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

August 18, 2010

MEMORANDUM TO: ACRS Members

FROM: Maitri Banerjee, Senior Staff Engineer ***/RA/***
Reactor Safety Branch A, ACRS

SUBJECT: CERTIFICATION OF THE MINUTES OF THE MEETING OF THE SUBCOMMITTEE ON ADVANCED BOILING WATER REACTOR REVIEW OF STP COLA ON MAY 20, 2010, IN ROCKVILLE, MARYLAND

The minutes of the subject meeting were certified on August 17, 2010, 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

cc w/ Attachment: J. Delgado

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MEMORANDUM TO: Maitri Banerjee, Senior Staff Engineer
Reactor Safety Branch – A
ACRS

FROM: Said Abdel-Khalik, Chairman
Advanced Boiling Water Reactor (ABWR) Subcommittee

SUBJECT: CERTIFICATION OF THE MINUTES OF THE MEETING OF THE SUBCOMMITTEE ON ABWR REGARDING COL APPLICATION OF SOUTH TEXAS PROJECT (STP) ON MAY 20, 2010

I hereby certify, to the best of my knowledge and belief, that the minutes of the subject meeting held on May 20, 2010, are an accurate record of the proceedings for that meeting.

/RA/ 08/17/2010
Said Abdel-Khalik, Chairman Date
ABWR Subcommittee

Certified: August 18, 2010
By: Said Abdel-Khalik

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
MINUTES OF THE MEETING OF THE SUBCOMMITTEE ON
ADVANCED BOILING WATER REACTOR (ABWR) REGARDING STP COLA
ON MAY 20, 2010, IN ROCKVILLE, MARYLAND

On May 20, 2010, the ACRS Subcommittee on ABWR held a meeting in Room T-2B1, 11545 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to receive a briefing from the NRC staff and the South Texas Project Nuclear Operating Company (STPNOC), the applicant for a combined operating license (COL) for a two unit ABWR at their existing reactor site in Texas regarding Chapters 7 and 14 of the COL FSAR and staff's SER with open items. The meeting was convened at 8:30 AM. The meeting was open to the public.

Attendees:

ACRS Members	**NRO Presenters**	**STNOC Presenters**
Said Abdel-Khalik (Chairman)	Mark Tonacci	Craig Swanner
J. Sam Armijo	George Wunder	Akira Fukumoto, Toshiba
William Shack	Stacy Joseph	Ed Brown
Mario Bonaca	Frank Talbot	**NRO Staff**
Jack Sieber	Dinesh Taneja	Jack Zhao
Mike Corradini	Adrian Muniz	Laura Dudes
John Stetkar	**STNOC Presenters**	**STPNOC & Others**
Mike Ryan	Scott Head	Tim Hurst, STPNOC
Charlie Brown	Coley Chappell	Chikashi Miyamoto, Toshiba
ACRS Staff	Steve Cashell	Eric Fredrickson, Westinghouse
Peter Wen (DFO)	Steve Blossom	Jun Ikeda, TANE
NRO Presenters	Jay Phelps	Toshifumi Sato, Toshiba
Gary Holahan	Kyle Dittman	Chris Crefeld, Westinghouse
	Mike Murray	Cal Teng, Westinghouse
		Jerry Mauck, STPNOC

The presentation slides and handouts used during the meeting are attached to the Office Copy of the meeting transcript. The presentation to the Subcommittee is summarized below.

Opening Statement

Chairman Abdel-Khalik convened the meeting by introducing the ACRS members. He noted that the current briefing was to discuss the COL application (COLA) FSAR and the corresponding staff SER-with-open-items for Chapters 7 and 14. He stated that the telephone bridge line available to the stakeholders to listen to the proceeding would be opened for receiving comments and questions at the end of the meeting. After asking the staff and the applicant to

identify the need for closing the meeting before going into discussion of proprietary information, Chairman Abdel-Khalik invited the staff to begin the presentation.

Introduction

In their opening statements, Mr. Mark Tonacci, the NRO Branch Chief for STP, and Mr. George Wunder, the NRO Lead Project Manager, introduced the staff presenters. Mr. Scott Head, the STP Regulatory Affairs Manager, introduced the STP staff.

STPNOC Presentation on Chapter 14

Mr. Steven Cashell, STP Licensing, began the STP presentation on Chapter 14, Initial test Program (ITP), which includes the testing activities conducted following completion of construction through the startup ending in commercial operations. Also included are the Inspections, Tests, Analyses, Acceptance Criteria (ITAAC) performed to verify that the as-built systems conform to the design features and design characteristics of the systems. Many of the design departures and site specific changes impact the ITP. The design control document (DCD) specified minimum and maximum voltage testing for electrical components that are being done in the shop will be correlated with the field test. The startup administrative manual is being developed to address the administrative and programmatic controls. The COL supplemental information included the STP commitment to provide NRC the approved preoperational and startup test procedures 60 days prior to testing or fuel loading.

Mr. Steve Blossom, STP Construction/Startup and ITAAC Manager, discussed the scope, organizational control and schedule for the three phases of the ITP, namely the construction testing, preoperational testing, and the startup test phase. Toshiba, Fleur, Westinghouse and Sargent & Lundy make up the engineering-procurement-construction (EPC) team with Toshiba providing the EPC Startup Manager at the construction phase. EPC is responsible for developing the construction and preoperational test program. A joint test group, with STP oversight, will administer the IST. Mr. Blossom discussed the two step turnover process, with a very high threshold for exceptions, when the plant will be turned over from the EPC organization to STP, after preoperational testing prior to fuel loading. All ITAAC will be completed prior to fuel loading, but only approximately 38 percent (or 356) of a total of 939 ITAAC will be completed during construction and pre-operational test phase. At fuel loading, the STP Startup Manager will assume responsibilities from the EPC Startup Manager. A plant operational review committee will be in place during fuel loading with the EPC in an advisory capacity. He then discussed Toshiba's experience with ABWR construction and initial testing. The startup organization is translating the lessons learned from the ABWR startups in Japan and loading them into STP database.

STP schedule calls for a preoperational test window of approximately nine months followed by seven months of fuel load and startup testing. The STP Units 3 and 4 will be organizationally separate from Units 1 and 2. Member Stetkar wanted to know what fraction of the construction and pre-op ITAAC involve design acceptance criteria (DAC), particularly the digital I&C DAC. Both Members Stetkar and Brown talked about their concern with the apparent lack of information in the DAC specifically related to digital I&C. Regarding the digital I&C (e.g., safety system logic control), Member Stetkar asked if the ITAAC or pre-op testing will include end-to-end functional testing to demonstrate operability of the system from input sensor to driven equipment or it will be a series of overlap testing. Mr. Blossom did not have an immediate answer, and the question was taken as an action item for later follow-up.

Mr. Head provided a status summary of the subject of reactor flow induced vibration. STP intends to provide a briefing on the technical aspects during the Chapter 3 discussion (to be scheduled for early 2011). He informed about STP's change of plan in that Unit 3 has been selected as the prototype unit (vice K6) and Unit 4 as the non-prototype. This will involve performing STP-specific predictive analysis, and use of K-6 to form its scope and expectations. Chairman Abdel-Khalik asked how the STP 3 and 4 steam flow velocity would compare with some of the BWR plants that have undergone extended power uprate. This was taken as an action item. Mr. Head also noted that K-6 and K-7 did not experience the types of steam dryer problems that some US BWR units had, and that the selection of Unit 3 as the prototype was partly based on the possibility of a future power uprate application. Chairman Abdel-Khalik noted that ACRS would like to review the models and the analyses that would be performed to support the steam dryer qualification.

Staff Presentation on Chapter 14

Ms. Stacy Joseph, the NRO project manager for the staff's review of Chapter 14 introduced her team and provided a short outline of staff's presentation. Mr. Frank Talbot of NRO discussed two open items in staff's SER related to the subject of reactor flow induced vibration and selection of the prototype plant. STP flow induced vibration assessment program would be evaluated in SER Section 3.9.2. Upon members' question he noted that bounding conditions developed from testing of the Category 1 prototype plant (Unit 3) will be applied to Unit 4 (non-prototype plant) requiring lesser amount of testing at Unit 4. Mr. Head of STP noted that the predictive analysis is using NRC approved methodology. The analysis results will be confirmed by Unit 3 testing through the pre-operational, startup, and operational phases, followed by a more limited testing at Unit 4. The predictive analysis will be performed by Westinghouse similar to the AP1000 approach that has already been reviewed by the NRC. STP is factoring the US BWRs experience in this area. There are five proposed post COL license conditions in staff's SER.

The next item of staff's presentation was the Section 14.3S of the staff's SER that evaluated the STP proposed ITAAC. Ms. Joseph provided an outline of staff review in this area and discussed two open items that are now closed. These items involved the general process for performing structural analysis ITAAC, and a staff request for an additional ITAAC for the diesel generator fuel oil storage. Upon Member Brown's question Mr. Tonacci of the staff noted that the cyber security reviews were postponed until later in SER development. Before closing the Chapter 14 discussion, Chairman Abdel-Khalik noted the follow-up action items resulting from this discussion, namely an action for STP to respond to members' question on end-to-end functional testing, and a comparison of expected steam line velocities with that of BWR plants that have extended power uprates. An action for the staff was to provide a briefing on their review of the reactor flow induced vibration predictive analyses expected to be completed by the end of December.

STPNOC Presentation on Chapter 7

Mr. Michael Murray, I&C manager of STP Units 3 and 4, started his presentation on I&C by noting that the COLA incorporates by reference the ABWR DCD information on functionality and logic. Departures are taken for incorporation of the advances in technology as well as to provide clarification. The STP design simplified the safety systems logic control (SSLC) system, and separated the reactor trip and isolation system from the ESF system (vs. one complex multiplexed system in the original DCD). Examples of other changes include incorporation of the generic BWR I&C enhancements, e.g., the oscillation power range monitors (OPRM). He then provided a general description of the departures and clarifications.

Upon Member Stetkar's question on how many safety system logic functions (SLFs) are there within the ESF logic and control system (ELCS) in each division, Mr. Ed Brown of STP noted that that there is a minimum of two. They are segmented by function, for example, low pressure injection functions, and high pressure injection functions providing for a mode of functional diversity. The functions are segmented further to provide for additional fault tolerance, leading to six SLFs for each of the three divisions of engineered safeguards. The SLFs that have very important functions like ECCS are duplicated. A long discussion ensued regarding the design details of the ELCS and SLFs.

Some clarifications to the digital control nomenclature and systems resulted in changes to testing and surveillance. Upon Member Brown's question, Mr. Murray stated that the auto surveillance test controller function was replaced with a simplified design of automatic test function that retained the online diagnostic capability, with a comprehensive fault monitoring during the operation of the system. He then discussed the Tier 2 departures that require NRC approval (i.e., departures affecting the technical specifications (TS) like implementation of the setpoint methodology), and that do not require NRC approval (e.g., OPRM).

Member Stetkar had several questions on departures. Departure 7.2-2, "Description of Scram Actuating Relays," involved the backup SCRAM relays that are changed from normally energized to normally de-energized, such that an actuation signal will energize the relay coil to operate the alternate scram function. His concern was that a loss of power to the division would prevent a scram. He also noted a possible inconsistency between the diagram of the backup SCRAM control circuit and the description of that circuit in the text. His next question involved the range of the drywell high pressure instrument that is changed from zero - 5.22 psig to 2.18 - 4.35 psig. He was concerned that not having the scale go down to zero would prevent the control room operators from knowing if the inerted containment has any positive pressure (if less than 2.18 psig) during normal operation, unless there are other instruments to provide that information. He also questioned the rationale behind removal of the Level 1 backup to the Level 3 isolation of the shutdown cooling system. These questions were taken for later follow-up.

Mr. Murray discussed the COL information items. Regarding the temperature profiles for the Class 1E digital equipment, several issues were discussed. STP has committed to do a temperature rise analysis for loss of ventilation under SBO. Localized hot spots in semiconductor materials for computing (as they are driven harder functionally, higher the temperature rise) was an issue addressed through factory testing. Upon Member Brown's question, detailed discussion ensued regarding the rationale for natural circulation cooling of the reactor protection system (RPS) (well proven field programmable gate array (FPGA) platform) cabinets vs. internal forced air cooling with a local temperature sensor and diagnostic alarm for ELCS (microprocessor based Common-Q platform).

Upon Member Stetkar's question, a long discussion took place on functions (display, communication, non-safety and operator interfaces) served by the maintenance and test panel (MTP). It was mentioned that the MTP was not involved in the safety actuation functions of the ELCS system. Each division has the MTP system, which performs the function of collecting plant data from the intra-division network, then buffers it and transmits it uni-directionally to the plant information control system (PICS), so that it's available for non-safety processing. It also allows the operation staff to change setpoints. Member Stetkar asked if faults in the MPT panel could lead to spurious input which would change setpoints without anybody's knowledge. Mr. Brown noted that although the panel is always connected, the functions to change setpoints are not enabled.

Mr. Kyle Dittman of STP stated the STP 3 and 4 control room will be based on the Japanese ABWR main control room design with upgrades from the human factors engineering and technical advances like flat panel displays. STP is incorporating operating experience from the Japanese ABWRs. Several STP staff had undertaken the simulator (Hamaoka 5) training at the boiling water training center in Japan, and provided feedback to the STP control room design. He then discussed the details of the communication functions (intra and inter-division, safety to non-safety and vice versa) in the reactor trip and isolation system (RTIS), neutron monitoring system (NMS) and ELCS, and how the platform design reduces common cause failures (CCFs). Regarding Member Brown's question on the unavailability of the non-safety related PICS, Mr. Taneja from the staff noted that each safety division has two operator interface consoles which are safety related and independent of the PICS. Upon Member Browns question on how corrupt data is prevented from affecting the voting logic, a long discussion evolved regarding the detection of parity error, data format, data buffer, logic testing and how to ensure a predictable and repeatable performance.

Mr. Dittman discussed the features of internal communication in the ELCS that consists of the actuation communication, and the intra-division communication. The actuation communication affects the initiation of systems like the high pressure core flooder. The intra-division network allows display of information to the operators on the flat panel displays, manipulation of components, communication of diagnostic information for the ELCS, and support of maintenance test.

Mr. Dittman then went into the subject of diversity and defense in depth. He noted in STP 3 & 4 I&C design, the hard wired diverse features of the DCD, which are independent of all digital I&C systems, have been retained. This included the manual reactor SCRAM switches, high pressure core flooder C-train initiation, diverse manual control, diverse display of specific process parameters, and the diverse hardwired controls that go directly to the components bypassing the digital platforms. Upon Member Stetkar's question on why only the high pressure core flooder function (HPCF) was selected and no low pressure function, Cal Teng of Westinghouse noted that at the time of design certification review, the NRC did not let GE take credit for the feedwater system. So, they added the HPCF-C. In addition to the HPCF-C, the condensate pumps were credited for injecting water in the reactor thus providing the low pressure system.

Mr. Dittman noted that in the certified design loss of the essential multiplexing system, common to a division (a worst-case CCF) would have adversely impacted the entire division of SSLC, although not affecting the reactor trip function. The STP 3 & 4 design provides for independent and diverse RTIS and ELCS with inherent communications capabilities. Therefore, this I&C design is not subject to total loss of a safety division (i.e., both RTIS and ELCS) due to any postulated CCF.

Member Brown continued to explore the issue of determinant data processing. Upon his question about the effect of a corrupt data packet, Mr. Dittman explained that similar to the FPGA case, the data packet that is sent over to the voter function consists of bi-state status (zero/one type of bits), and does not include instructional information. On the SLF side, this input is put into a memory location for the SLF logic. So there is nothing that could corrupt the functionality of the voting function that would have come across the high speed link. Regarding if data in itself could end up corrupting the voting function process, Mr. Dittman explained the process and stated the Common-Q processor is not a general purpose computing machine. It is a controller that is designed to buffer a safety function processor from external events, including communication events and network events from the interdivision network. Within the controller there are two separate microprocessors with separate memory. Information that is communicated by high speed

link goes to the second processor that handles only communications, and can only pass data through a dual-ported shared memory to the safety-function calculator. It cannot pass anything other than data, and the data types that it can pass are restricted. For example, the entire maximum message can be limited by the types of data included in the message (e.g., the number of bits) so that the receiving station would expect those bits. The communication processor strips the header, does the CRC check (to make sure the message has a reasonable probability of being correct), and takes the data and puts it into the dual-ported memory. The only thing the function processor does is to read that data and use it in a calculation. A long discussion ensued regarding the details of the steps involved.

Regarding the Common-Q platform, Member Brown wanted STP to show that it responds in a predetermined, predictable and repeatable manner. Mr. Brown of STP explained how in a Common-Q platform, the program reads the analog sensor data, communicates the data to the processor (cyclic execution tied to a clock interrupt) with basic tasks (two inputs and one output with buffers) that are independent, and the transmission task. To avoid overloading the communication processor, the amount of time available to service the interrupts is very long with respect to the amount of time needed, so that all three basic tasks that are cyclic tasks are performed in a deterministic, periodic and predictable way. On the subject of determinant data processing, Member Brown pointed out that the ITAAC acceptance criteria only require that a report exists that concludes it has been done (the ITAAC does not specify a timing analysis nor an acceptance criteria that reflects a predictable and repeatable processing time from parameter input to output to the control device, whatever their nature). Mr. Brown responded that it would be demonstrated by a time response test. He noted that as a basis for establishing the ITAAC test acceptance criteria, a timing analysis (for the most demanding Chapter 15 accident) is required to be done and provided to the staff. Then the STP presentation ended with a summary statement made by Mr. Murray.

Staff Presentation on Chapter 7

After a short break, staff presentation on Chapter 7 started with Mr. Gary Holahan, Director NRO, addressing the Subcommittee. He reinforced three points. He noted that the staff recognized the importance of digital I&C as it can enhance safety and reliability, but also brings in new and different issues and concerns. Secondly, review and approval of digital I&C systems in the new reactor designs, is a licensing activity under the design certification and the COL processes. The licensing and safety decisions need to be based on a clear licensing basis with a good technical evaluation that can be done only as part of the licensing process and not through inspections. The inspection activities need to be based on a clear licensing basis, and the inspection process should not be used as a second level of review. He requested the committee to focus on the design certification and the COL review process as the most logical place to make safety findings. He noted that the staff, with the committee's advice, needed to come to a solid licensing basis to make the final safety determinations within the licensing process itself. Thirdly, he reminded the Committee of a related Commission decision. Given the complexity of the digital I&C systems and the software, and the difficulty in making a determination regarding the inherent reliability of the digital-based systems, the Commission took a position, that these systems should be the state of the art without any identifiable design flaws, but still would need a diverse, independent and reliable backup system, which is the focus of the staff review.

Mr. Muniz of NRO introduced the technical staff, the topics of staff discussion, and the status of open and confirmatory items. Mr. Dinesh Taneja started the technical presentation by noting that the obsolescence of the communication system in the certified design played a big part in selection of the STP I&C design. The design uses platforms that have inherent data and communication

capabilities built into it. The Tier 1 functional requirements for the NMS, RPS and ECCS, separated into three distinct digital I&C systems, are not affected. The staff review concluded that the functionality of I&C design remained the same, only the functions are accomplished differently. Member Stetkar questioned the basis for the staff's conclusion given that STP had changed in many cases how some of those functions (e.g., alternate scram function, logic combination from separate SLF within a division) are implemented. Mr. Taneja stated that those areas were of extensive staff review resulting in the subject conclusion at a high level. Member Stetkar wanted to know how the staff ensured that the changes did not impact the safety of the ECCS actuation in a negative manner. Mr. Taneja explained that upon a failure of one of the SLFs, the logic becomes "one-out-of-one" instead of "two-out-of-two," thus ensuring actuation of the system. Mr. Brown of STP explained that when a failure is detected by the online diagnostics, the failed processor channel is bypasses automatically, thus changing the logic from "two-out-of-two" to "one-out-of-one." There also is a manual capability to perform that SLF bypass, both testable by ITAAC.

Mr. Taneja explained that the in the certified design, communication was shared between the RPS and ECCS rendering the whole division inoperable upon loss of that communication, although the inputs to RTIS were hardwired and not affected. These functions are now separated in two different platforms. He noted that the staff's SER for the ELCS Common-Q platform (also being used in the AP-1000 design and found acceptable to the staff) has a requirement for STP to perform a timing analysis to demonstrate that the timing would be within the bounds of the Chapter 15 analyses. This requirement is verified through the ITAAC/DAC process post COL (STP being the pilot plant for digital I&C DAC inspection). A long discussion between the staff and the members ensued, terminated only after Chairman Abdel-Khalik noted that the Committee would address this issue from a generic perspective and make its opinions known to the Commission and to the staff in a forthcoming letter.

Mr. Taneja discussed the Tier 2* departure which updated the SSLC conformance to regulatory guidance, industry codes and standards. He noted that STP decided to use a setpoint methodology in their TS setpoint control program in lieu of identifying specific values for the STP TS. The methodology is very similar to that being applied to the AP 1000 design and references a licensing topical report on stability analysis for the OPRM setpoints. This topical report is intended to be used for the STP fuel amendment planned to be submitted post-COL. As the COLA is based on the DCD fuel design, STP will replace the reference to the topical report in the setpoint methodology report (submitted under COLA) with calculated values for OPRM setpoint based on the stability option 3 method from the BWR owners group (approved in the DCD FSER). The stability topical report is being submitted for staff review and approval as part of a number of topical reports related to the fuel amendment which will be used after COL to revise the calculation for the stability setpoints.

Mr. Taneja then discussed staff review of diversity and defense-in-depth. As noted before, the certified design provides for diverse backup hardwired capabilities for reactivity control (reactor trip), core cooling (ESF actuation), containment isolation, and supporting diverse displays to cope with a postulated worst-case event, i.e., undetected 4-division common mode failure of all communications or logic processing functions in conjunction with a large break LOCA. STP 3 & 4 COLA incorporates by reference the diversity and defense-in-depth consideration of the certified ABWR design with no departures. The staff performed design diversity analyses for design basis events (DBE) described in Chapter 15. The analyses assumed a worst-case postulated common mode failure (CMF) of the digital safety systems concurrently with each of the design basis events, a "realistic" modeling as opposed to standard "licensing basis" modeling, and operator actions at the remote shutdown system after one hour. Prior to the one

hour period, all operator actions were limited to those which could be performed in the main control room, using equipment that was independent of the postulated CMF.

Mr. Taneja then addressed Member Stetkar's question whether the change of the platform had any impact to the diversity implementation. Mr. Taneja noted that the design provides for independent and diverse RTIS and ELCS with inherent communications capabilities resulting in reduced concerns with CMF in digital I&C systems. It also incorporates diverse backup design features of the certified ABWR design with no departures. He referred to Figure 7C-1 from the FSAR that showed hardwired diverse features that bypass the digital logic and go straight to the components.

After a short break, Chairman Abdel-Khalik asked STP to address the questions raised by members that were deferred. The first such question involved preoperational testing of the ELCS. Mr. Swanner of STP noted that preoperational testing of the ELCS is covered as part of testing of the ESF requirements under the overall SSLC system testing described in Chapter 14. This did not satisfy Member Stetkar whose question was whether an "end-to-end" testing of the SSLC functions were included in the preoperational test program. The next question involved the coincidence logic within a single division for actuation of ESF equipment. Mr. Swanner discussed the RAI responses and FSAR TS sections including the TS bases that describe the TS functions for ESF, which one has the required redundancy in the division, which one goes to one-out-of-one voting, and the criteria for selecting the redundancy for each of the functions.

Mr. Chappell of STP addressed member Stetkar's question on standard departure 7.2-2, "Description of Scram Actuating Relays," in that it describes an energized to actuate backup SCRAM function. He noted that a "two out of two" coincidence logic will energize the coil and close the relay that will energize the solenoid valves that will then vent the SCRAM air header. Member Stetkar noted that the need to apply power to the relay coil to close the output contacts to apply power to the solenoid fundamentally changed a failure mode from a "de-energize to actuate the safe condition" to an "energize to actuate the safe condition" for these relays. Mr. Jerry Mauck of STP noted that the backup (ARI) SCRAM system is there only to meet the ATWS rule and is always "energized to actuate." However, Member Stetkar's question on apparent inconsistency between a diagram of the backup scram control circuit and the text in the FSAR was not addressed.

Regarding the question related to the range of the drywell high pressure instrument, Mr. Swanner noted that contrary to the previous statement, the lower end of the range goes into the negative side of the zero, thus addressing Member Stetkar's concern. Regarding the question on the rationale behind removal of the Level 1 backup to the Level 3 isolation of the shutdown cooling system, Mr. Chappel noted that the actual containment isolation valves are isolated by a Level 3 signal and that design feature has not changed. In addition to the two isolation valves, there is a third shutdown cooling suction valve whose purpose is to align the RHR system to the low pressure core flooder mode. It does that upon an ECCS initiation signal and includes Level 1 and hydraulic pressure. So the design has not changed.

Chairman Abdel-Khalik then asked the public or other stakeholders attending the meeting in the room or on the telephone bridge-line to provide comments or ask questions. As no one raised any comments or questions, Chairman Abdel-Khalik asked the members for input or comments. Member Brown noted that he still had to think about the discussion on "deterministic" and reach a position on it. Member Stetkar noted that the importance of instrumentation and control requires that the documentation in the FSAR at the COL stage be consistent and contain details. This would provide sufficient information to the inspectors, when the ITAAC inspections are performed,

to confirm that the design is actually implemented according to the functional logic. Member Bonaca shared Member Stetkar's views and noted the need for consistency between the FSAR and the plant as built. Chairman Abdel-Khalik expressed the committee's appreciation to STP and the staff for a very informative presentation, and adjourned the meeting at 3:47 PM.

ACRS ABWR Subcommittee Action Items

No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION / DISPOSITION	Date Resolved
March 2, 2010 Subcommittee Meeting							
1	3/2/10	Dr. Armijo expressed interest in the fuel related topical reports and the effect of the fuel change (amendment to COL) on the analyses in Chapters 4 and 15. Communicate ACRS desire to review fuel amendment (first reload) application that replaces GE 7 fuel (DCD) to contemporary fuel (Armijo)	Chapter 4	SER	~~NRC~~/ACRS (Abdullahi/ Banerjee)	~~At the 5/20/10 meeting the staff will tell the Subcommittee which topical reports will be presented to them and when. The staff will also answer the question of whether or not the amendment will go before ACRS~~. Potential impact to other areas including Chapters 6 and 15 in addition to Chapter 4. Closed as Follows: A list of fuel amendment related technical/ topical reports has been provided. ACRS (Dr. Armijo lead) to determine which ones the Committee would like to review and the responsible Subcommittee(s). Proposal to be presented at the April P&P. ACRS, with Member Banerjee's lead, will review the TRs.	4/9/10
2	3/2/10	Future presentation of staff and STP to address diesel qualification to 60 degrees C, related occupancy issues and HVAC changes. (Abdel-Khalik)	Chapter 9	COLA/SER	STP/NRO	STP to provide additional discussion on habitability at future Subcommittee meeting on impact of higher temperature (departure T1 2.15-2) when Chapter 9 is presented to the Subcommittee. The issue of diesel qualification was addressed at 3/18/10 meeting satisfactory to the members.	

ACRS ABWR Subcommittee Action Items

No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION / DISPOSITION	Date Resolved
3	3/2/10	Part 21 reports issued on stability analysis post DCD need to be addressed (Abdel-Khalik)	Chapters 4 and 15	COLA/SER	STP/NRO	STP and staff to address at March 18, 2010 meeting. Closed as follows: STPNOC will provide an updated Stability Option III analyses including resolution of the Part 21 issues before fuel load (COM 4.4-3) Staff will followup commitment through established processes.	3/18/10
4	3/2/10	Part 21 reports issued post DCD - how staff identifies, captures and addresses Part 21 issues that affect the ABWR design? (Abdel-Khalik)	Chapters?	COLA/SER	NRO	Staff plans to address it at a future ~~the March 18, 2010,~~ meeting. STP is preparing a list of all applicable part 21 items since original design certification and will develop a process to address them in the COLA space. Staff to followup and address at a future ACRS meeting.	
5	3/2/10	Deletion of MSIV closure and scram on hi radiation	Chapters 7 and 19	DCD	-	BWROG Topical Report reviewed and approved by NRC. Closed	3/2/10
6	3/2/10	FW line break mitigation – This accident is not described in Chapter 15 (Abdel-Khalik).	Chapter 6	COLA/SER	STP/NRO	The applicant stated that this accident does not affect Chapter 15 doses and that the entirety of the accident and its effects will be discussed in the presentation on Chapter 6. Address during 6/24/10 meeting.	

ACRS ABWR Subcommittee Action Items

No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION / DISPOSITION	Date Resolved
7	3/2/10	FPGA – address in more detail (e.g., inter-channel communication, determinancy) (Brown)	Chapter 7	COLA/SER	STP/NRO	Staff to discuss at 5/20 meeting. NRO to provide documents to Subcommittee in advance of briefing on this topic as needed.	
8	3/2/10	Address GSI-191 flow blockage (not just for fuel) (Abdel- Khalik)	Chapter 6	COLA/SER	STP/NRO	Staff and STP to discuss this issue during presentation on strainers and downstream effects testing as part of Chapter 6 on 6/24 ~~May 20~~, 2010.	
9	3/2/10	Address how underground release is handled (e.g., H3) in STP design and operational programs. Address if underground piping carrying radioactive liquids run through tunnels, designed for zero leakage, or above/ below the water table. (Ryan)	Chapter 11	COLA/SER	STP	To be discussed at a future meeting.	
10	3/2/10	GALE code – impact of the very conservative approach used by the staff and need for uncertainty analysis and use of actual experience data. (Ryan)	Chapter 12	SER	NRO	Dr. Ryan asked if staff has any insights on how results from the new GALE code will compare to results from the old GALE code. What impact is this likely to have on the application? He also expressed concern regarding the effect on the applicant of making significant changes to RGs in the middle of a review? Staff to address this issue generically at a future meeting. Staff discussed the issue at 3/18/10 SC meeting to Committee's satisfaction. The issue is closed.	3/18/10

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No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION / DISPOSITION	Date Resolved
11	3/2/10	Disparity between staff and STP presentation related to all x/q values being bounded by DCD.	Chapter 15	SER	NRO	Staff acknowledged error in presentation slides. Issue closed.	3/2/10
12	3/2/10	Related to HFE, how specific DAC acceptance criteria be amenable to staff inspection (Bley)	Chapter 18	SER	ACRS	DAC issues will be closed after the issuance of the COL. This means that the Committee will not be able to track the closure of DAC-related technical issues before they are requested to write a letter on the staff's SER. ACRS to receive briefing on digital I&C DAC at 570 ACRS meeting on 3/5/10, and decide if further follow-up is needed.	
13	3/2/10	Subcommittee would like a better understanding of how adding dry/wetwell pressure indication on SPDS gives higher assurance of control room capability post accident when SPDS is non-safety related (Stetkar)	Chapter 18	SER	NRO	Staff to provide additional information to ACRS.	
14	3/2/10	EDG qualification to increased ambient temperature (Stetkar)	Chapters 8, 9	FSAR/SER	STP/NRO	STP to discuss at next meeting. This item is closed.	3/18/10

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No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION / DISPOSITION	Date Resolved
15	3/2/10	Subcommittee would like a better understanding of the basis for SER conclusion related to MCR and RSS and operator ability in switching from a digital MCR to analog RSS (Stetkar)	Chapter 18	SER	NRO	Staff to address this question in the context of the Chapters 7 and 18 discussions on RSS.	
16	3/2/10	May need more aggressive staff review of HFE. Dr. Bonaca indicated that he might have questions on Chapter 18 (human factors engineering) after he reflected on the presentation. (Bonaca)	Chapter 18	SER	ACRS/NRO	Staff to address: Dr. Bonaca referring to questions from Dr. Stetkar above – Treatment of SPDS, core cooling display parameters and their bases. Closed-refer to item 15 above.	Closed
17	3/2/10	Staff needs to formalize handling of DAC	Chapter 18	NRO Programs	ACRS/NRO	Future ACRS Briefings to address. Also see item 12.	
18	3/2/10	Related to SER open item 1-3 on aging management, it was noted that detailed technical review is conducted under license renewal process when it should be an issue to consider from the first day on. Dr. Stetkar noted that additional guidance in the area may be helpful.	Chapter 1	Aging managemen t	ACRS/NRO	Staff plans to close this issue in the staff's final SER with no open items.	

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No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION / DISPOSITION	Date Resolved
19	3/2/10	Occupational doses received from ABWRs and how they compare to occupational doses at other reactors. Can we compare ABWR to other Japanese BWRS as well as to U.S. BWRs? (Ryan)	Chapter 12	ABWR occupational dose	NRO	Staff to address this issue at a future meeting. At 3/18 SC meeting, NRO and STP provided occupational dose data for Japanese and US BWRs since 1993 and the average dose for the Kashiwazaki-Kariwa plants, two of which are ABWR units, from 1997 thru 2002.	3/18/10
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20	3/18/10	Number of times RCIC is expected to cycle on and off during an 8 hour SBO event (Stetkar)	Chapter 5	RCIC	STP	RCIC qualification and Operator response may be challenged due to repeated cycling	
21	3/18/10	Rx vessel EOL fluence value and error band (Abdel-Khalik/Armijo)	Chapter 5	Rx Vessel Material	STP	COLA uses DCD value, will be updated once PTLR is finalized/approved	3/18/10
22	3/18/10	Ensure all documents (engineering, design, procedures, PTS etc) at the plant use a consistent set of units (either British or Metric). (Abdel-Khalik)	All	All	STP	Too may number of problems and near misses happen when operators and technicians at the plant have to take action based on inconsistent units.	
23	3/18/10	Address how K6 and K7 RCS leakage TS limits compare with proposed STP numbers, and justify STP limits, if higher. Also address instrument sensitivity and how it compares with 1 gpm number. (Armijo)	Chapter 5	PTS	STP	Unidentified leakage limit was increased from 1 gpm DCD value to 5 gpm STP TS as STP is not using LBB.	

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No.	MTG/ date generated	ACTION ITEM	CONTEXT	AREA	LEAD(s)	COMMENTS / ACTION / DISPOSITION	Date Resolved
24	3/18/10	Confirm that East transmission lines are capable of supplying all 4 units' safety loads when other lines are lost. (Stetkar/Sieber)	Chapter 8	FSAR	STP	Concern was that given shared transmission right of way and towers, all other lines could be lost under a storm situation.	
25	3/18/10	State if there are single or double closing coils on switchyard breakers. (Stetkar)	Chapter 8	FSAR	STP	There may be additional questions if the answer is "single."	
26	3/18/10	Provide switchyard control system backup battery discharge time. (Stetkar/Sieber)	Chapter 8	FSAR	STP	Breakers may not close after LOOP clears if battery exhausted.	
27	3/18/10	Performance of switching logic under various electrical transients. (Stetkar)	Chapter 8	FSAR	STP	STP may a want to address it beyond COL while detailed design is finalized.	
28	3/18/10	NRO to address how the SBO rule requirements are being ensured after operator action time is factored into the scenario with STP specification of "less than 10 minutes CT startup time." (Stetkar)	Chapter 8	SER	NRO	As STP chose not to do SBO coping analysis, they have to demonstrate that the CTs are capable of powering shutdown buses within 10 minutes of the onset of SBO (10 CFR 50.63 (c)(2)). The scenario involves needed operator action to shed/load buses before breaker can be closed.	
29	3/18/10	Address qualification of submerged 345 KV cables. (Brown)	Chapter 8	FSAR	STP	High water table prompted question on qualified life.	

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30	3/18/10	Address when DRAP list will be effectively populated and staff review is completed. How does staff ensure the DRAP list and the process (COLA vs. ITAAC) related to it are acceptable? (Stetkar)	Chapter 17	FSAR/SER	STP/NRO	With evolving plant PRA and DRAP, members were concerned that ITAAC may not be an appropriate closer mechanism for DRAP list.
31	3/18/10	4.16 kV winding in CTG1 bus could carry two PIP buses together with one safety bus (Stetkar)	Chapter 8	FSAR/SER	STP	STP to confirm ~~address~~ at a future meeting
			May 20, 2010 Subcommittee Meeting			
32	5/20/10	During the presentation on preoperational testing, members Stetkar and Brown noted that they had identified "overlap testing" requirements for various systems but could not identify end-to-end testing requirements.	Chapter 14	FSAR	STP	STP to address at a future meeting
33	5/20/10	Dr. Abdel-Khalik wanted to know the steam velocity and how it compares to other plants.	Chapter 14	FSAR	STP	STP to address at a future meeting
34	5/20/10	Dr. Abdel-Khalik wants the staff to provide reports submitted regarding flow induced vibration for review by the Committee.	Chapter 14	Tech. Report	NRO	
35	5/20/10	Member Brown raised the issue of cyber-security ITAAC and whether or not it should be included in Chapter 14.	Chapter 14	ITAAC	NRO	NRO staff to address at a future meeting
36	5/20/10	Dr. Stetkar pointed out a possible inconsistency between the diagram of the backup SCRAM control circuit and the description of that circuit in the text.	Chapter 14	FSAR/SER	STP/NRO	STP and NRO staff to address at a future meeting
			June 8, 2010 Subcommittee			
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