the applicant has proposed is reasonable.

Dominion's Presentation of COL Chapter 15:

Ms. Borsh presented Dominion's presentation of the Safety Analysis chapter. She said that most of the information is included in the DCD. However, Dominion has added information to the Analysis of Infrequent Events section. In addition, she stated that Dominion added a new section to the DCD, which is called "ESP Information." She discussed some of the items added to the application, such as, a statement concerning nuclear instrumentation to aid in detecting a possible incorrect loaded fuel bundle after fueling operations. She indicated that this chapter contained no open or confirmatory items.

NRC Staff's Presentation of COL Chapter 15:

Mr. Jay lee of the staff presented staff's evaluation of Chapter 15, in particular, the presentation focused on the radiological consequence analysis of the postulated design basis accidents, which is site-related, as well as design. He discussed the regulatory issue concerning does the ESBWR design provide adequate mitigation or radiological consequences in the event of a major reactor accident to protect public health and safety at the proposed North Anna site. A discussion occurred on how staff performed the dose calculation. He noted that the ESBWR DCD used a set of hypothetical χ/Q values while North Anna used site-specific χ/Q values. He said that the staff concluded that the North Anna site-specific offsite and control room χ/Q values fall within those values used in the ESBWR DCD, Rev. 5 radiological consequence analyses for each of the DBA. Therefore, the North Anna site-specific offsite and control room

total doses for each DBAs are lower than the ESBWR DCD, Revision 5 generic total doses for each DBA. The ESBWR DCD, Revision 5, Chapter 15 radiological analyses shows that the offsite and control room radiological consequences meet the regulatory dose acceptance criteria. Therefore, the analysis for the North Anna site demonstrated that the DBA offsite and control room radiological consequences meet the regulatory dose acceptance criteria specified in 10 CFR 52.79 and 10 CFR 100.21. Mr. Lee said that the conclusions are based on the information provided in the ESBWR DCD, Revision 5 and are subject to the future revisions of the ESBWR DCD to the final design certification.

Dominion's Presentation of COL Chapter 17:

Ms. Borsh presented chapter 17, Quality Assurance. She indicated that Dominion's application incorporated the QA ESBWR that was applied during the preparation of the early site permit application. For the maintenance rule, Dominion provided a description of the program by incorporating NRC approved NEI 07-02A, 'Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52.' She indicated that there were two outstanding open items related to final NRC acceptance of NEI template 06-14. The chapter contained no confirmatory items.

NRC Staff's Presentation of COL Chapter 17:

Aida Rivera of the NRC staff presented Chapter 17. Dominion included by reference the QA ESBWR applied by GEH for the ESBWR. She indicated that based on the guidance used by the staff, NRC concluded that the QA program is adequate. The staff doesn't have any COL activities or post-COL activities related to this area.

Dominion's Presentation of COL Chapter 19:

For Chapter 19, Ms. Borsh discussed the PRA results and insights. She stated that Dominion made a commitment to compare as-built SSC High Confidence Low Probability of Failure (HCLPF) values or other assumptions to those assumed in ESBWR seismic margin analysis shown in the DCD. A minimum HCLPF value of 1.67 SSE will be met for SSCs in DCD table. This will all take place prior to fuel load. She also stated that as part of development of certified design PRA, site and plant-specific information were reviewed to determine if any changes from certified design PRA were warranted. No open or confirmatory items are in this chapter.

NRC Staff's Presentation of COL Chapter 19:

Mark Caruso from NRC's PRA staff presented Chapter 19 for the staff. It was stated that ITAAC 7, in Table 3.3-1 of the ESBWR DCD Tier 1 is being modified to assure that the severe accident management technical basis will be incorporated into the procedures before plant operation. Staff also stated that as-built SSC HCLPF will be compared to those assumed in the ESBWR seismic margin analysis. Deviations from the HCLPF values or other assumptions in the seismic margins evaluation will be analyzed to determine if any new vulnerability have been introduced. A minimum HCLPF value of 1.67*SSE will be met for the SSCs. This comparison and analysis will be completed prior to fuel load.

Dominion's Presentation of COL Chapter 8:

Ms. Borsh indicated that the electric power section provided an overview of the utility power grid, including the switchyards, transformers, and the transmission lines. She described the

transmission system including lines and voltages, switchyard arrangement, and transmission line map. In addition the normal and alternate preferred power source and the equipment in the circuits were described.

NRC Staff's Presentation of COL Chapter 8:

Mr. Pal of the staff stated that the applicant adequately addressed COL information items NAPS COL 8.2.4-1-A thru 8.2.4-10-A involving the design details of the plant site switchyard and its interface with the local transmission grid. In addition, testing and inspection of switchyard components and failure modes were discussed. He said that the staff concluded that the requirements of GDC 5, 17 and 18 and 10 CFR 50.65 are satisfied for this section. Since flooding of manholes has become a generic issue, underground cable inspection and frequency were also discussed.

Subcommittee Comments

Simulator Design and Review:

The major discussion item from the North Anna COL is how the Simulator is certified for use in operator training. It was assumed that this was part of the Human Factors discussion, but the committee wants clarification on staff review. Has the Simulator design, fidelity and qualification been reviewed in the past by the ACRS during CE-80, ABWR, AP1000 DC reviews? If not, when is it examined?

Dr. Said Abdel-Khalik

Asked has there been any example where the site specific material was found to be in conflict with material incorporated by reference? I response, Mr. Kevern indicated that there have been cases where the information was confusing but not contradictory.

Dr. Graham Wallis

Several technical issues were raised that will have to be resolved in the context of the certification of the ESBWR design; such as long term, post LOCA containment pressure changes, steam dryer vibration, sump screen blockage and downstream effects, etc.

Wallis comments that future meetings should only involve aspects that are unique to North Anna, or deviate significantly from the DCD. He further stated that the Subcommittee does not need to hear or see lists of ASME codes and NRC regulations used during the review. He believes that this approach would make more effective use of the Subcommittee's time and allow better value added to probe more of the technical issues.

Dr. Tom Kress

The question was raised as to the value added by the ACRS in reviewing the COL when most of the technical issues are covered by IBR and can be found either in the Certification or the Early Site Permit. Most of the key points would have been covered in the DCD discussions, but it was important to understand how it all fits together in the COL.

Dr. Sam Armijo

Overall, I concluded that the staff and the applicant have dealt with this first-of-a-kind application in a well-organized and complete manner. The review focused on the process to be employed in the North Anna application and this process will serve as a model for subsequent ESBWR COLs and COLs for other designs. The staff did a good job of clarifying what was meant by incorporation by reference and described how COLs would handle issues that were not covered either in the design certification or the ESP.

Several technical issues were raised by the subcommittee that will have to be resolved in the course of certifying the ESBWR design. I think the North Anna review was not the right venue for resolving engineering issues, such as long term, post LOCA containment pressure changes, steam dryer vibration, sump screen blockage and downstream effects, etc.

The broad questions regarding the applicant's plans (or ability) to resolve spent fuel storage issue were not appropriate either. This applicant is in the same boat as all licensees operating nuclear plants. The spent fuel storage, reprocessing or disposal is a national political issue and the proper venue for resolving this issue is in congress, the courts or the polls.

SUBCOMMITTEE DECISIONS AND ACTIONS:

Following the Dominion, GEH and staff presentations and discussions, Chairman Corradini asked if anyone had any further questions, thanked everyone for their presentations, and then adjourned the meeting at 3:10 pm.

BACKGROUND MATERIALS PROVIDED TO THE SUBCOMMITTEE PRIOR TO THIS MEETING:

1. Memorandum from D. B. Matthews, Director, Division of New Reactor Licensing/Office of New Reactors (DNRL/NRO), to E. M. Hackett, Executive Director, Advisory Committee on Reactor Safeguards, dated May 19, 2009, 2008, "Safety Evaluation Report With Open Items Regarding The North Anna Unit 3 Combined License Application – Chapters 1, 4, 6, 7, 15, 17, 18, and 19" (ML091380075)
2. Memorandum from D. B. Matthews, Director, Division of New Reactor Licensing/Office of New Reactors (DNRL/NRO), to E. M. Hackett, Executive Director, Advisory Committee on Reactor Safeguards, dated May 29, 2009, 2008, "Safety Evaluation Report With Open Items Regarding The North Anna Unit 3 Combined License Application – Chapter 8, Electric Power," (ML091460461)

Note: Additional details of this meeting can be obtained from a transcript of this meeting available for downloading or viewing on the Internet at <http://www.nrc.gov/reading-rm/doc-collections/acrs/tr/subcommittee/2007/> or purchase from Neal R. Gross and Co., Inc., (Court Reporters and Transcribers) 1323 Rhode Island Avenue, NW, Washington, DC 20005 (202) 234-4433.