From:	Adrian Muniz
Sent:	Tuesday, February 10, 2009 7:38 AM
To:	Ian Jung; Dinesh Taneja; Thomas Fredette; Jack Zhao
Cc:	STPCOL
Subject:	FW: STPNOC LETTER RESPONDING TO REQUEST FOR I&C INFORMATION
Attachments:	U7-C-STP-NRC-090009_Additional I&C Info.pdf

Please see attached a letter from STP providing the additional information identified in out letter dated December 18, 2008.

Adrian Muñiz

From: Cook, James W [mailto:jwcook@STPEGS.COM]
Sent: Monday, February 09, 2009 6:39 PM
To: Adrian Muniz; Belkys Sosa; George Wunder; Loren Plisco; Raj Anand; Rocky Foster; Stacy Joseph; Tekia Govan; Tom Tai
Subject: STPNOC LETTER RESPONDING TO REQUEST FOR I&C INFORMATION

Attached is an information only copy of an official letter sent to the NRC which responds to an 18Dec request for certain additional I&C information.

The official paper copies will be sent tomorrow according to the letter addressee list.

If you have any questions on this subject please contact me.

James Cook

Licensing Engineer STP 3 & 4
jwcook@stpegs.com
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Subject: FW: STPNOC LETTER RESPONDING TO REQUEST FOR I&C INFORMATION
Sent Date: 2/10/2009 7:38:10 AM
Received Date: 2/10/2009 7:38:13 AM
From: Adrian Muniz

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Options
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Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

February 9, 2009
U7-C-STP-NRC-090009

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Additional I&C Information

References: 1. Letter, Belkys Sosa to Mark McBurnett, "Regulatory Audit Summary of
South Texas Project, Units 3 and 4 Instrumentation and Control Design
Information," dated December 18, 2008, (ML083460608).

2. Letter, Scott Head to Document Control Desk, "Schedule for Providing
Additional I&C Information," dated December 19, 2008, (ML083640468).

Reference 1 identified four additional information items needed by the NRC staff in order for
them to complete their review of the instrumentation and controls (I&C) sections of the STP 3 & 4
Combined License Application (COLA). In Reference 2, South Texas Project Nuclear Operating
Company (STPNOC) agreed to submit responses to each of the items identified along with the
necessary proposed COLA changes. This letter provides the requested information.

Attachment 5 provides a description of the approach employed by STP for the I&C sections of
our COLA. It is intended to aid NRC reviewers by providing context for the information
provided in our COLA and in this letter.

Attachments 1 through 4 correspond to each of the numbered items in Reference 1. The
enclosures to this letter provide supporting data and proposed COLA revisions referenced in
Attachments 1 through 4. As discussed with the NRC during the audit on December 10, 2008,
and as provided in Reference 2, the attachments address those departures from Tier 1 and Tier 2*
material that pertain to I&C. Departures from Tier 2 are not addressed because those departures
do not require NRC approval.

When a change to the COLA is indicated, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of these responses.

There are no commitments in this letter.

If you have any questions, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 2/9/2009

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

jwc

Attachments:
1. Response to I&C Audit Item 1
2. Response to I&C Audit Item 2
3. Response to I&C Audit Item 3
4. Response to I&C Audit Item 4
5. STP Units 3 &4 Digital Instrumentation and Control Systems Design and Design Process

Enclosures:
   Summary of Enclosures
1. Revisions to COLA Tier 1 Section 3.4
2. Revisions to COLA Tier 2 Sections
3. Revisions to COLA Part 7 Section 2.1
4. Compliance Review for STP 3&4 COLA

cc: w/o attachment except*
(paper copy)   (electronic copy)

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NRC Item 1):

Describe the scope of I&C departures and how the departures conform to current standard review plan (SRP) acceptance criteria, related staff guidance and industry standards. Refer to the examples listed below. If design does not meet the applicable staff guidance, provide the description of alternate method used.

Note:

In response to this request, STP has reviewed the Tier 1 and Tier 2* departures related to I&C, which include departures STD DEP T1 2.2-1, STD DEP T1 2.3-1, STD DEP T1 3.4-1, and STD DEP 1.8-1. The discussions in STD DEP T1 2.2-1, STD DEP T1 2.3-1, and STD DEP 1.8-1 adequately describe the departures and justifications for the changes, and therefore changes to these departures are not needed in response to this request. The following information focuses only on STD DEP T1 3.4-1. The response to each of the four NRC bullet points is provided below.

First NRC Bullet:

- Evaluation of impact to Design Control Document (DCD) Table 1.8-7, "Summary of Differences from SRP Section 7," has not been fully captured.

RESPONSE:

DCD Tier 2, Subsection 7.3.2.4.2, Specific Regulatory Requirements Conformance, under item (1) 10CFR50.55a (IEEE-279), states "A clarification should be made with regard to IEEE-279, Section 4.19. The parent RHR System annunciates activity at the loop level (i.e., "RHR LOOP A, B, C ACTIVATED"). However, the individual mode of the RHR System is not separately annunciated."

STP 3&4 COLA, Rev. 2, appropriately deleted the first sentence, "A clarification should be made with regard to IEEE-279, Section 4.19" because this should not be in the COLA. However, in Table 1.8-7 of the COLA, "Summary of Differences from SRP Section 7," the IEEE-279, 4.19 requirement was erroneously deleted. Instead, the Summary Description of Difference column should have included an editorial change to reflect the above DCD clarification. Table 1.8-7 (**Enclosure 2.a)** will be revised to reflect the DCD clarification in Subsection 7.3.2.4.2, and no further evaluation is necessary. With this clarification, Table 1.8-7 is complete and considered correct.

Second NRC Bullet:

- Evaluation of impact to DCD Tier 2, Table 1.8-19, "Standard Review Plans and Branch Technical Positions Applicable to Advanced Boiling Water Reactor (ABWR)," is not documented in the COLA.

RESPONSE:

Evaluation of STD DEP T1 3.4-1 against the SRP is provided in the enclosed SRP Section 7.2 Evaluation for the Reactor Trip and Isolation System (RTIS)/Neutron Monitoring System (NMS) Departures and SRP Section 7.3 Evaluation for the Engineered Safety Feature (ESF) Logic and Control System (ELCS) Departure **(Enclosures 4.b and 4.c)**. Evaluations of STD DEP T1 3.4-1 against the Branch Technical Positions are provided in **Enclosure 4.d and 4.e**.

Third NRC Bullet:

- SRP 14.3 and 14.3.5 provide guidance for Tier 1 design descriptions, figures, and Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) for I&C systems. Applicability of these SRP sections to STP 3 and 4 has not been evaluated.

RESPONSE:

STPNOC evaluated the guidance of SRP 14.3 and 14.3.5 to evaluate if any new ITAAC is warranted or if any existing ITAAC need to be modified as a result of the changes identified in STD DEP T1 3.4-1. The results of that evaluation are summarized in **Enclosure 4.f.**

The I&C platform changes identified in STD DEP T1 3.4-1 are to the design of the subsystems that communicate the functions as described in the DCD, and do not change the functions themselves, the ITAAC as described in the DCD remain completely applicable and valid. Therefore changes to the I&C ITAAC are neither required nor appropriate. For clarity, the system nomenclature was updated, but this only changes the callout of the system performing the function, and does not change the function or acceptance criteria. Further, the changes in STD DEP T1 3.4-1 do not introduce any new functions in addition to those already described in the DCD, and therefore no new I&C ITAAC are necessary.

Fourth NRC Bullet:

- Evaluation of impact to DCD Table 1.8-20, "NRC Regulatory Guidelines Applicable to ABWR," has not been fully captured, i.e., applicability of Regulatory Guides (RGs) 1.152, 1.168 through 1.172, 1.180, and 1.209 has not been evaluated. This evaluation should also be addressed in COLA.

RESPONSE:

Updates to COLA Tier 2, Table 1.8-20, "NRC Regulatory Guidelines Applicable to ABWR," and Table 1.8-21, "Industrial Codes and Standards Applicable to ABWR," are provided in **Enclosure 2.a**.

Conformance of STD DEP T1 3.4-1 to Regulatory Guides and IEEE Standards is provided in **Enclosure 2.b**, which includes an update to COLA, Tier 2, Table 1.9S-1, "Site-Specific Conformance with Regulatory Guides," and a new Table 1.9S-1a, "IEEE Standards Applicable to the STP 3&4 I&C Platforms." Table 1.9S-1 includes applicability of Regulatory Guides 1.152, 1.168 through 1.172, 1.180, and 1.209 to the STP 3&4 RTIS/NMS configurable logic devices. An update to Table 7.1-2, Regulatory Requirements Applicability Matrix for I&C Systems, is provided in **Enclosure 2.c**.

NRC Item 2):

In Table 1.9S-1, "Site-Specific Conformance with Regulatory Guides," STP commits to RG 1.206. RG 1.206 provides guidance on the level of detail to be captured in a COLA. STP's COLA Revision 2 does not contain the level of detail as prescribed in RG 1.206 for the I&C departures.

Note:

In response to this request, STP has reviewed the Tier 1 and Tier 2* departures related to I&C, which include departures STD DEP T1 2.2-1, STD DEP T1 2.3-1, STD DEP T1 3.4-1, and STD DEP 1.8-1. The discussions in STD DEP T1 2.2-1, STD DEP T1 2.3-1, and STD DEP 1.8-1 adequately describe the departures and justifications for the changes, and therefore changes to these departures are not needed in response to this request. The following response focuses on STD DEP T1 3.4-1.

RESPONSE:

Regulatory Guide (RG) 1.206 prescribes a level of detail for an applicant that is proposing a final design. As stated in Attachment 5, UTLR-0001-P, Rev. 0 has been submitted for NRC review and additional level of detail for the RTIS/NMS platform will be contained in the Toshiba Topical Reports to be submitted for NRC staff review and approval. The previously NRC-approved WCAPs provide additional level of detail for the ELCS platform. These Topical Reports, along with documents necessary for closeout of the I&C Design Acceptance Criteria (DAC), will provide the level of detail prescribed by RG 1.206 for the STP 3&4 final I&C design.

The level of design detail submitted at this stage of design is appropriate and consistent with the DCD, DAC, and RG 1.206, and the platforms described in the topical reports for RTIS/NMS and ELCS as identified in Attachment 5 are appropriate for Staff review of the STP 3&4 digital I&C system at this stage of design.

A comparison of STD DEP T1 3.4-1 to RG 1.206 is provided in **Enclosure 4.a**.
Additional detail is contained in the proposed changes to COLA Tier 1, Part 2 and COLA Part 7, Section 2.1 for STD DEP T1 3.4-1 **(Enclosures 1 and 3)**.

NRC Item 3):

In accordance with RG 1.206, the staff expects the applicant to provide a detailed schedule for implementation of Design Acceptance Criteria (DAC). STP has not provided the schedule information of sufficient detail.

RESPONSE:

In a public meeting on October 23, 2008, STPNOC provided to the NRC the following projected milestone completion dates for the DAC items contained in Tier 1 Table 3.4. The following items will be completed as part of the site acceptance testing during the pre-operational test phase, currently scheduled for the fourth quarter of 2014. These dates are estimates as of 1/29/2009.

- #1-4 Inspection and Tests of Safety System Logic and Control (SSLC)
- #5 Test of anticipated transient without scram (ATWS)
- #6 Inspection of Main Control Room (MCR) Alarms, Displays & Controls
- #16 Tests to Verify Diversity

The programmatic DAC items will be completed as indicated:

- #7-10 Digital Systems Software Plans – **Second Qtr 2009**
- #11 Digital Systems Software Development Review – **Fourth Qtr 2012**
- #12 Digital Platform Electromagnetic Compatibility (EMC) Qualification Plan – **Second Qtr 2009**
- #13 Setpoint Determination Methodology – **Fourth Qtr 2009 (Setpoint Calcs – Second Qtr 2013)**
- #14 Environmental Qualification Program – **Second Qtr 2013**
- #15 Plan for Verifying I&C Installation Correctness Verification Program – **Fourth Qtr 2014**

The following additional information is being provided based on the flow of documents through the software life cycle and is based on the stages and documents that are shown in Tier 1 Figure 3.4d. These dates are estimates as of 1/29/2009.

- All dates shown represent completion during the quarter indicated.
- All dates are best estimates based on limited information available as of 1/29/2009.
- These dates are expected to be impacted as detailed schedules are developed, and as predecessors and successors are more accurately defined.
- Verification and Validation (V&V) reports for Design Analysis and for Implementation Analysis may not apply.
- For activities outside of the Planning Activities there will be separate reports for each of the platforms.
- Planning Activities are common documents. Requirements Activities, Design Activities, Implementation Activities, Integration Activities, Validation Activities, and Installation Activities are unique documents for each system.

Estimated Date of Completion	Document Description or Title	
	1. **Planning Activities**:	
2009Q2	1.1 Software Management Plan	
2009Q2	1.2 Software Development Plan	
2009Q2	1.3 Software Quality Assurance (QA) Plan	
2009Q3	1.4 Integration Plan	
2009Q4	1.5 Installation Plan	
2009Q4	1.6 Maintenance Plan	
2009Q4	1.7 Training Plan	(Training to be provided after installation)
2009Q4	1.8 Operations Plan	
2009Q3	1.9 Software Safety Plan	
2009Q3	1.10 Software V&V Plan	
2009Q3	1.11 Software Configuration Management (CM) Plan	(Westinghouse Electric Company (WEC) and Toshiba Corporation (TSB) each have their plan)
	Lead up to the Conformance Review / **NRC Planning Audit**	
	2. **Requirements Activities**:	
2010Q1	2.1 Requirements Specification	
2010Q2	2.2 Requirements Safety Analysis	
2011Q3	2.3 V&V Requirements Analysis Report	
2011Q3	2.4 CM Requirements Report	
	Lead up to the Conformance Review / **NRC Requirements Audit**	
	3. **Design Activities**:	
2010Q2	3.1 Design Specification	
2010Q4	3.2 Hardware & Software Architecture	
2011Q4	3.3 Design Safety Analysis	
2012Q1	3.4 V&V Design Analysis Report	
2012Q1	3.5 CM Design Report	
	Lead up to the Conformance Review / **NRC Design Audit**	
	4. **Implementation Activities**:	
2010Q2	4.1 Code Listings	
2011Q4	4.2 Code Safety Analysis	
2011Q4	4.3 V&V Implementation Analysis & Test Report	
2011Q4	4.4 CM Implementation Report	
	Lead up to the Conformance Review / **NRC Implementation Audit**	
	5. **Integration Activities**:	
2014Q2	5.1 System Build Documents	
2014Q2	5.2 Integration Safety Analysis	
2014Q2	5.3 V&V Integration Analysis & Test Report	
2014Q2	5.4 CM Integration Report	
	Lead up to the Conformance Review / **NRC Integration Audit**	

Estimated Date of Completion	Document Description or Title	
	6. **Validation Activities**:	
2013Q4	6.1 Validation Safety Analysis	
2013Q4	6.2 V&V Validation Analysis &Test Report	
2013Q4	6.3 CM Validation Report	
	Lead up to the Conformance Review / **NRC Validation Audit**	
	7. **Installation Activities**:	
2015Q1	7.1 Operations Manuals	
2015Q1	7.2 Installation Configuration Tables	
2015Q1	7.3 Maintenance Manuals	
2015Q1	7.4 Training Manuals	
2014Q4	7.5 Installation Safety Analysis	
2014Q4	7.6 V&V Installation Analysis & Test Report	
2014Q4	7.7 CM Installation Report	
	Lead up to the Conformance Review / **NRC Installation Audit**	
2015	**FUEL LOAD - ESTIMATE**	(Currently scheduled for mid 2015)
	8. **Operation & Maintenance Activities**:	
2014Q4	8.1 Change Safety Analysis	
2014Q4	8.2 V&V Change Report	
2014Q4	8.3 CM Change Report	

NRC Item 4):

The audit team identified editorial changes that need to be made to the COLA. These errors, in some instances, made it difficult for the staff to understand your proposed I&C design departures.

RESPONSE:

STP reviewed the examples of inconsistencies identified by the NRC at the audit. STP acknowledges these inconsistencies and proposes the following resolutions:

- The inconsistency between Tier 1 Figure 2.2.5, which shows OPRM as a subsystem of APRM, and other sections of the COLA, which describe OPRM as a subsystem, will be resolved by the deletion of STD DEP 7.6-1. This will result in the COLA incorporating by reference the description in the DCD where OPRM is characterized as a subsystem of APRM.
- The inconsistencies between the subsection numbering of Tier 1 Section 3.4 have been resolved as shown in the proposed COLA changes in **Enclosure 1**.
- The inconsistencies regarding the use of nomenclature in Tier 1 Table 3.4 which has been changed by STD DEP T1 3.4-1 have been resolved as shown in the proposed COLA changes in **Enclosure 1**. The terms Essential Multiplexing System (EMS) and Non-Essential Multiplexing System (NEMS) have been changed to Essential Communication Function(s) (ECF) and Non-Essential Communication Function(s) (NECF), respectively.

In addition, a search of the COLA was undertaken for inconsistencies in use of nomenclature related to changes made by STD DEP T1 3.4-1. A number of corrections were identified in Tier 2 Chapters 2, 6, 7, 8, 9, 14, 15, and 19.

The following table shows the editorial changes required for correcting I&C terminology in the COLA.

DCD terminology	Revised terminology for COLA
remote multiplexing	data communications equipment
multiplexer	control device or controller
multiplexer	controller
trip logic unit (TLU)	trip logic function (TLF)
trip unit	trip function
multiplex (verb)	digitally transmit
multiplex (noun)	data communication
essential multiplexing system (EMS)	essential communications function (ECF)
signal multiplexer	signal A-D converter
digital trip module (DTM)	digital trip function (DTF)
system logic unit (SLU)	system logic function (SLF)

These, and any other identified inconsistencies, will be incorporated into the next routine revision of the COLA following NRC acceptance of the response.

STP Units 3&4 Digital Instrumentation and Control Systems Design and Design Process

ABWR DCD

The ABWR DCD contains both Tier 1 and Tier 2 information that has been incorporated by reference into 10 CFR 52 Appendix A. Tier 1 information contains the Certified Design Material (CDM), which includes the design description; Inspections, Tests, Analyses and Acceptance Criteria (ITAAC); site parameters; and interface requirements for design certification. The Tier 1 information is derived from the more extensive information provided in Tier 2.

The DCD Tier 1 information has been certified by rulemaking according to the requirements of 10 CFR Part 52. It was reviewed and found acceptable by the NRC staff in NUREG-1503, Vol. 1, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor Design" (FSER), dated July 1994. Thus, the DCD Tier 1 has been certified, has finality, and can be changed only through rulemaking or license amendment.

I&C Design Acceptance Process

The FSER describes the NRC Staff's final safety evaluation findings of the ABWR instrumentation and control (I&C) systems design in Chapter 7. The acceptance criteria used as the basis for the NRC Staff's evaluation of the I&C systems for the ABWR were set forth in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, LWR Edition," and 10CFR Part 52. The primary section of NUREG-0800 used for this portion of the review was Section 7, "Instrumentation and Controls."

The results of the NRC review of the DCD were that the I&C systems which are important to safety in accordance with Regulatory Guide (RG) 1.70, Revision 3, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," November 1978, were identified and had an associated Design Description and ITAAC. Some aspects of the design which affect all I&C systems (such as the software design process) were addressed in an I&C Tier 1 Section 3.4 rather than repeated in Tier 1 for each individual I&C Design Description (included in the DCD as Tier 1 Section 2).

The Staff acknowledged that the ABWR I&C systems are significantly different from I&C systems in previously-approved designs. The primary differences result from using digital microprocessor-based I&C systems with multiplexed data links in place of the analog electronics, relay logic, and hardwired systems previously approved. The Staff previously reviewed designs using digital equipment similar to that proposed for the ABWR; however, the ABWR significantly extended the quantity and scope of system coverage of the digital microprocessor applications and, in conjunction with the 10 CFR Part 52 design certification process, and required a unique review which was not directly comparable with any past licensing review. The differences from past license reviews were addressed in detail in the FSER. The Staff also acknowledged that the technology in this area was evolving, and therefore it was undesirable to "lock-in" a final design for certification.

To provide finality for the ABWR certified design, the NRC relied on a structured design implementation process to be followed by a COL applicant during the final design of the I&C hardware and software, to ensure that design results are in conformance with the certified design descriptions and all applicable requirements. These plans and procedures will guide the design process throughout the lifecycle stages (see ABWR DCD Tier 1 Figure 3.4d). These programmatic aspects are described in DCD Tier 1 Subsection 3.4B, and the Design Acceptance Criteria (DAC) ITAAC are found in Section 3.4. The primary function of this development process is to implement all applicable functional requirements, including regulatory guidance, codes and standards, and acceptance criteria. The implementation of these plans and procedures and the resulting design are the responsibility of the COL applicant/licensee.

The DAC activities completed by the COL applicant will be made available for inspection by the NRC to verify conformance with the requirements at several stages during the digital control system design process. The COL applicant is required to satisfactorily complete DAC activities at each stage prior to proceeding to the next stage of the design development process. At each stage, the COL applicant must verify that the design development is in accordance with the certified design process and that the detailed design developed is in conformance with the certified design, as revised by the approved COLA. This phased approach will continue until all DAC steps for all the safety-related software are complete. The DAC and the DAC process is not being changed for STP 3&4.

In the FSER, the Staff provided further digital I&C (DI&C) system evaluations related to the SRP criteria (RGs, IEEE, GDC, BTP), the Electric Power Research Institute (EPRI) requirements document, and additional criteria including responses to NRC requests for additional information (RAI). Based on findings, discussions, and resolution of the RAI issues with GE, the NRC Staff concluded that the design and the design process of the RPS and ESF I&C as described met the requirements of the GDC and 10 CFR 50.55a(b) (IEEE 279), and that the design was acceptable. Although specific platforms were not identified or certified, the nomenclature used in the DCD reflects the technology in general use at the time of the certification. Since those technologies are no longer currently accepted industry practice, in some instances, the STPNOC departures have updated the nomenclature while maintaining functionality described in the certified material. Consequently, the existing ITAAC and DAC requirements are appropriate, adequate, and applicable.

STP Units 3&4 I&C Licensing Considerations

The STP 3&4 project is proceeding with DI&C system design using the DCD design and DAC/ITAAC criteria based on the following platforms:

- NRW-FPGA-Based I&C System platform for the RTIS/NMS, as described in Topical Report UTLR0001P, Rev. 0, "Topical Report of NRW-FPGA-Based I&C System Design Process" (Proprietary) which has been submitted for NRC generic review.
- Common Q Digital Platform for ELCS use, which was submitted for generic use and was approved for reference as described in Topical Report WCAP-16097-P-A,

Revision 0, "Common Qualified Platform Topical Report." and WCAP-16096-P-A, Revision 1, "Software Program Manual for Common Q Systems," which is also approved and being used for the ELCS.

The NRW-FPGA platform topical report is not a complete submittal for the FPGA platform and will be supplemented by future topical reports prior to approval for use by the NRC. The Common Q platform has already received approval by the NRC. These topical reports, supplemented by COLA STD DEP T1 3.4-1, describe the DI&C system design including design processes.

The vast majority of information concerning the STP 3&4 I&C design incorporates, without change and by reference, the information in the ABWR DCD. The topical reports and departure indicated above do not change any of the functions related to the I&C design as they relate to the DCD. The input data as well as all output actions taken as a result of that data are unchanged from the DCD. STD DEP T1 3.4-1 eliminates the use of traditional, outdated multiplexers and implements the more current, industry preferred design of data communication for RTIS/NMS and ELCS protection and engineered safety features signals to support the final required actuation of safety equipment. This departure does not change any safety criteria with respect to generation of signals or the safety equipment actuation, but does implement the latest available technology.

As noted earlier, the DAC are not affected by this departure. In addition, the ITAAC are not affected as the requirements and functions are unchanged as summarized in the previous paragraph **(Enclosure 4.f)**. Consequently, those aspects of the I&C design which were reviewed and approved by the NRC in the DCD, including the DAC process, are already certified, have finality, and should not be subject to re-review and approval by the NRC. Only the departures as provided in Revision 2 of the COLA, the existing FPGA Topical Report, and future FPGA Topical Reports should be subject to review.

The codes and standards to be applied for the I&C system design are as follows: (1) for those aspects which are unchanged from the DCD, the codes and standards identified in the DCD apply, (2) for those aspects related to the updated equipment for the RTIS/NMS systems, current codes and standards will apply, and (3) for the ELCS, the codes and standards identified in the NRC approved topical report will apply. The codes, standards, and regulatory guides are provided in **Enclosure 2.a**.

STD DEP T1 3.4-1 and associated departures meet the intent of the FSER and ABWR DCD with respect to evolution of the DI&C and the DAC/ITAAC, and provisions of Regulatory Guide 1.206, Section C.I.7, and its appendices for information to be submitted with the COLA. The assessment of STD DEP T1 3.4-1 to this Regulatory Guide is provided in **Enclosure 4.a**.

Conclusion

STPNOC Project believes that the above discussion and information in the attachments regarding the design and design process of the DI&C system demonstrates compliance with the certified ABWR DCD. This is consistent with the NRC Staff's findings in the FSER, which concludes that the top-level design processes, features, and performance characteristics of the I&C aspects of the ABWR design are appropriately described in the Tier 1 design descriptions, and can be adequately verified through the DAC process.

Summary of Enclosures

The following proposed STP 3&4 COLA changes are enclosed:

Enclosure 1: Revisions to COLA Tier 1 Section 3.4

Enclosure 2: Revisions to COLA Tier 2

      a.   Section 1.8

      b.   Section 1.9S

      c.   Section 7.1, Table 7.1-2 "Regulatory Requirements Applicability Matrix for I&C Systems"

Enclosure 3: Revisions to COLA Part 7 Section 2.1, STD DEP T1 3.4-1 change description

The following additional items are enclosed to aid the NRC Staff but are not to be included in the COLA:

Enclosure 4: Compliance Review for STP 3&4 COLA, I&C

      a.   "Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206," for Section C.I.7 evaluating departures for the RTIS/NMS and ELCS

      b.   "Conformance of STD DEP T1 3.4-1 with SRP 7.2, Evaluation for the RTIS/NMS Departures"

      c.   "Conformance of STD DEP T1 3.4-1 with SRP Section 7.3, Evaluation for the ELCS"

      d.   "Review of SRP Chapter 7 BTPs for Applicability to I&C Departures related to RTIS/NMS"

      e.   "Review of SRP Chapter 7 BTPs for Applicability to I&C Departures related to ELCS"

      f.   "Evaluation of ITAAC for STD DEP T1 3.4-1"

Revisions to COLA Tier 1 Section 3.4

The following changes will be made to Tier 1, Section 3.4:

3.4 Instrumentation and Control

The devices addressed in this section are electronic components of the ABWR's I&C systems. These components ~~are configured as~~ include *real-time* ~~microcontrollers that use~~ *microprocessors and* ~~other programmable~~ configurable *logic devices to perform data acquisition, data communications, and system logic processing. These components also contain* ~~automatic,~~ *on-line self-diagnostic features* ~~to monitor these tasks~~ *and off-line test capability to aid in maintenance and surveillance.* ~~The~~ For microprocessor based systems (ESF Logic and Control), the *operating programs for* ~~these~~ the *controllers are integrated into the hardware* ~~as firmware~~ in nonvolatile memory that cannot be modified with the system on-line. ~~[software permanently stored in programmable read-only memory (PROM)]~~. For configurable logic devices (RTIS and NMS), the functions are incorporated into the logic configuration. ~~A controller's operating system can permit field a~~ Adjustment of selected parameters is permitted *under proper change control. Adjustable parameters are stored in* ~~electrically-alterable read-only~~ *memory* ~~(EAROM) or equivalent~~ that can only be altered through the use of special equipment and/or procedures.

~~3.4.1 A~~ Safety System Logic and Control

Design Description

SSLC equipment comprises microprocessor-based, software-controlled signal processors (ELCS) and/or configurable logic devices (RTIS and NMS) *that perform signal conditioning, setpoint comparison, trip logic, system initiation and reset, self-test,* ~~calibration,~~ *and bypass functions.* ~~The signal processors associated with a particular safety-related system are an integral part of that system. Functions in common, such as self-test, calibration, bypass control, power supplies and certain switches and indicators, belong to SSLC. However, SSLC is not, by itself, a system; SSLC is the aggregate of signal processors for several safety-related systems.~~ *SSLC hardware and software are classified as Class 1E, safety-related.*

3.4.3 C *Diversity and Defense-in-Depth Considerations*

Diverse Backup Support for SSLC Equipment

Diverse Features of Protection System	Functional Diversity in Protection System	Defense-in-Depth Configuration	Equipment Diversity
(7) Non-Essential ~~Multiplexing System (NEMS)~~ **Communication Function (NECF)** independent and diverse from ~~EMS~~ **ECF**		D	

The following nomenclature changes will be made to **Figure 3.4b Safety System Logic & Control Block Diagram**:

- Change "TLU" to "TLF" in upper DTF block.

- Change "System Logic Function (SLF)"to "Safety System Logic Function (SLF)" in Notes 3 and 4.

- Change misspelling "unreasonalby" to "unreasonably" in Note 4.

Table 3.4 Instrumentation and Control

Design Commitment	Inspections, Tests, Analyses and Acceptance Criteria	
	Inspections, Tests, Analyses	Acceptance Criteria
Safety System Logic and Control		
12. Electrical and electronic components in the systems listed below are qualified for the anticipated levels of electrical interference at the installed locations of the components according to an established plan: a. Safety System Logic and Control b. Essential ~~Multiplexing System~~ **Communication Function** c. Non-Essential ~~Multiplexing System~~ **Communication Function** d. Other microprocessor-based, software controlled systems or equipment The plan is structured on the basis that electromagnetic compatibility (EMC) of I&C equipment is verified by factory testing and site testing of both individual components and interconnected systems to meet EMC requirements for protection against the effects of: a. Electromagnetic Interference (EMI) b. Radio Frequency Interference (RFI) c. Electrostatic Discharge (ESD) d. Electrical surge [Surge Withstand Capability (SWC)]	12. The EMC compliance plan will be reviewed.	12. An EMC compliance plan is in place. The plan requires, for each system qualified, system documentation that includes confirmation of component and system testing for the effects of high electrical field conditions and current surges. As a minimum, the following information is documented in a qualification file and subject to audit: a. Expected performance under test conditions for which normal system operation is to be ensured. b. Normal electrical field conditions at the locations where the equipment must perform as above. c. Testing methods used to qualify the equipment, including: (1) Types of test equipment. (2) Range of normal test conditions. (3) Range of abnormal test conditions for expected transient environment.

Revisions to COLA Tier 2 Section 1.8

The following changes will be made to Tier 2 Section 1.8 to address RG applicability:

1.8   Conformance with Standard Review Plan and Applicability of Codes and Standards

Revisions have been made to Table 1.8-20 and are summarized here. The STP 3 & 4 FSAR conforms with the following revisions of Regulatory Guides (RGs).

RG 1.75 Rev. 3 (ELCS conforms to Revision 2, 1978)

1.8.2 Applicability of Codes and Standards

Standard Review Plans, Branch Technical Positions, Regulatory Guides and Industrial Codes and Standards which are applicable to the ABWR design are provided in Tables 1.8-19, 1.8-20 and 1.8-21. Applicable revisions are also shown. The Standard Review Plan, Branch Technical Positions, Regulatory Guides and Industrial Codes and Standards which are applicable to the I&C platforms selected are provided in Tables 1.9S-1 and 1.9S-1a.

The following changes will be made to Table 1.8-7, restoring this row to incorporate by reference the DCD information (removing the strikeout) except for the Summary Description of Difference, which is being corrected as follows:

Table 1.8-7 Summary of Differences from SRP Section 7

SRP Section	Specific SRP Acceptance Criteria	Summary Description of Difference	Subsection Where Discussed
7.1	Table 7 1: 1a IEEE 279, 4.19	~~RHR Annunciation at loop level.~~ **The parent RHR System annunciates activity at the loop level, "RHR LOOP A,B,C ACTIVATED". The individual mode of the RHR system is not separately annunciated.**	7.3.2.3.2 (1) 7.3.2.4.2 (1) 7.4.2.3.2 (1)

The following changes will be made to Table 1.8-20:

Table 1.8-20 NRC Regulatory Guides Applicable to ABWR

RG No.	Regulatory Guide Title	Appl. Rev.	Issued Date	ABWR Applicable?	Comments
[1.75	*Physical Independence of Electric Systems*	2 3	9/78 2/05[5]	*Yes*][4]	

Table 1.8-20 Notes:

(5) ELCS conforms to Revision 2, 1978

The following changes will be made to Table 1.8-21:

Table 1.8-21 Industrial Codes and Standards[*] Applicable to ABWR

Code or Standard Number	Year	Title
Institute of Electrical and Electronics Engineers (IEEE)		
[384(†)	*1981* **1992**	*Criteria for Independence of Class 1E Equipment and Circuits*][3][9]

Notes:

(9) ELCS conforms to Revision 2, 1978

Revisions to COLA Tier 2 Section 1.9S

The following RGs, Codes and Standards Conformance are applicable to I&C platform departures, and these changes are addressed in Tables 1.9S-1 and new Table 1.9S-1a:

Table 1.9S-1 Site-Specific Conformance with Regulatory Guides

No.	Title	Rev.
Division 1		
1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems	0 (1973)[1,2]
1.53	Application of the Single-Failure Criterion to Safety Systems	2 (11/03) for RTIS/NMS 0 (1993)[2] for ELCS
1.62	Manual Initiation of Protection Actions	0 (1973)[1,2]
1.75	Independence of Electrical Safety Systems	3 (2/05) for RTIS/NMS 2 (1978)[2] for ELCS
1.100	Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants	2 (1988)[1,2]
1.118	Periodic Testing of Electric Power and Protection System	3 (1995)[1] for RTIS/NMS 2 (1978)[2] for ELCS
1.152	Criteria for Use of Computers in Safety Systems of Nuclear Power Plants	2 (2006)[1] for RTIS/NMS 1 (1996)[2] for ELCS
1.168	Verification, Validation, Reviews and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	1 (2004)[1] for RTIS/NMS 0 (1987)[2] for ELCS
1.169	Configuration Management Plans for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0 (1997)[1,2]
1.170	Software Test Documentation for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0 (1997)[1]
1.171	Software Unit Testing for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0 (1997)[1]
1.172	Software Requirements Specifications for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0 (1997)[1]
1.173	Developing Software Life Cycle Process for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	0 (1997)[1]
1.180	Guidelines for Evaluating Electromagnetic and Radio- Frequency Interference in Safety-Related Instrumentation and Control Systems Instrumentation and Control Systems	1 (2003)[1] for RTIS/NMS 0 (2000)[2] for ELCS
1.209	Guidelines for Environmental Qualification of Safety-Related Computer-Based Instrumentation and Control Systems in Nuclear Power Plants	0 (2007)[1] for RTIS/NMS 3 for ELCS[3]

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[1] The Toshiba TOSDIA-FPGA platform has been submitted for generic review as described in Topical Report "UTLR-0001-P Rev.0"

[2] The Common Q Digital Platform was submitted for generic use and was approved for reference as described in Topical Report WCAP-16097-P-A, Revision 0, "Common Qualified Platform Topical Report." This topical report includes the SERs dated August 11, 2000, June 22, 2001, and February 4, 2003, and is consistent with the referenced industry standards and Regulatory Guides that reference Note 2. The Westinghouse "Software Program Manual for Common Q Systems" (SPM), WCAP-16096-NP-A also incorporates standards and Regulatory Guide requirements. The requirements that this platform were licensed to are submitted as an acceptable alternate to current requirements based on the original NRC review and SERs. This topical report was reviewed against Rev. 2 (1978).

[3] RG 1.209 endorses IEEE 323-2003. The ELCS conforms to IEEE 232-1983 as shown above and as discussed in Note 2.

Table 1.9S-1a IEEE Standards Applicable to the STP 3&4 Platforms

IEEE No.	Category	Rev.
IEEE 7-4.3.2	Digital Computers and Software	2003[1] for RTIS/NMS 1993[2] for ELCS
IEEE 323	EQ	2003[1] for RTIS/NMS 1983[2] for ELCS
IEEE 338	Periodic Testing	1987
IEEE 344	Seismic	1987[1] for RTIS/NMS 1987[2] for ELCS
IEEE 379	Single Failure	2000[1] for RTIS/NMS 1994[2] for ELCS
IEEE 384	Independence	1992
IEEE 603	I&C	1991
IEEE 828	Configuration Management	1990
IEEE 829	Software Test Documentation	1983
IEEE 830	Software Requirements Specifications	1993
IEEE 1008	Software Unit Testing	1987
IEEE 1012	V&V	1998
IEEE 1028	Software Reviews and Audits	1997
IEEE 1042	Software Configuration Management	1987
IEEE 1074	Software Life Cycle Processes	1995

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[1] The Toshiba TOSDIA-FPGA platform has been submitted for generic review as described in Topical Report "UTLR-0001-P Rev.0"

[2] The Common Q Digital Platform was submitted for generic use and was approved for reference as described in Topical Report WCAP-16097-P-A, Revision 0, "Common Qualified Platform Topical Report." This topical report includes the SERs dated August 11, 2000; June 22, 2001 and February 4, 2003 and is consistent with the referenced industry standards and Regulatory Guides that reference Note 2. The Westinghouse "Software Program Manual for Common Q Systems" (SPM), WCAP-16096-NP-A also incorporates standards and Regulatory Guide requirements. The requirements that this platform were licensed to are submitted as an acceptable alternate to current requirements based on the original NRC review and SERs. This topical report was reviewed against Rev. 2 (1978).

Revisions to COLA Tier 2 Section 7.1

The following changes will be made to Table 7.1-2, heading row, to address the applicability of a more recent IEEE code, due to STD DEP 1.8-1:

Table 7.1-2 Regulatory Requirements Applicability Matrix for I&C Systems

Applicable Criteria	10CFR 50.55	GDC																				
		2	4	10	12	13	15	16	19	20	21	22	23	24	25	28	29	33	34	35	38	41	44
Reference Standard (RG, IEEE, ISA)	*279* **603**																					

Table 7.1-2 Regulatory Requirements Applicability Matrix for I&C Systems (Continued)

Applicable Criteria	Regulatory Guide							BTP						II-D	II-E	II-F		II-K						
	1.22	1.62	1.75	1.97	1.105	1.118	1.151	3	12	20	21	22	26	3	4.2	1	3	1.23	3.13	3.15	3.18	3.21	3.22	3.23
Reference Standard (RG, IEEE, ISA)	*279* 603	*279* 603	384		*567-04* 603	338	*567-02* 603	*279* 603	*279* 603	*279* 603	RG 1.47	RG 1.22	*279* 603				RG 1.97							

Revisions to COLA Part 7 Section 2.1

Description

The description of STD DEP T1 3.4-1 Safety-Related I&C Architecture will be revised as follows:

This departure can be characterized into five primary changes.

(1) Elimination of obsolete data communication technology

The departure eliminates references to the Essential Multiplexer System (EMS) and the Non-Essential Multiplexer System (NEMS) originally envisioned in the ABWR architecture and replaces them with separate and independent system level data communication capabilities. The original concept was based on a common EMS, which could be used by multiple safety-related, digitally-based protection systems. This departure defines separate dedicated data communication functions for each safety-related digital platform, including separate and independent data communication functions for each division within a system. ~~The original concerns expressed by the NRC related to the common EMS are addressed as part of~~ Appendix 7A ~~and have~~ has been updated to reflect the separate communication capabilities.

~~In addition, the reference ABWR DCD identified use of the data communication standard ANSI-X3 series, Fiber Distributed Data Interface (FDDI), as the communication protocol for the EMS. FDDI is an obsolete technology and no longer appropriate for use. The safety-related data communication will use a combination of proprietary network data communication protocols and dedicated point-to-point communication to fully meet the defined data communication functional requirements.~~

This departure meets all the applicable regulatory requirements including Regulatory Guides, industry standards and NRC Branch Technical Positions, as shown in Part 2, Tier 2, Table 1.9S-1 and Table 1.9S-1a. Separation of a centralized communication system into separate system communication functions provides the following benefits:

- Allows the use of different (diverse) platforms for the Reactor Trip and Isolation System (RTIS) and the Engineered Safety Features Logic and Control System (ELCS). This feature allows the overall Safety System Logic and Control (SSLC) to be more resistant to common mode failure.

- Provides for a more robust communication design since a credible single failure will cause less degradation to independent communication functions than the single failure would cause in the centralized, common essential multiplexing system defined in the DCD.

- The new design is not subject to a single common cause failure disabling both the RTIS and ELCS. In the DCD design, common cause failure within the EMS would disable both RTIS and ELCS.

- Provides the flexibility to utilize communication technologies that have benefits in the areas of simplicity of function and improved independence, such as the use of "point to point" unidirectional data links

The reference ABWR DCD identified use of the data communication standard ANSI-X3 series, Fiber Distributed Data Interface (FDDI), as the communication protocol for the EMS. FDDI is an obsolete technology and no longer appropriate for use.

The RTIS uses direct hardwired inputs to the system instead of the concept of using remote multiplexers as described in the certified ABWR DCD. This significantly reduces the complexity of data communication requirements for this system, while continuing to meet ABWR DCD functional requirements.

The ELCS continues to use remote acquisition of signal information and remote output of command information to controlled components. The ELCS will utilize serial, unidirectional, fiber optically-isolated data links instead of the FDDI protocol. The ELCS vendor's platform, including the use of unidirectional, serial data links, has been generically reviewed and approved by the NRC, as described in Topical Report WCAP-16097-P-A, Revision 0, "Common Qualified Platform Topical Report," and has operating experience in U. S. nuclear power plant safety system applications. This demonstrates that this method of communication meets the regulatory and industry standard requirements applicable to safety data communication.

The elimination of the multiplexer concept required all references to the ~~system(s)~~ Essential Multiplexing System (EMS) and Non-Essential Multiplexing System (NEMS) and ~~its~~ their primary components to be replaced with a generic data communication reference. The terms EMS and NEMS were eliminated along with Remote Multiplexer Unit (RMU) and Control Room Multiplexer Unit (CMU).

The communication functions are primarily described in FSAR Sections T1 2.2, T1 2.7, T1 3.4, T2 7.2, T2 7.3 and T2 7.9S.

(2) Elimination of unnecessary inadvertent actuation prevention logic and equipment.

The reference ABWR DCD described the design of the Engineered Safety Features (ESF) actuation outputs as being fully redundant within each division of the ESF digital controls systems. This design was to minimize the potential for false actuation of ESF components. In the design, each output was processed through two redundant sets of hardware and a final two-out-of-two (2/2) logic decision was performed on a component level. Both sets of outputs had to demand actuation before a component would actually respond. As part of the detailed design of the ABWR ESF digital controls, it was

determined that only selected ESF components required the redundant actuation prevention logic. ~~If actuated during normal plant operation, most of the ESF components do not have an adverse impact on the safety or operation of the plant. The limited set of components that cannot be actuated during normal operation, such as the main steam isolation valves, are provided with redundant actuation equipment and logic.~~

~~The complexity of implementing the fully redundant actuation logic was found to be a detriment to the design, and significantly increased the required maintenance and testing while providing no increase in true plant reliability. As a result, the redundant actuation logic is only implemented for components that may impact plant safety or operation if actuated during normal plant operation.~~

The redundant actuation logic is only implemented for systems where false actuation of a single component can initiate false protective actions during normal plant operation. For components such as the ELCS Automatic Depressurization System (ADS), a single valve opening will depressurize the reactor. For such components, a two-out-of-two vote is required to actuate each valve, with two different programmable logic controllers and their separate input and output modules within a single division.

As a result, the redundant actuation logic is only implemented for components that may impact plant safety or operation if actuated during normal plant operation such as the ECCS functions of the ELCS as described in FSAR Section T1 3.4.

(3) Clarifications of digital controls nomenclature and systems

The reference ABWR DCD defined many functional design requirements in terms typically reserved for hardware. Examples include the terms "module," "unit," and "system." The terminology was corrected to refer to the requirement as a "function" to eliminate the confusion associated with purely functional requirements and not physical requirements defined in the DCD. Examples include:

- Digital Trip Module (DTM) to Digital Trip Function (DTF)

- Trip Logic Unit (TLU) to Trip Logic Function (TLF)

- Safety System Logic Unit (SLU) to Safety System Logic Function (SLF)

- Plant Computer System (PCS) to Plant Computer Functions (PCF)

- Essential Multiplexer System (EMS) to Essential Communication Function (ECF)

In addition, to better define the functional design and implementation of the digital controls platforms, specific I&C system names were assigned to the ESF digital controls systems and the Reactor Protection System (RPS). The digital controls responsible for the ESF systems are designated as the ESF Logic & Control System (ELCS). The RPS functions are implemented in two separate I&C systems: the Reactor Trip & Isolation System (RTIS) and the Neutron Monitoring System (NMS). The term Safety System

Logic & Control (SSLC) was clarified as a general term used to cover all of the logic and controls associated with safety-related control systems.

The nomenclature changes required updating several sections of the original DCD to make all sections of the STP 3&4 COLA consistent.

(4) Final selection of platforms changed the implementation architecture

This departure revises the implementation architecture to use configurable logic devices for NMS and RTIS in lieu of microprocessors. This platform change was necessary to incorporate available platforms that meet both the regulatory and technical requirements. These design updates are primarily described in Tier 2 Section 7.2.

(5) Testing and surveillance changes for SSLC

This departure revises the testing and surveillance descriptions for SSLC (NMS, RTIS, and ELCS) consistent with the characteristics of the design platforms selected. These changes are primarily described in Tier 2 Section 7.1.

Additionally, the Chapter 16 Technical Specifications Section 3.0 is modified to reflect the above changes to the safety-related I&C architecture.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.1.7.1.1	Identification of Safety-Related Systems	Elimination of obsolete data communication technology	This departure has no impact on the identification of safety related systems.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment.	This departure has no impact on the identification of safety related systems.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on the identification of safety related systems.
		Final selection of platforms changed the implementation architecture	This departure has no impact on the identification of safety related systems.
		Testing and surveillance changes	This departure has no impact on the identification of safety related systems.
C.1.7.1.2	Identification of Safety Criteria	Elimination of obsolete data communication technology	This departure has no impact on the safety criteria. The new communication technology continues to meet the required industry standards and regulatory criteria as described in the R.G. and industry standards evaluation described in Table 1.9S-1 and Table 1.9S-1a .
		Elimination of unnecessary inadvertent actuation prevention logic and equipment.	This departure has no impact on the safety criteria. The design continues to meet the required industry standards and regulatory standards as described in the R.G. and industry standards evaluation described in Table 1.9S-1 and Table 1.9S-1a.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Clarifications of digital controls nomenclature and systems	This departure has no impact on the safety criteria. The design continues to meet the required industry standards and regulatory criteria as described in the R.G. and industry standards evaluation described in Table 1.9S-1 and Table 1.9S-1a
		Final selection of platforms changed the implementation architecture	Conforms. This departure resulted in the imposition of Regulatory Guides and Standards that are more recent than the standards of the ABWR DCD. See the R.G. and Industry standard evaluation provided in Table 1.9S-1 and Table 1.9S-1a
		Testing and surveillance changes	This departure has no impact on the safety criteria. The modified testing and surveillance continues to meet the required criteria
C.1.7.2	**Reactor Trip System**		
C.1.7.2.1.1	System Description	Elimination of obsolete data communication technology	Conforms. This departure is described in the revised COLA
		Elimination of unnecessary inadvertent actuation prevention logic and equipment.	Conforms. This departure is applicable only to the ELCS, not the RPS.
		Clarifications of digital controls nomenclature and systems	Conforms. This departure is described in the revised COLA
		Final selection of platforms changed the implementation architecture	Conforms. The areas in the system description that were affected by this departure are described in the revised COLA
		Testing and surveillance changes	Conforms. The areas in the description affected by this departure are described in the COLA.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.1.7.2.1.2	Design Basis Information		
C.1.7.2.1.2	Single Failure Criterion	Elimination of obsolete data communication technology	Conforms. The use of unidirectional, serial point to point data links with fiber optic communication media continues to meet the single failure criterion.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment.	This departure is applicable to ELCS only. The overall design, including this departure, continues to meet the single failure criterion.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on compliance to the single failure criterion.
		Final selection of platforms changed the implementation architecture	Conforms. The implementation architecture will meet the single failure criterion as described in the compliance evaluation described in Table 1.9S-1 and Table 1.9S-1a.
		Testing and surveillance changes for SSLC	This departure has no impact on compliance to the single failure criterion.
C.1.7.2.1.2	Quality of Components and Modules	Elimination of obsolete data communication technology	These departures have no impact on the requirements for the quality of components and modules.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.1.7.2.1.2	Defense in Depth and Diversity	Elimination of obsolete data communication technology	Conforms. This departure has no negative impact on the ABWR DCD description of defense in depth and diversity. The RPS will be utilizing different communication hardware and software from the ELCS. As a result of not utilizing a central EMS, as originally described in the ABWR DCD, the diversity between the RPS and the ELCS is increased.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	This departure has no impact on the ABWR DCD description of defense in depth and diversity.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on the ABWR DCD description of defense in depth and diversity
		Final selection of platforms changed the implementation architecture	Conforms. This departure has no negative impact on the ABWR DCD description of defense in depth and diversity. Since the RPS will be utilizing different hardware and software from the ELCS, the diversity between the RPS and the ELCS is increased.
		Testing and surveillance changes	This departure has no impact on the ABWR DCD description of defense in depth and diversity
C.1.7.2.1.2	System testing and inoperable surveillance	Elimination of obsolete data communication technology	Conforms. This departure does not change the commitment to meet the requirements for system testing and inoperable surveillance. The COLA describes the self-test changes for data communication that result from the technology changes.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Clarifications of digital controls nomenclature and systems	This departure has no impact on the system test or inoperable surveillance
		Final selection of platforms changed the implementation architecture	This departure does not change the commitment to meet the requirements for system testing and inoperable surveillance.
		Testing and surveillance changes for SSLC	Conforms. This departure resulted in a change the detailed description of periodic testing and on-line self testing. The scope of automatic on-line self testing was reduced and the scope of periodic testing that was manually performed or manually initiated was increased. The departure is described in the revised COLA. The departure meets Reg. Guide 1.22 requirements for surveillance and testing. See R.G. and industry standards in Table 1.9S-1 and Table 1.9S-1a.
C.1.7.2.1.2	Use of Digital Systems	Elimination of obsolete data communication technology	Conforms. SRP Chapter 7, Appendix 7.0-A
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	These departures do not impact the review process outlined in SRP Chapter 7 Appendix 7.0A. The deviations from the Reg. Guides and industry standards necessitated by the departure are described and evaluated in Table 1.9S-1 and Table 1.9S-1a.
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.2.1.2	Setpoint Determination	Elimination of obsolete data communication technology	These departures have no impact on the methodology utilized for setpoint determination.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.2.1.2	Equipment Qualification	Elimination of obsolete data communication technology	These departures have no impact on the equipment qualification requirements described in the ABWR DCD.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.2.2	Analysis		
C.1.7.2.2	GDC requirements	Elimination of obsolete data communication technology	These departures have no impact on the compliance to the GDCs.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.2.2	IEEE Std 603	Elimination of obsolete data communication technology	These departures have no impact on the compliance to IEEE Std 603.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.1.7.2.2	IEEE Std 7-4.3.2	Elimination of obsolete data communication technology	These departures have no impact on the compliance to IEEE Std 7-4.3.2.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.2.2	Postulated accidents and failures	Elimination of obsolete data communication technology	These departures have no impact on the required performance of the RTIS.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.3	**Engineered Safety Feature Systems**		
C.I.7.3.1.1	System Description	Elimination of obsolete data communication technology	Conforms. This departure is described in the COLA description for ELCS.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.I.7.3.1.2	Design Basis Information		
C.I.7.3.1.2	Single Failure Criterion	Elimination of obsolete data communication technology	Conforms. The use of unidirectional, serial point to point data links for communicating safety function information rather than the FDDI implementation described in the ABWR DCD does not change the ELCS system's compliance to the single failure criterion.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	This departure has no impact on compliance to the single failure criterion.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on compliance to the single failure criterion.
		Final selection of platforms changed the implementation architecture	The design, including this departure, continues to meet the single failure criterion.
		Testing and surveillance changes	This departure has no impact on compliance to the single failure criterion.
C.I.7.3.1.2	Quality of Components and Modules	Elimination of obsolete data communication technology	This departure has no impact on the quality of components and modules.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	This departure has no impact on the quality of components and modules.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on the quality of components and modules.
		Final selection of platforms changed the implementation architecture	Conforms. ELCS, RTIS, and NMS platforms will be provided by qualified vendors utilizing approved Quality Assurance methods.
		Testing and surveillance changes	This departure has no impact on the quality of components and modules.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.I.7.3.1.2	Independence	Elimination of obsolete data communication technology	Conforms. The use of unidirectional, serial point to point data links that utilize fiber optic communication media meet the independence requirements imposed by Reg. Guides and standards as described in Table 1.9S-1 and Table 1.9S-1a.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	This departure has no impact on independence.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on independence.
		Final selection of platforms changed the implementation architecture	This departure has no impact on independence as described in the "elimination of obsolete communication technology" in Table 1.9S-1 and Table 1.9S-1a.
		Testing and surveillance changes	This departure has no impact on independence.
C.I.7.3.1.2	Defense in Depth and Diversity	Elimination of obsolete data communication technology	Conforms. This departure has no negative impact on the ABWR DCD description of defense in depth and diversity. The ELCS will be utilizing different communication hardware and software from the RPS. As a result of not utilizing a central EMS, as originally described in the ABWR DCD, the diversity between the ELCS and the RPS is increased.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	This departure has no impact to the ABWR DCD description of defense in depth and diversity.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Clarifications of digital controls nomenclature and systems	This departure has no impact to the ABWR DCD description of defense in depth and diversity.
		Final selection of platforms changed the implementation architecture	Conforms. This departure has no negative impact on the ABWR DCD description of defense in depth and diversity. Since the ELCS will be utilizing different hardware and software from the RPS, the diversity between the ELCS and the RPS is increased.
		Testing and surveillance changes	This departure has no impact on the ABWR DCD description of defense in depth and diversity.
C.I.7.3.1.2	System Testing and Inoperable Surveillance	Elimination of obsolete data communication technology	Conforms. This departure does not change the commitment to meet the requirements for system testing and inoperable surveillance. The COLA describes the self-test changes that result from the technology changes.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	Conforms. This departure does not change the commitment to meet the requirements for system testing and inoperable surveillance. The COLA describes the self-test changes that result from the technology changes.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on the system test or inoperable surveillance.
		Final selection of platforms changed the implementation architecture	This departure does not change the commitment to meet the requirements for system testing and inoperable surveillance. See testing and surveillance changes described in the next item.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Testing and surveillance changes	Conforms. This departure does not change the commitment to meet the requirements for system testing and inoperable surveillance. This departure resulted in a change to the detailed description of periodic testing and on-line self testing. The scope of automatic on-line self testing was reduced and the scope of periodic testing that was manually performed or manually initiated was increased. The departure is described in the revised COLA. The departure meets Reg. Guide 1.22 requirements for surveillance and testing. See R.G. and industry standards evaluation in Table 1.9S-1 and Table 1.9S-1a.
C.I.7.3.1.2	Use of Digital Systems		SRP Chapter 7, Appendix 7.0-A These departures should not impact the review process outlined in SRP Chapter 7 Appendix 7.0A. The deviations from the Reg. Guides and industry standards necessitated by the departure are described and evaluated in Table 1.9S-1 and Table 1.9S-1a.
C.I.7.3.1.2	Setpoint determination	Elimination of obsolete data communication technology	These departures have no impact on the methodology to determine setpoints.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.I.7.3.1.2	ESF control systems	Elimination of obsolete data communication technology	These departures do not change the functional design for the ESF controls. Therefore there is no impact of these departures on the ABWR DCD descriptions of the ESF control systems.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.I.7.3.1.2	Equipment qualification	Elimination of obsolete data communication technology	These departures have no impact on the equipment qualification requirements described in the ABWR DCD and COLA.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.3.2	Analysis		
C.1.7.3.2	GDCs	Elimination of obsolete data communication technology	These departures have no impact on the compliance to the GDCs.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.3.2	IEEE Std 603	Elimination of obsolete data communication technology	These departures have no impact on the compliance with IEEE Std 603
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.3.2	IEEE Std 7-4.3.2	Elimination of obsolete data communication technology	Deviation. The supplier of the ELCS platform has received a generic review and approval of the digital platform. The NRC review of the platform utilized a previous revision of IEEE-Std-7-4.3.2. Based on the previous review and NRC approval, the version of the standard that was utilized by the NRC in their review is an acceptable alternative to the revision indicated in the current SRP.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.3.2	Postulated accidents and failures	Elimination of obsolete data communication technology	This departure has no impact on the required ELCS performance for postulated accidents and failures
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	Conforms. This departure has no negative impact on the ability of the system to provide the safety actuation function in the event of a single, credible failure. The arrangement of actuated components, such as pumps and valves, assigned to controllers is such that a single failure will not result in an inadvertent actuation of the safety function.
		Clarifications of digital controls nomenclature and systems	This departure has no impact on the required ELCS performance for postulated accidents and failures
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.1.7.4	Systems Required for Safe Shutdown	Elimination of obsolete data communication technology	These departures have no impact on the Systems required for Safe Shutdown.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.5	Information Systems Important to Safety	Elimination of obsolete data communication technology	These departures have no impact on Information Systems Important to Safety
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.I.7.6	Interlock Systems Important to Safety	Elimination of obsolete data communication technology	These departures have no impact on the Interlock Systems Important to Safety
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.I.7.7	Control Systems Not Required for Safety	Elimination of obsolete data communication technology	These departures have no impact on the Control Systems Not Required for Safety
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.I.7.8	Diverse Instrumentation and Control Systems	Elimination of obsolete data communication technology	Conforms. These departures have no negative impact on Diverse Instrumentation and Control Systems. The RTIS and ELCS are implemented on different platforms, enhancing the diversity between these two systems.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.I.7.9	Data Communication		
C.I.7.9.1	System Description	Elimination of obsolete data communication technology	This departure is described in the COLA
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	This departure has no impact on Data Communications System Description
		Clarifications of digital controls nomenclature and systems	Conforms. The new nomenclature is utilized to describe data communications in the COLA.
		Final selection of platforms changed the implementation architecture	Conforms. The data communications departures are described in the COLA
		Testing and surveillance changes	Conforms. The departure is described in the COLA as it pertains to data communication.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.I.7.9.2	Design Basis Information		
C.1.7.9.2	Quality of Components and Modules	Elimination of obsolete data communication technology	Conforms. ELCS, RTIS, and NMS platforms will be provided by qualified vendors utilizing approved Quality Assurance methods.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.9.2	Data Communication System (DCS) software quality	Elimination of obsolete data communication technology	These departures have no impact on data communication quality.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.9.2	Protocol selected for the DCS should meet the performance of all supported systems	Elimination of obsolete data communication technology	The communication protocols that replace the obsolete FDDI communication method are required to meet the required system performance requirements. The departure does not change the requirements, only the method of meeting them.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment.	This departure has no impact.
		Clarifications of digital controls nomenclature and systems	This departure has no impact.
		Final selection of platforms changed the implementation architecture	This departure has no impact.
		Testing and surveillance changes	This departure has no impact.

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.1.7.9.2	Potential hazards to the DCS including inadvertent actuation, error recovery, self-testing, and surveillance testing	Elimination of obsolete data communication technology	The COLA describes the self-testing, and surveillance testing departures associated with the departures.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment.	Conforms. This departure has no negative impact on the ability of the system to provide the safety actuation function in the event of a single, credible failure.
		Clarifications of digital controls nomenclature and systems	This departure has no impact.
		Final selection of platforms changed the implementation architecture	Conforms. The COLA describes the self-testing and surveillance changes associated with the departure. The design continues to conform to industry standard and R.G. requirements.
		Testing and surveillance changes	Conforms. Testing and surveillance changes are described in the COLA.
C.1.7.9.2	Access control to DCS	Elimination of obsolete data communication technology	These departures have no negative impact on the compliance to the requirements for access control to DCS.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.I.7.9.2	Consequential failure as a result of using single path for multiple signals and appropriate assignment of channels to ensure redundancy and diversity	Elimination of obsolete data communication technology	Conforms. The departure of a centralized communication system using FDDI to separate systems for RPS and ELCS that utilize unidirectional serial point to point data links reduces the effect of consequential failures that result from a single failure. This result occurs because multiple point to point links replace a single set of FDDI communication paths.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	These departures have no impact on the DCS consequential failures.
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.9.2	See IEEE 603 for Independence	Elimination of obsolete data communication technology	These departures have no impact on compliance to IEEE Std 603. The required independence is maintained.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
C.1.7.9.2	Fail into a Safe State or State Determined to be Acceptable	Elimination of obsolete data communication technology	This departure has no impact on the requirement or the ability of the system design to meet this requirement
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	Conforms. This departure has no negative impact on the ability of the system to provide the safety actuation function in the event of a single, credible failure.
		Clarifications of digital controls nomenclature and systems	This departure has no impact.
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.9.2	System Testing and Surveillances	Elimination of obsolete data communication technology	Conforms. The impact on system testing and surveillance is described in the COLA. System testing and surveillance requirements continue to be met
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.9.2	Status Of DCS in the Design and Inoperable Status Indications	Elimination of obsolete data communication technology	These departures have no impact on the requirement or ability of the design to meet bypass and inoperable status indication requirements.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	

Conformance of STD DEP T1 3.4-1 with Regulatory Guide 1.206

Criteria	Description	Departure	Evaluation
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.9.2	Communication Media Relative to Fault Propagation	Elimination of obsolete data communication technology	The departure has no impact on the communication media relative to fault propagation.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	
C.1.7.9.3	Analysis of Conformance to Reg. Guides, Industry Standards, GDC 1, and 10 CFR 50.55a(a)(1)	Elimination of obsolete data communication technology	Partial conformance. Reg. Guides and industry standards are described in Table 1.9S-1 and Table 1.9S-1a.
		Elimination of unnecessary inadvertent actuation prevention logic and equipment	
		Clarifications of digital controls nomenclature and systems	
		Final selection of platforms changed the implementation architecture	
		Testing and surveillance changes	

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria Requirements	Description	Departure	Evaluation
1	10 CFR 50.55a (a) (1), "Quality Standards."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures have no impact on the compliance to the requirement.
2	10 CFR 50.55a(h) (IEEE Std 603-1991)	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to the requirement. The referenced standard is included in the Regulatory Guides, Codes and Standards Conformance Table that describes Regulatory Guide and industry standard compliance.

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria	Description	Departure	Evaluation
3	10 CFR 50.34(f), "Additional TMI-Related Requirements,"		
	10 CFR 50.34(f), (2) (v), "Bypass and Inoperable Status Indication."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.
	10 CFR 50.34(f), (2) (xxiii), "Anticipatory Trip on Loss of Main Feedwater or Turbine Trip."		Not applicable to the ABWR.
4	10 CFR 50, Appendix A, General Design Criterion (GDC) 1, "Quality Standards and Records."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria	Description	Departure	Evaluation
5	GDC 2, "Design Basis for Protection Against Natural Phenomena."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.
6	GDC 4, "Environmental and Missile Design Basis."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria	Description	Departure	Evaluation
7	GDC 10, "Reactor Design."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.
8	GDC 13, "Instrumentation and Control."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria	Description	Departure	Evaluation
9	GDC 15, "Reactor Coolant System Design."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.
10	GDC 19, "Control Room."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria	Description	Departure	Evaluation
11	GDC 20, "Protection Systems Functions.	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.
12	GDC 21, "Protection System Reliability and Testability."	Elimination of obsolete data communication technology, Final selection of platforms changed the implementation architecture, Clarifications of digital controls nomenclature and systems, Testing and surveillance changes for the SSLC	Conforms. These departures have an impact on the methods of periodic testing as described in the ABWR DCD. These departures resulted in testing designs that use manual tests or manually initiated test sequences rather than the automatic testing described in the ABWR DCD. The modified test design continues to meet the requirements of GDC 21.

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria	Description	Departure	Evaluation
13	GDC 22, "Protective System Independence."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	The departures have no impact the compliance to independence requirements.
14	GDC 23, "Protection System Failure Modes."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	Conforms. The RTIS and NMS fail safe.
15	GDC 24, "Separation of Protection and Control Systems."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to this requirement.

Conformance of STD DEP T1 3.4-1 with SRP 7.2 Acceptance Criteria for the RTIS/NMS Departures

SRP 7.2 Acceptance Criteria	Description	Departure	Evaluation
16	GDC 25, "Protection System Requirements for Reactivity Control Malfunctions."	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to the requirements of GDC 25.
17	GDC 29, "Protection Against Anticipated Operational Occurrences	Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to the requirements of GDC 29.

SRP Acceptance Criteria

See Table above for compliance to Reg. Guides and industry standards, and see RG 1.206 evaluation (**Enclosure 4a**)

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria Requirements	Description	Departure	Evaluation
1.	10 CFR 50.55a (a) (1), "Quality Standards."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to Quality Standards.
2.	10 CFR 50.55a(h) (IEEE Std 603-1991)	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to IEEE Std-603.

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
3	10 CFR 50, Appendix A, General Design Criterion (GDC) 1, "Quality Standards and Records."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to the requirements for Quality Standards and Records.
4	GDC 2, "Design Basis for Protection Against Natural Phenomena."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to GDC 2 requirements.

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
5	GDC 4, "Environmental and Missile Design Basis."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to GDC 4 requirements
6	GDC 10, "Reactor Design."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to GDC 10 requirements

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
7	GDC 13, "Instrumentation and Control."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to GDC 13 requirements
8	GDC 15, "Reactor Coolant System Design."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to GDC 15 requirements

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
9	GDC 16, "Containment Design"	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to GDC 16 requirements
10	GDC 19, "Control Room."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to GDC 19 requirements

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
Additional acceptance criteria applicable to the ESFAS			
1	10 CFR 50.34(f), "Additional TMI-Related Requirements,"		
	10 CFR 50.34(f), (2) (v), "Bypass and Inoperable Status Indication."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to 10 CFR 50.34(f), (2)(v), "Bypass and Inoperable Status Indication." requirements
	10 CFR 50.34(f), (2) (xii), "Auxiliary Feedwater System Automatic Initiation and Flow Indication"."		Not applicable to ABWR
	10 CFR 50.34(f), (2)(xiv), Containment Isolation Systems	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures do not have an impact on the compliance to 10 CFR 50.34(f), (2)(xiv), Containment Isolation Systems requirements

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
2	GDC 20, "Protection Systems Functions.	Elimination of obsolete data communication technology,	These departures do not have an impact on the compliance to GDC 20 requirements
		Elimination of unnecessary inadvertent actuation prevention logic and equipment,	
		Clarifications of digital controls nomenclature and systems,	
		Final selection of platforms changed the implementation architecture,	
		Testing and surveillance changes for the SSLC.	
3.	GDC 21, "Protection System Reliability and Testability."	Elimination of unnecessary inadvertent actuation prevention logic and equipment.	Conforms. Arrangement of actuated components, such as pumps and valves prevent inadvertent actuation of a complete safety function due to a single failure.
		Elimination of obsolete data communication technology,	These departures have no impact on the compliance to GDC 21.
		Clarifications of digital controls nomenclature and systems,	
		Final selection of platforms changed the implementation architecture.	
		Testing and surveillance changes for the SSLC.	Conforms. This departure changes the automatic testing to a combination of manual tests and manually initiated tests. The testing described in the COLA continues to meet GDC 21.

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
4.	GDC 22, "Protective System Independence."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC	These departures have no impact on the compliance to GDC 22 requirements
5.	GDC 23, "Protection System Failure Modes."	Elimination of unnecessary inadvertent actuation prevention logic and equipment.	This departure does not negatively impact the compliance to GDC 23. The system continues to meet the requirements of GDC 23.
		Elimination of obsolete data communication technology, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures have no impact on the compliance to GDC 23 requirements.

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
6.	GDC 24, "Separation of Protection and Control Systems."	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures have no impact on the compliance to GDC 24 requirements.
7.	GDC 29, "Protection Against Anticipated Operational Occurrences	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures have no impact on the compliance to GDC 29 requirements.

Conformance of STD DEP T1 3.4-1 with SRP Section 7.3 Acceptance Criteria for the ELCS

SRP 7.3 Acceptance Criteria	Description	Departure	Evaluation
1-6	Additional acceptance criteria applicable to ESF control systems GDC 33, GDC 34, GDC 35, GDC 38, GDC 41 and GDC 44.	Elimination of obsolete data communication technology, Elimination of unnecessary inadvertent actuation prevention logic and equipment, Clarifications of digital controls nomenclature and systems, Final selection of platforms changed the implementation architecture, Testing and surveillance changes for the SSLC.	These departures have no impact on the functioning of the ESF control systems as described in the COLA.
SRP Acceptance Criteria			
See Table above for compliance to Reg. Guides and industry standards, and see RG 1.206 evaluation (**Enclosure 4a**)			

Review of SRP Chapter 7 BTPs for Applicability to I&C Departures related to RTIS/NMS

BTP	Description	Applicable to RTIS/NMS SRP 7.2	Discussion
7-1	Guidance on Isolation of Low-Pressure Systems from the High-Pressure Reactor Coolant System	No	Not applicable to departures
7-2	Guidance on Requirements of Motor-Operated Valves in the Emergency Core Cooling System Accumulator Lines	No	Not applicable to departures
7.3	Guidance on Protection System Trip Point Changes for Operation with Reactor Coolant Pumps Out of Service	No	Not applicable to departures
7-4	Guidance on Design Criteria for Auxiliary Feedwater Systems	No	Not applicable to departures
7-5	Guide on Spurious Withdrawals of Single Control Rods in Pressurized Water Reactors	No	Not applicable to departures
7-6	Guidance on Design of Instrumentation and Controls provided to Accomplish Changeover from injection to Recirculation Mode	No	Unaffected by the departures
7-8	Guidance for Application of Regulatory Guide 1.22	Yes	Conforms. Departures related to changes to test and surveillance meet this BTP.
7-9	Guidance on Requirements for Reactor Protection System Anticipatory Trips	Yes	Conforms.
7-10	Guidance on the Application of Regulatory Guide 1.97	No	Unaffected by the departures
7-11	Guidance on Application and Qualification of Isolation Devices	Yes	Conforms. Fiber optic isolation is generally used and this meets the requirements of this BTP. Surge testing requirements are covered by compliance to RG 1.180.
7-12	Guidance on Establishing and Maintaining Instrument Setpoints	Yes	Unaffected by the departures
7-13	Guidance on Cross-Calibration of Protection System Resistance Temperature Detectors	No, sensors only	Unaffected by the departures
7-14	Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems	Yes	Conforms. Topical Reports UTLR-0001-P outline conformance.

Review of SRP Chapter 7 BTPs for Applicability to I&C Departures related to RTIS/NMS

BTP	Description	Applicable to RTIS/NMS SRP 7.2	Discussion
7-17	Guidance on Self-Test and Surveillance Test Provisions	Yes	Conforms. The departure in the COLA reduces the amount of automatic self-testing and increased the amount of manual testing and manually initiated self-testing. This was done to minimize the potential for self-testing to have a negative impact on reliability and availability, Self-testing was also modified to be consistent with the platform capabilities of the selected suppliers. The departure conforms to the intent of this BTP.
7-18	Guidance on the Use of programmable Logic Controllers in Digital Computer-Based Instrumentation and Control Systems	No	The RTIS and NMS do not use programmable logic controllers.
7-19	Guidance for the Evaluation of Diversity and Defense –in-Depth in Digital Computer-Based Instrumentation and Control Systems	No	Conforms. The departures do not negatively impact the design for diversity and defense-in-depth.
7-21	Guidance on Digital Computer Real-Time Performance	Yes	The departures do not impact conformance to this BTP.

Review of SRP Chapter 7 BTPs for Applicability to I&C Departures related to ELCS

BTP	Description	Applicable to ELCS SRP 7.3	Discussion[1]
7-1	Guidance on Isolation of Low-Pressure Systems from the High-Pressure Reactor Coolant System	No	Not applicable to departures
7-2	Guidance on Requirements of Motor-Operated Valves in the Emergency Core Cooling System Accumulator Lines	No	Not applicable to departures
7.3	Guidance on Protection System Trip Point Changes for Operation with Reactor Coolant Pumps Out of Service	No	Not applicable to departures
7-4	Guidance on Design Criteria for Auxiliary Feedwater Systems	No	Not applicable to departures
7-5	Guide on Spurious Withdrawals of Single Control Rods in Pressurized Water Reactors	No	Not applicable to departures
7-6	Guidance on Design of Instrumentation and Controls provided to Accomplish Changeover from injection to Recirculation Mode	Yes	Unaffected by the departures
7-8	Guidance for Application of Regulatory Guide 1.22	Yes	Conforms. Departures related to changes to test and surveillance meet this BTP.
7-9	Guidance on Requirements for Reactor Protection System Anticipatory Trips	No	Not applicable to ELCS, including departures.
7-10	Guidance on the Application of Regulatory Guide 1.97	No	Unaffected by the departures
7-11	Guidance on Application and Qualification of Isolation Devices	Yes	Conforms. Fiber optic isolation is generally used and this meets the requirements of this BTP. Surge testing requirements are covered by compliance to RG 1.180.
7-12	Guidance on Establishing and Maintaining Instrument Setpoints	Yes	Unaffected by the departures
7-13	Guidance on Cross-Calibration of Protection System Resistance Temperature Detectors	No	Unaffected by the I&C Departures

Review of SRP Chapter 7 BTPs for Applicability to I&C Departures related to ELCS

BTP	Description	Applicable to ELCS SRP 7.3	Discussion[1]
7-14	Guidance on Software Reviews for Digital Computer-Based Instru- mentation and Control Systems	Yes	Conforms. Topical Reports WCAP-16097-P-A outlines conformance.
7-17	Guidance on Self-Test and Surveillance Test Provisions	Yes	Conforms. The departure in the COLA reduces the amount of automatic self-testing and increased the amount of manual testing and manually initiated self-testing. This was done to minimize the potential for self-testing to have a negative impact on reliability and availability, Self-testing was also modified to be consistent with the platform capabilities of the selected suppliers.
7-18	Guidance on the Use of programmable Logic Controllers in Digital Computer-Based Instrumentation and Control Systems	Yes	The ELCS platform was reviewed and approved by the NRC in Topical Report WCAP-16097-P-A, Common Qualified Platform.
7-19	Guidance for the Evaluation of Diversity and Defense –in-Depth in Digital Computer-Based Instrumentation and Control Systems	No	Conforms. The departures do not negatively impact the design for diversity and defense-in-depth.
7-21	Guidance on Digital Computer Real-Time Performance	Yes	The I&C departures do not impact compliance to this BTP.

Note:

1. ELCS complies with Reg.Guides and Standards revisions that may differ in revision dates. The ELCS design is based upon the NRC approved topical report generic platform that used the revisions in effect at that time.

EVALUATION OF TIER 1 ITAAC FOR STD DEP T1 3.4-1

Specific Departure Items	Are elements of this departure item covered by ITAAC(s)?	If yes, identify associated: Chapter 2 ITAAC(s) / Chapter 3 DAC	Does SRP 14.3 identify specific ITAAC that are applicable to departure item?	Do the existing ITAAC encompass the requirements of the SRP 14.3 ITAAC?	Comments
1) Elimination of obsolete data communication technology	YES	Table 2.7.5 Items 1-7	Yes	Yes	
		Table 3.4 Items 1-4, 6-12, 14-16	No	N/A	SRP 14.3 does not identify specific DAC related ITAAC
2) Elimination of unnecessary inadvertent actuation prevention logic and equipment	YES	No	No	N/A	SRP 14.3 does not identify specific DAC related ITAAC
		Table 3.4 Items 1 & 2	No		
3) Clarifications of digital controls nomenclature and systems	NO	N/A	N/A	N/A	Administrative changes only
4) Final selection of platforms changed the implementation architecture	YES	Table 2.2.7 Items 1-4, 6, 7, 8	Yes	Yes	
		Table 3.4 Item 1-4, 6-12, 14-16	No	N/A	SRP 14.3 does not identify specific DAC related ITAAC
5) Testing and surveillance changes for SSLC	YES (defined in DAC 3.4 only)	N/A	Yes	Yes	
		Table 3.4 Items 1 & 4	No	N/A	SRP 14.3 does not identify specific DAC related ITAAC