PMHarrisCOL PEmails

From: Angelo Stubbs
Sent: Friday, September 05, 2008 8:50 AM
To: HarrisCOL Resource
Cc: John Segala; Samuel Lee
Subject: FW: HARRIS S-COL PHASE I REVIEW, Delivery of DRAFT Phase I Review TER of Task Order 21, S-COL Section 9.2.11, Raw Water System, to Contract NRC-42-07-036
Attachments: DRAFT_HARRIS_TER_Phase I Review_Section_9.2.11_Raw Water System.doc; DRAFT RAIs_HARRIS_Phase I Review_Section_9.2.11_Raw Water System.doc

-----Original Message-----
From: Steve Pope [mailto:spope@islinc.com]
Sent: Wednesday, July 30, 2008 11:12 AM
To: Angelo Stubbs
Cc: John Segala; Samuel Lee; Peter Wilson; Christopher Chwasz; Devender Reddy
Subject: HARRIS S-COL PHASE I REVIEW, Delivery of DRAFT Phase I Review TER of Task Order 21, S-COL Section 9.2.11, Raw Water System, to Contract NRC-42-07-036

Angelo:

In accordance with Contract NRC-42-07-036, Task Order 21, Subtask 4, JCN Q-4014, attached is the DRAFT Phase I Review TER for HARRIS Station S-COL Section 9.2.11, Raw Water System.

Also attached are DRAFT RAIs against this system, some of which are very similar to those of Bellefonte's against the Raw Water System. The DRAFT RAIs have been annotated as to their similarity to the Bellefonte RAIs.

ISL used the SER templates provided to us by Devender Reddy (Bellefonte RCOL PSER 9.2.11 provided on July 16th and Lee SCOL PSER 9.2.11 provided on July 29th) as the base document for this Harris S-COL Phase I Review TER Section 9.2.11.

Please let me know if you have any questions or comments.

Thank you,

Steve

Hearing Identifier: ShearonHarris_COL_Public
Email Number: 74

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Subject: FW: HARRIS S-COL PHASE I REVIEW, Delivery of DRAFT Phase I Review TER of Task Order 21, S-COL Section 9.2.11, Raw Water System, to Contract NRC-42-07-036
Sent Date: 9/5/2008 8:50:05 AM
Received Date: 9/5/2008 8:50:06 AM
From: Angelo Stubbs

Created By: Angelo.Stubbs@nrc.gov

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"John Segala" <John.Segala@nrc.gov>
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Tracking Status: None
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Files	**Size**	**Date & Time**
MESSAGE	1116	9/5/2008 8:50:06 AM
DRAFT_HARRIS_TER_Phase I Review_Section_9.2.11_Raw Water System.doc	56898	
DRAFT RAIs_HARRIS_Phase I Review_Section_9.2.11_Raw Water System.doc	35394	

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9.2.11 RAW WATER SYSTEM

9.2.11.1 Introduction

FSAR Section 9.2.11, "Raw Water System," describes the raw water system (RWS) for Shearon Harris Nuclear Power Plant, Units 2 and 3. The RWS is a non-safety-related system that uses water from the Harris Reservoir as the source of cooling and makeup water for the Harris units. The pump-house for the RWS pumps is located on the Thomas Creek branch of the Harris Reservoir. The structure is common to both Nuclear Plant Units 1 and 2. The intake structure is equipped with trash racks and screens. The RWS for each unit consists of three 50% RWS pumps, three automatic strainers, two 100% ancillary raw water pumps, and piping to the systems requiring makeup water.

The RWS provides a continuous supply of water from the Harris Reservoir to provide circulating water system (CWS) fill and makeup, service water system (SWS) fill and makeup, demineralized water treatment system feed, and feed to the potable water storage tank. In addition, the RWS provides fill for the fire protection system fire water storage tanks and pump suction source for the main and ancillary raw water pump discharge strainer and screen back washes. Further, the RWS provides an alternate source of makeup to the SWS from the secondary fire water tank clearwell and an alternate dilution source for radwaste discharge when the CWS cooling tower blowdown is not available.

9.2.11.2 Summary of Application

Section 9.2.11 of the Harris Units 2 and 3 FSAR provides information concerning the RWS design basis, system description, system operation, safety evaluation, tests and inspections, and instrumentation. An RWS section was not included in the AP1000 DCD for the NRC staff to evaluate. The RWS is needed in order to operate the Harris units and consequently, the applicant has provided a complete description of this system in the FSAR for the Harris units.

9.2.11.3 Regulatory Basis

In most cases, the regulatory bases for AP1000 systems are provided in the staff's Final Safety Evaluation Report (FSER) that approved the standard plant design. However, because the RWS was not addressed in the AP1000 DCD, it was not evaluated by the staff in the FSER and a regulatory basis for this system was not established for the standard plant design. Consequently, the staff is unable to refer to the AP1000 FSER for the regulatory basis of the RWS and instead, the regulatory basis of the RWS for the Harris units is provided in this section.

The RWS pumps water supplied by the Harris Reservoir for use in dissipating the heat necessary for normal power operation (among other things) and in this capacity, the RWS is somewhat similar to a circulating water system. Because large amounts of water are being pumped by the RWS, flooding is a major consideration. The regulatory criteria that pertain to circulating water system evaluations are provided by NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 10.4.5, "Circulating Water System." As specified in this section of the Standard Review Plan (SRP), staff

acceptance of the RWS is based upon compliance with General Design Criterion 4 (GDC 4), "Environmental and Dynamic Effects Design Bases," by establishing design provisions to minimize the occurrence and accommodate the effects of discharging water that may result from a component or pipe failure in the RWS.

Another important review consideration is the capability of the RWS to provide make-up water to the basins of the SWS cooling towers for dissipating heat. Because the basins of the SWS cooling towers have a very limited water storage capacity, the RWS is needed continuously to support the SWS and its ultimate heat sink (UHS) functions. As such, the RWS is considered to be important to safety because it supports the normal SWS (defense-in-depth) capability of removing reactor and spent fuel decay heat. This function is part of the first line of defense for reducing challenges to passive safety systems in the event of transients and plant upsets, and it may be important for reducing shutdown risk when the reactor coolant system is open (e.g., mid-loop condition). The staff's evaluation of the RWS focuses primarily on confirming that the RWS will not adversely affect safety-related SSCs; that the RWS is capable of performing its defense-in-depth functions and any functions that are important based on regulatory treatment of non-safety systems (RTNSS) considerations; and that the ITAAC, initial test program, and RTNSS availability controls that have been established for the RWS are adequate. Because the RWS is an integral part of the SWS and its UHS (heat dissipation) functions, the RWS will be evaluated using the guidance provided by SRP Section 9.2.1, "Station Service Water System," and SRP Section 9.2.5, "Ultimate Heat Sink," as they pertain to these considerations. Acceptability is judged based upon conformance with the guidance specified by these SRP Sections (as deemed appropriate to assure defense-in-depth and RTNSS capabilities) and the staff's policy with respect to RTNSS.

The NRC staff's policy and review considerations with respect to RTNSS are specified by SECY-94-084, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs," dated March 28, 1994; SECY-95-132, "Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems (RTNSS) in Passive Plant Designs (SECY-94-084)," dated May 22, 1995; and SECY-96-128, "Policy and Key Technical Issues Pertaining to the Westinghouse AP600 Standardized Passive Reactor Design," dated June 12, 1996; as approved by the Commission in Staff Requirements Memoranda (SRM) dated June 30, 1994, June 28, 1995, and January 15, 1997, respectively. For convenience of reference, the policies and review considerations stated in SECY-94-084 and SECY-95-132 (as approved by the Commission in the SRM referred to above) were consolidated into a single document and included as an attachment to a memorandum from Dennis M. Crutchfield to Docket Files dated July 24, 1995. Also, the staff's policy stated in SECY-96-128 regarding post-72 hour actions for passive plants was clarified in a memorandum from L. Joseph Callan to the Commissioners dated June 23, 1997.

9.2.11.4 Technical Evaluation

As discussed above in the Regulatory Evaluation Section, the RWS was not specifically described for the AP1000 standard plant design and consequently, it was not evaluated by the staff in the FSER for AP1000. The staff reviewed the information provided in Section 9.2.11 of the FSAR that describes the RWS for the Harris units, including the information provided by Figures 10.4-201 and 10.4-202. The staff's evaluation of the RWS focuses primarily on flooding considerations and on the capability of the RWS to perform its defense-in-depth and RTNSS

functions, as applicable. Also, the staff's evaluation includes consideration of other (interfacing) review areas as deemed appropriate to facilitate the staff's evaluation of these areas.

Although the RWS is not safety-related, failures of this system and related components could result in severe and unacceptable flooding consequences. As discussed above in the Regulatory Evaluation Section, the staff's evaluation includes a review of the impact that RWS-related flooding has on SSCs that are either designated as safety-related or subject to RTNSS. If SSCs important to safety can be adversely affected by RWS failures, the staff confirms that design provisions have been included to address vulnerabilities that have been identified in this regard and to minimize hydraulic transients and their effects upon the functional capability and the integrity of these systems. Because the applicant did not identify and address the potential consequences of RWS-related failures on safety-related and RTNSS equipment, the staff is unable to confirm compliance with GDC 4 and RTNSS policy considerations. The staff requested that the applicant provide additional information to address the impact of flooding on safety-related and RTNSS equipment, including plant-specific ITAAC, test program, technical specification, and availability control considerations as appropriate. **[RAI 9.2-11.1 and RAI 9.2-11.2]**

As discussed in the Regulatory Basis Section, the RWS is relied upon for providing defense-in-depth heat removal for the reactor and spent fuel by supplying makeup water for the SWS cooling tower basins. Likewise, the RWS may also be needed for RTNSS considerations during reduced reactor coolant system inventory conditions. The staff's evaluation confirms that the RWS is capable of performing its defense-in-depth and RTNSS functions (as applicable). While Section 9.2.11 of the FSAR generally discusses the RWS and contingencies that exist for providing makeup for the SWS cooling tower basins, a clearly defined RWS design basis for assuring the defense-in-depth and RTNSS capabilities for the most limiting situations was not provided and measures were not described for assuring the functional capability of the RWS over time. For example, the minimum RWS flow rate, water inventory, temperature limitations, and corresponding bases for providing SWS makeup for the two Harris units were not described. Also, the suitability of RWS materials for the plant-specific application and measures being implemented to resolve vulnerabilities and degradation mechanisms to assure RWS functionality over time were not addressed. Because the applicant did not adequately describe the RWS design basis and address other review considerations specified in Section III of SRP Sections 9.2.1 and 9.2.5 that are relevant for assuring defense-in-depth and RTNSS functional capabilities, the staff is unable to confirm compliance with defense-in-depth and RTNSS policy considerations. The staff requested that the applicant provide additional information to fully describe the RWS design basis and to address relevant considerations specified by SRP Sections 9.2.1 and 9.2.5, such as minimum net positive suction head requirements, materials considerations, design provisions, and measures being implemented to assure the functional capability of the RWS over time, including plant-specific ITAAC, test program, technical specification, and availability control considerations as appropriate. **[RAI 9.2.11-3 and RAI 9.2.11-4]**

As specified by 10 CFR 20.1406, combined operating license (COL) applicants are required to describe how facility design and procedures for operation will minimize the generation of radioactive waste and contamination of the facility and environment, and facilitate eventual plant decommissioning. Although the RWS has no interconnections with any systems that contain radioactive fluids, industry experience has shown that this alone may not be sufficient to prevent the RWS from becoming contaminated. For example, unplanned leaks or release of

contaminated fluids as a result of component failures or transport, drainage problems in contaminated areas, and the migration of contamination through soils and other porous barriers over time have caused systems and areas of the plant that are not directly connected with contaminated systems to become contaminated. Also, because the RWS is used as a source of water for diluting liquid radwaste, this may create a potential for contaminating the RWS or for spreading contamination inadvertently. Therefore, the staff requested that the applicant provide additional information to describe design provisions and other measures that will be implemented to satisfy the requirements specified by 10 CFR 20.1406, including measures that will be implemented to monitor the RWS for contamination and corrective actions that will be taken to eliminate any radioactive contamination that is identified. **[RAI 9.2.11-5 and RAI 9.2.11-6]**

9.2.11.5 Post Combined License Activities

[At the conclusion of the review, this section will identify any applicable COL holder activities or follow-up actions for the NRC staff.]

9.2.11.6 Conclusion

The NRC staff has evaluated the RWS as described in FSAR Section 9.2.11 of the Harris AP1000/COL application. The staff's evaluation focused primarily on confirming that: a) the RWS will not adversely affect safety-related SSCs, b) the RWS is capable of performing its defense-in-depth and RTNSS functions over the life of the plant; and c) ITAAC, Technical Specification, availability controls, and initial test program considerations have been adequately addressed and are appropriate. The RWS was evaluated using the guidance referred to in the Regulatory Evaluation Section as it pertains to these considerations and acceptability was based upon conformance with the NRC requirements and criteria that are specified in this regard. Based upon the results of this evaluation, the staff has determined that the additional information referred to above in the Technical Evaluation Section is required in order for the staff to complete its evaluation of the RWS. Therefore, this area of review remains open pending the receipt and evaluation of the additional information that has been requested.

<Note that evaluation of the RWS, and its intake structure may need to be evaluated by DE/SEB1 for civil/structural considerations, DSER/RHEB and/or DSER/RSAC for hydrology and siting considerations; DSRA/SBFT for fire protection interface considerations; DCIP/CHPB for 10 CFR 20.1406 considerations, and DSRA/SPLA for RTNSS considerations>

Harris Phase I Review of Section 9.2.11 Raw Water System
DRAFT RAIs

RAI 9.2.11-1 (Bellefonte 321/1044)

Regulatory guidance for the evaluation of the Raw Water System (RWS) is found in Standard Review Plan (SRP) Section 9.2.1, "Station Service Water System." The SRP acceptance criteria are based on meeting General Design Criterion (GDC) 4 as it relates to structures, systems, and components (SSCs) important to safety being designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing and postulated accidents, including loss-of-coolant accidents. Explain how FSAR Section 9.2.11, "Raw Water System," addresses protection of SSCs important to safety from the effects of flooding from a RWS component failure (i.e., explain why flooding due to RWS failure will not result in detrimental effects on SSCs important to safety.

RAI 9.2.11-2 (Bellefonte 712/2361)

In order for the staff to confirm compliance with General Design Criteria (GDC) 4, "Environmental and Dynamic Effects Design Bases" and proper implementation of policy considerations relative to regulatory treatment of non-safety systems (RTNSS), additional information is needed to identify and address the potential effects of raw water system (RWS)-related failures on safety-related and RTNSS equipment. The staff also requests that the applicant establish plant-specific inspection, tests, analyses, and acceptance criteria (ITAAC); initial test program provisions; technical specifications, and availability controls for the RWS as appropriate. The applicant should provide any markups of the Final Safety Analysis Report (FSAR) and other parts of the application as applicable to facilitate the staff's evaluation.

RAI 9.2.11-3 (Similar but not identical to Bellefonte 323/1045)

In FSAR Section 9.2.11.4, Safety Evaluation," the applicant states the following: "The RWS does not have a safety-related function and, therefore, does not require a nuclear safety evaluation. It does not have an interconnection with any system that contains radioactive fluids." In FSAR Section 9.2.11.1.2, "Power Design Basis," the applicant states that the RWS is "providing an alternate dilution source for liquid radwaste discharge when the CWS cooling tower blowdown is not available." The staff requests the applicant to provide clarification regarding the conflicting statements in these two sections. Also, the staff requests the applicant to clarify whether the RWS has an interconnection with any system that contains radioactive fluids. If so, the staff requests the applicant to provide justification that the RWS will not affect the safety-related SSCs that are connected to the RWS.

RAI 9.2.11-4 (Bellefonte 712/2362)

While Section 9.2.11 of the FSAR generally discusses the raw water system (RWS) and contingencies that exist for providing makeup for the service water system (SWS) cooling tower basins, a clearly defined RWS design basis for assuring the defense-in-depth and RTNSS capabilities for the most limiting situations was not provided and measures were not described for assuring the functional bases for providing capability of the RWS over time. For example, the minimum RWS flow rate, water inventory, temperature limitations, and corresponding bases for providing SWS makeup for the two

Harris units were not described. Net positive suction head requirements, materials considerations, and industry operational experience were not addressed. Design provisions and measures being implemented to resolve vulnerabilities and degradation mechanisms, to confirm the adequacy of the design, and to assure the functional capability of the RWS over time were also not addressed, including consideration of plant-specific ITAAC, the initial test program, technical specifications, and availability controls as appropriate. Because the RWS design basis was not adequately described and review considerations specified in Section III of Standard Review Plan (SRP) Sections 9.2.1 and 9.2.5 that are relevant for assuring the RWS functional capability over time were not adequately addressed, the staff is unable to confirm compliance with defense-in-depth and RTNSS policy considerations. Therefore, the staff requests additional information to fully describe the RWS design basis and to address those review considerations specified by Section III of SRP Sections 9.2.1 and 9.2.5 that are relevant for assuring the functional capability of the RWS over time. Additional guidance for addressing these SRP areas of review is provided in Sections CI.9.2.1 and CI.9.2.5 of Regulatory Guide (RG) 1.206. The staff also requests that the applicant provide markups of the FSAR and other parts of the application to facilitate the staff's evaluation.

RAI 9.2.11-5 (Similar but not identical to Bellefonte 322/1045)

Section 9.2.11.3, "System Operation," of the Harris FSAR states that makeup flow to the Circulating Water System (CWS) is not normally required after the plant is shutdown, and that the Raw Water System (RWS) pumps are not available during a loss-of-offsite power (LOOP). The staff notes that Section 9.2.11.3 is incomplete in that it does not provide information on the operation of the ancillary water pumps, described in Section 9.2.11.2, "System Description," during the various modes of plant operation, nor does it provide information on the operation of the RWS during a LOOP. The staff also notes that the Service Water System (SWS) provides an indirect non-safety-related means of cooling to the normal decay heat removal system during shutdown operations (see Section 16.3, "Investment Protection Short-Term Availability Controls," Page 16.3-22 of AP 1000 DCD, Revision 16). In order to properly evaluate the Harris RWS and its components, the staff requests the applicant to provide additional information on the function of the ancillary water pumps during normal and abnormal modes of plant operation, including the operation of the RWS during a LOOP. Also the staff requests the applicant to identify whether the ancillary RWS pumps are credited for long term decay heat removal in the event of a LOOP.

RAI 9.2.11-6 (Bellefonte 712/2363)

As specified by 10 CFR 20.1406, combined operating license (COL) applicants are required to describe how facility design and procedures for operation will minimize the generation of radioactive waste and contamination of the facility and environment, and facilitate eventual plant decommissioning. Although the raw water system (RWS) has no interconnections with any systems that contain radioactive fluids, industry experience has shown that this alone may not be sufficient to prevent the RWS from becoming contaminated. For example, unplanned leaks or release of contaminated fluids as a result of component failures or transport, drainage problems in contaminated areas, and the migration of contamination through soils and other porous barriers over time have caused systems and areas of the plant that are not directly connected with contaminated systems to become contaminated. Therefore, additional information is needed to

describe design provisions and other measures that will be implemented to satisfy the requirements specified by 10 CFR 20.1406 requirements, including measures that will be implemented to monitor the RWS for contamination and corrective actions that will be taken to eliminate any radioactive contamination that is identified. Regulatory Guide (RG) 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning," provides guidance that may be used for addressing the requirements specified by 10 CFR 20.1406.