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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY	)	Docket No. 50-400-LA
	)	
(Shearon Harris Nuclear Power Plant)	)	ASLBP No. 99-762-02-LA

APPLICANT'S ANSWER TO PETITIONER BOARD OF COMMISSIONERS OF ORANGE COUNTY'S CONTENTIONS

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TABLE OF CONTENTS

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I. INTRODUCTION

In its Initial Prehearing Order of February 24, 1999, the Atomic Safety and Licensing Board ("Licensing Board"), pursuant to 10 C.F.R. § 2.714(b), required that Petitioner file by April 5, 1999, a supplement to its hearing petition/intervention request, which supplement must include a list of contentions and supporting bases. The Licensing Board also directed that responses to Petitioner's supplement be filed by May 5, 1999.

Contentions were filed on April 5, 1999 by Petitioner Board of Commissioners of Orange County ("Petitioner" or "BCOC").[1] Applicant Carolina Power & Light Company ("Applicant" or "CP&L") hereby submits the following Answer to BCOC's contentions. Prior to discussing each contention, Applicant sets forth in Section II its statement of law on the relevant standards for admission of contentions. We address the Technical Contentions in Section III and

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1 Orange County's Supplemental Petition to Intervene ("BCOC Supp. Pet.")

Environmental Contentions in Section IV. For the reasons set forth with respect to each of the contentions, Applicant respectfully submits that none of the contentions should be admitted.

II. STANDARDS FOR ADMISSIBILITY AND SCOPE OF CONTENTIONS

A. Overview Of Admissibility Requirements

The Commission's Rules of Practice at 10 C.F.R. § 2.714 set forth the requirements for the admission of contentions. In addition to demonstrating the required interest, a petitioner must submit at least one valid contention that meets the requirements of 10 C.F.R. § 2.714 in order to be permitted to participate in a licensing proceeding as a party. 10 C.F.R. § 2.714(b)(1); Yankee Atomic Electric Co. (Yankee Nuclear Power Station), CLI-96-7, 43 NRC 235, 248 (1996); Georgia Institute of Technology (Georgia Tech Research Reactor, Atlanta, Georgia), CLI-95-12, 42 NRC 111, 117 (1995).

For a contention to be admitted, it must meet the standards set forth in 10 C.F.R. § 2.714(b)(2), which provides that "[e]ach contention must consist of:"

> "a specific statement of the issue of law or fact to be raised or controverted", accompanied by
>
> (i) a "brief explanation of the bases of the contention";
>
> (ii) a "concise statement of the alleged facts or expert opinion" supporting the contention together with references to "specific sources and documents . . . on which the petitioner intends to rely to establish those facts or expert opinion"; and
>
> (iii) "[s]ufficient information . . . to show that a genuine dispute exists with the applicant on a material issue of law or fact," which showing must include "references to the specific portions of the application . . . that the petitioner disputes and the supporting reasons for each dispute . . . ."

10 C.F.R. § 2.714(b)(2); Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC ___ (1999)(slip op. at 5, 6). The failure of a contention to comply with any one of these requirements is grounds for dismissing the contention. 10 C.F.R. § 2.714(d)(2)(i);

Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), CLI-99-10, 49 NRC ___ (1999)(slip op at 10); Arizona Public Service Co. (Palo Verde Nuclear Generating Station, Units 1, 2, and 3), CLI-91-12, 34 NRC 149, 155-56 (1991). Further, a contention must also be dismissed where the "contention, if proven, would be of no consequence . . . because it would not entitle [the] petitioner to relief." 10 C.F.R. § 2.714(d)(2)(ii); Yankee Atomic Electric Co. (Yankee Nuclear Power Station), LBP-96-2, 43 NRC 61, 78, aff'd, CLI-96-7, 43 NRC 235 (1996); Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-91-39, 34 NRC 273, 280-81 (1991).

The standards governing the admissibility of contentions are the results of the 1989 amendments to 10 C.F.R. § 2.714. These amendments were intended "to raise the threshold for admission of contentions." Rules of Practice for Domestic Licensing Proceedings -- Procedural Changes in the Hearing Process; 54 Fed. Reg. 33,168 (1989); see also Oconee, CLI-99-11, supra, slip op. at 5-6; Palo Verde, CLI-91-12, supra, 34 NRC at 155-56; Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-91-35, 34 NRC 163, 167 (1991). The requirements of the new rule are to be enforced rigorously: "[i]f any one . . . is not met, a contention must be rejected." Palo Verde, CLI-91-12, supra, 34 NRC at 155; see also Shoreham, LBP-91-39, supra, 34 NRC at 279. A licensing board must not overlook a deficiency in a contention or assume the existence of missing information. Id.; see also Policy on Conduct of Adjudicatory Proceedings, 63 Fed. Reg. 41,872, 41,874 (1998). The Commission has also recently reaffirmed its position that the 1989 amendments "effectively work to bar ill-defined 'anticipatory' contentions . . . Our revised rules do not permit 'vague, unparticularized contentions,' or 'notice pleading, with details to be filled in later.'" Oconee, CLI-99-11, supra, slip. op. at 12 (citations omitted); Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), ALAB-687, 16 NRC 460, 468 (1982), vacated in part on other grounds, CLI-83-19, 17 NRC 1041 (1983).

B. Pleading Requirements and General Limitations On The Admissibility Of Contentions

The detailed pleading requirements of 10 C.F.R. § 2.714(b)(2)(i)-(iii) added by the 1989 amendments "heighten[ed] the specificity requirements for pleadings filed by parties seeking to intervene in [formal] licensing proceedings." Yankee Nuclear, CLI-96-7, supra, 43 NRC at 248, citing Union of Concerned Scientists v. NRC, 920 F.2d 50, 51-52 (D.C. Cir. 1990). Commission regulations and precedent include several general limitations on the scope of issues that may properly be raised and litigated in a licensing proceeding.

1. Basis with Specificity

Under the amended Rules of Practice, a petitioner must set forth "[a] brief explanation of the bases of the contention." 10 C.F.R. § 2.714(b)(2)(i). Further, a petitioner must provide:

> A concise statement of the alleged facts or expert opinion which support the contention and on which the petitioner intends to rely in proving the contention at the hearing, together with references to those specific sources and documents of which the petitioner is aware and on which the petitioner intends to rely to establish those facts or expert opinion.

10 C.F.R. § 2.714(b)(2)(ii).

The Commission has made clear that the requirement of 10 C.F.R. § 2.714(b)(2)(ii) for the provision of specific reference to documents or other sources of information has the effect of overturning prior precedent which had previously held that § 2.714 did not require a petitioner to describe facts which would be offered in support of a proposed contention. 54 Fed. Reg. at 33,170. The Rules of Practice now require that a petitioner include facts in support of its position in order to demonstrate that a genuine dispute as to a material issue of law or fact exists.

Id.; Oconee, CLI-99-11, supra, slip op. at 5-6.[2] As the Commission further observed, a contention therefore is not to be admitted "where an intervenor has no facts to support its position and where the intervenor contemplates using discovery or cross-examination as a fishing expedition which might produce relevant supporting facts." 54 Fed. Reg. at 33,171. Thus, under the amended Rules of Practice a statement "that simply alleges that some matter ought to be considered" does not provide a sufficient basis for an admissible contention. Sacramento Municipal Utility District (Rancho Seco Nuclear Generating Station), LBP-93-23, 38 NRC 200, 246 (1993), review declined, CLI-94-02, 39 NRC 91 (1994).

2. Opposition to Applicant's Position

Under the Rules of Practice as amended, 10 C.F.R. § 2.714(b)(2)(iii) requires a petitioner to provide:

> Sufficient information . . . to show that a genuine dispute exists with the applicant on a material issue of law or fact. This showing must include references to the specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute, or, if the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure and the supporting reasons for the petitioner's belief.

The Statement of Considerations to the 1989 amendments states this provision "will require the intervenor to read the pertinent portions of the license application, including the Safety Analysis Report and the Environmental Report, state the applicant's position and the petitioner's opposing view." 54 Fed. Reg. at 33,170. If the petitioner does not believe these materials address a

[2] As observed by the Commission, such a requirement is consistent with judicial decisions, such as Connecticut Bankers Ass'n v. Board of Governors, 627 F.2d 245, 251 (D.C. Cir. 1980).

relevant issue, the petitioner is "to explain why the application is deficient." Id. See also Palo Verde, CLI-91-12, supra, 34 NRC at 155-56. Thus, a contention that does not directly controvert a position taken by the applicant in the license application is subject to dismissal. See Texas Utilities Electric Co. (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

3. Petitioner's Mistake Cannot Be the Basis of a Contention

Further, a contention that mistakenly claims that the applicant failed to address a relevant issue in the application must also be dismissed. See, e.g., Georgia Power Co. (Vogtle Electric Generating Plant, Units 1 and 2), LBP-91-21, 33 NRC 419, 424 (1991); Rancho Seco, LBP-93-23, supra, 38 NRC at 247-48 (the claim that the "EA's findings are inadequate because there is no discussion" of the licensee's decommissioning activities or the associated environmental impacts ignores that the "entire EA discusses the decommissioning activities to be performed" by the licensee as well as the associated environmental impacts and "makes no showing that any of these matters are misstated . . . "). In such circumstances, relative to the purported lack of information or lack of analysis, "there is no material factual dispute that warrants further inquiry." General Public Utilities Nuclear Corp. (Oyster Creek Nuclear Generating Station), LBP-96-23, 44 NRC 143, 163 (1996).

4. Challenges to Regulations Barred

It is well established that "a licensing proceeding . . . is plainly not the proper forum for an attack on applicable statutory requirements or for challenges to the basic structure of the Commission's regulatory process." Philadelphia Electric Co., (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974). Thus, a contention which collaterally attacks a Commission rule or regulation is not appropriate for litigation and must be rejected. 10 C.F.R. § 2.758; Potomac Electric Power Co. (Douglas Point Nuclear Generating Station, Units 1 and 2), ALAB-218, 8 AEC 79, 89 (1974).

Further, a contention which "advocate[s] stricter requirements than those imposed by the regulations" is "an impermissible collateral attack on the Commission's rules" and must be rejected. Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2), LBP-82-106, 16 NRC 1649, 1656 (1982); see also Arizona Public Service Co. (Palo Verde Nuclear Generating Station, Units 1, 2, & 3), LBP-91-19, 33 NRC 397, 410, aff'd in part and rev'd in part on other grounds, CLI-91-12, 34 NRC 149 (1991). Likewise, a contention that seeks to litigate a generic determination established by Commission rulemaking is "barred as a matter of law." Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-93-1, 37 NRC 5, 30 (1993); Yankee Nuclear, CLI-96-7, supra, 43 NRC at 251.

Moreover, a petitioner cannot challenge the applicant's future compliance with clear regulatory constraints without a particularized basis. A contention asserting that an applicant will violate "clear regulatory constraints" will not be admitted unless the petitioner has made a "particularized demonstration that there is a reasonable basis to believe the applicant would act contrary to their explicit terms." Oyster Creek, LBP-96-23, supra, 44 NRC at 164.

5. Scope of Proceeding and Materiality

Licensing boards "are delegates of the Commission" and, as such, they may "exercise only those powers which the Commission has given [them]." Public Service Co. (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-316, 3 NRC 167, 170-71 (1976); accord Portland General Electric Co. (Trojan Nuclear Plant), ALAB-534, 9 NRC 287, 289-90 n.6 (1979). Accordingly, matters outside the scope of a proceeding do not provide a basis for a cognizable contention. Marble Hill, ALAB-316, supra, 3 NRC at 170-71. A contention is not cognizable unless it is material to a matter that falls within the scope of the proceeding for which the licensing board has been delegated jurisdiction as set forth in the Commission's Notice of Opportunity for Hearing. Id.; see also Commonwealth Edison Co. (Zion Station, Units 1 and 2), ALAB-616, 12 NRC 419, 426-27 (1980); Commonwealth Edison Co. (Carroll County Site),

ALAB-601, 12 NRC 18, 24 (1980). The Notice of Opportunity for Hearing in this case delineates the scope of the present licensing proceeding as follows:

> The [NRC] is considering issuance of an amendment to Facility Operating License No. NPF-63 issued to Carolina Power & Light . . . for operation of the Shearon Harris Nuclear Power Plant. . . . The proposed amendment would support a modification to the plant to increase the spent fuel storage capacity by adding rack modules to spent fuel pools (SFPs) "C" and "D" and placing the pools in service.

64 Fed. Reg. 2237, 2238 (1999). Thus, an admissible contention here is limited to the very narrow set of incremental health and safety or environmental impacts resulting from the activation and use of already-installed spent fuel storage at the Shearon Harris Nuclear Power Plant ("Harris plant" or "Harris" or "HNP") in spent fuel pools C and D, as requested in CP&L's license amendment application.

The specific issues of law or fact raised or controverted by a contention must be material to the granting or denial of the license amendment at issue. This general limitation on the admission of contentions is expressly provided for by the 1989 amendments to 10 C.F.R. § 2.714 and is implicit in NRC precedent prior to the 1989 amendments. In the Statement of Considerations to the 1989 amendments, the Commission defined a "material" issue as meaning that the "resolution of the dispute would make a difference in the outcome of the licensing proceeding." 54 Fed. Reg. at 33,172 (emphasis added). Thus, immaterial issues are subject to dismissal under 10 C.F.R. § 2.714(d)(2)(ii) because, even if proven, they "would not entitle [the] petitioner to relief." See also Notice of Consideration, supra, 64 Fed. Reg. at 2240 (1999).

The requirement that contentions raise issues material to the granting or denial of the license subject of the licensing proceeding ensures that contentions have concrete application to the facility in question and precludes the litigation of generalized claims unrelated to the facility. See, e.g., Peach Bottom, ALAB-216, supra, 8 AEC at 21, n.33 ("if someone wants to advance

generalizations regarding his particular views of what applicable policies ought to be, a role other than as a party to a trial-type hearing should be chosen"), quoting Duke Power Co. (William B. McGuire Nuclear Station, Units 1 & 2), ALAB-128, 6 AEC 399, 401 (1973); accord, Oconee, CLI-99-11, supra, slip op. at 6.

6. Health and Safety Significance

For a contention raising non-environmental issues to be material, it must assert a significant health and safety concern with respect to the license application. The contention "must either allege with particularity that an applicant is not complying with a specified [safety] regulation, or allege with particularity the existence and detail of a substantial safety issue . . . ." Seabrook, LBP-82-106, supra, 16 NRC at 1656 (footnote omitted); accord Duke Power Co. (Catawba Nuclear Station, Units 1 and 2), LBP-82-116, 16 NRC 1937, 1946-1947 (1982). For example, contentions concerning alleged deficiencies in a decommissioning plan must not only allege and provide sufficient bases to show the deficiencies, but also show that the purported deficiencies have "some independent health and safety significance" such that reasonable assurance of the public health and safety with respect to decommissioning is no longer assured. Yankee Nuclear, LBP-96-2, supra, 43 NRC at 75; see also Yankee Nuclear, CLI-96-7, supra, 43 NRC at 258 ("Petitioners must show some specific, tangible link between the alleged errors in the plan and the health and safety impacts they invoke").

C. The Scope of a Contention Is Limited by Its Specific Bases

Certain of the contentions filed by Petitioner allege a general inadequacy in the license amendment application (e.g., Contention 3: "Inadequate Quality Assurance") followed by specific assertions in the basis as to the manner in which the application is allegedly deficient. It is well established under Commission precedent that the scope of a contention is determined by its literal terms, coupled with its stated bases. See, e.g., Public Service Company of New

Hampshire (Seabrook Station, Units 1 and 2), ALAB-899, 28 NRC 93, 97 (1988). In that case, in assessing the scope of the intervenor's contention, the Appeal Board stated that:

> The reach of a contention necessarily hinges upon its terms coupled with its stated bases. . . . [O]ne purpose of the requirement in [§]2.714(b) that the bases of a contention be set forth with reasonable specificity is to put the other parties on notice as to what issues they will have to defend against or oppose. Thus, where a question arises as to the admissibility of a contention, we look to both the contention and its stated bases. . . . [W]here the issue is the scope of a contention, there is no good reason not to construe the contention and its bases together in order to get a sense of what precise issue the party seeks to raise.

Id. at 97 (emphasis added)(citations omitted).

Similarly in Illinois Power Co. (Clinton Power Station, Unit 1), LBP-81-61, 14 NRC 1735, 1737 (1982), the Licensing Board held that contentions must be narrowed to fit their stated bases. In analyzing the admissibility of contentions, "making broad allegations plus specific allegations that provide the bases for the broad range," the Board ruled that

> Where a contention is made up of a general allegation which, standing alone, would not be admissible under 10 C.F.R. §2.714(b), plus one or more alleged bases for the contention set forth with reasonable specificity, the matters in controversy raised by such contention are limited in scope by the specific alleged basis or bases set forth in the contention.

Id. at 1736-37 (emphasis added). Accord, Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2), LBP-81-35, 14 NRC 682, 685-86 (1981).

Thus, the scope of a broadly worded contention is limited by the specific assertions made in its bases. Accordingly, in analyzing the admissibility of the Petitioner's contentions, the Applicant has proposed that certain contentions be restated to incorporate the specific allegations from their bases. This serves to focus the analysis whether each contention is admissible and, in

the event the contention were admitted, to better define the precise issues to be litigated within the scope of the contention.

III. GROUP I: TECHNICAL CONTENTIONS

Petitioner has advanced three technical contentions, alleging (1) inadequate emergency core cooling and residual heat removal; (2) inadequate criticality prevention; and (3) inadequate quality assurance. None of the technical contentions should be admitted for the reasons summarized below.

First, Petitioner has demonstrated a misunderstanding of the Harris Final Safety Analysis Report ("FSAR") and the license amendment application. Indeed, some of the information discussed regarding the Harris FSAR was incorrect information from outdated versions of the Harris FSAR. Thus, the source of a number of concerns raised by the Petitioner results from misunderstandings or mistakes. Second, Petitioner has claimed that certain analyses have not been performed or inspections not planned, where in fact the opposite is true. Third, in a number of instances the scope of the contention was much broader than the basis offered by Petitioner in support. Closer inspection shows that the basis does not actually support the contention in any event. Fourth, often the purported basis for a contention lacked specificity. Fifth, Petitioner has raised issues outside the scope of this proceeding. Sixth, a subpart of one contention is no more than a unparticularized and unsupported assertion that Applicant will fail to comply with a clear regulatory requirement. Seventh, in some instances Petitioner attempted to support a contention with Applicant's own statements in the license amendment application. There is no genuine issue in dispute with Applicant's own statements. Eighth, both of the bases for Contention 2 are impermissible collateral attacks on the Commission's rules. Finally, in Contention 3, Petitioner has not shown any nexus between the alleged inadequacies in the 50.55a Alternative Plan and public health and safety.

While Applicant's response to Petitioner's technical contentions is somewhat lengthy, it is necessary to explain why, for example, Petitioner is mistaken, or that there is no statement of basis with specificity for the proffered contentions, or that there are no health and safety impacts raised by the proposed contentions.

We address Contentions 1, 2 and 3 in the remainder of this section.

A. Contention 1: Inadequate Emergency Core Cooling and Residual Heat Removal

1. The Contention

BCOC Contention 1 asserts the following:

> In order to cool spent fuel storage pools C and D, CP&L proposes to rely on the Unit 1 Component Cooling Water ("CCW") system, coupled with administrative measures to ensure that the heat load from the pools does not overtax the CCW system. CP&L's reliance on the Unit 1 CCW system and administrative measures for cooling spent fuel storage pools C and D will unduly compromise the effectiveness of the residual heat removal ("RHR") system and the Emergency Core Cooling System ("ECCS") for the Shearon Harris plant, such that the plant will not comply with Criteria 34 and 35 of Appendix A to 10 C.F.R. Part 50.

BCOC Supp. Pet. at 4. BCOC begins its statement of basis by quoting General Design Criteria 34 and 35 and summarizing a number of statements made by CP&L in its license amendment application.[3] Id. at 4-7. BCOC then identifies six specific issues that form the basis for its

[3] For example, BCOC notes that CP&L has stated: some CCW system flow will be sent to the pool C&D heat exchangers many hours into a LOCA event (citing Applicant's license amendment application ("Lic. Amend. App."), Encl. 9); the CCW system has adequate margin to accommodate pools C and D (id.); a technical specification will be added to limit the heat load in pools C and D to 1.0 MBTU/hour (id., Encl. 5). Needless to say, these citations to CP&L's own statements in its license amendment application do not establish a genuine dispute with CP&L, and therefore do not provide a basis for Contention 1. See BCOC Supp. Pet. at 4-7.

contention. To facilitate the determination of admissibility of this contention, the Applicant has summarized BCOC's six bases asserted for Contention 1 as follows:[4]

> Basis 1 - Even without the amendment to add pools C and D, the Harris FSAR shows that the CCW system is incapable of accommodating the heat load from the recirculation phase of a design-basis LOCA;
>
> Basis 2 - The analysis of CCW margin supporting the license amendment application does not address the time dependence of the CCW system heat load during a design-basis LOCA;
>
> Basis 3 - The analysis of CCW margin supporting the license amendment application does not address degradation of CCW and RHR heat exchanger performance due to heat exchanger fouling and plugging;
>
> Basis 4 - The license amendment application does not address the potential for failure to comply with the administrative measure limiting the heat load in pools C and D to 1.0 MBTU/hour;
>
> Basis 5 - The license amendment application does not address the potential for increased operator error in diverting CCW system flow to meet the cooling needs of pools C and D during a LOCA event;
>
> Basis 6 - The analysis supporting the license amendment application does not address the ability of Unit 1 electrical systems to meet the needs of pools C and D while also supporting essential safety functions.

BCOC Supp. Pet. at 7-9. BCOC closes its statement of basis with a discussion of different equipment approaches for cooling pools C and D that BCOC would have liked CP&L to have pursued.[5] See id. at 9-10. BCOC notes that "CP&L has not proceeded with this option." Id. at

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4 See § II.C., supra.

5 For example, the Petitioner would have preferred that CP&L provide cooling for pools C and D by "[c]onstruction of an independent cooling system for pools C and D, supported by dedicated emergency diesel generators." Id. at 9. The Petitioner also notes that a "future upgrade of the CCW system . . . contemplated [by CP&L] is not described in the present license amendment application" and that "CP&L has made no commitment to undertake [this] upgrade." Id. at 9-10.

9. BCOC's statement of design alternatives that the Applicant has not pursued is beyond the scope of this proceeding and does not provide a basis for an admissible contention. See § II.B.5., supra.

2. Applicant's Response to the Contention

Contention 1 should be rejected in its entirety because each of the six bases asserted by the Petitioner fail to provide the support required for an admissible contention within the Commission's regulations. In general, BCOC's Contention 1 is based on a misreading and mistaken understanding of the facts supporting the Harris FSAR and license amendment application and thus must be dismissed. See § II.B.3., supra. Each of the six bases asserted by BCOC are addressed, in turn, below.

Basis 1 - Even Without the Amendment to Add Pools C and D, the Harris FSAR Shows that the CCW System is Incapable of Accommodating the Heat Load From the Recirculation Phase of a Design-Basis LOCA

Basis 1 for this contention must be rejected both because it is beyond the scope of this proceeding and because it is supported by a mistaken understanding of the facts in the Harris FSAR.

Basis 1 must first be rejected because it is beyond the scope of this proceeding. BCOC's statement to support Basis 1 alleges that "design information in the Final Safety Analysis Report ('FSAR') for the Harris plant suggests that accommodating a design-basis LOCA will already exploit the margin of the CCW system, without any additional load from pools C and D." BCOC Supp. Pet. at 7 (emphasis added). This statement demonstrates that this basis is challenging the already existing and approved accident analyses for the Harris plant, before the license amendment request in this proceeding to activate pools C and D. A contention which attempts to raise issues outside of the scope of the current proceeding, as set forth in the Commission's Notice of Opportunity for Hearing, must be rejected by the Board. See § II.B.5.,

supra. The Commission defined the scope of this proceeding in the Notice of Opportunity for Hearing, which states that:

> The [NRC] is considering issuance of an amendment . . . to increase the spent fuel storage capacity by adding rack modules to spent fuel pools (SFPs) 'C' and 'D' and placing the pools in service.

64 Fed. Reg. at 2237-38. This proceeding therefore addresses the addition of spent fuel pools C and D to HNP. It does not address the existing status of the Harris plant prior to the addition of pools C and D. Thus, the scope defined by the Commission for this proceeding does not include the validity of the current licensing basis of the Harris plant (i.e., prior to the addition of pools C and D). Because Basis 1 raises issues outside the scope of this proceeding, it must be rejected by the Board.

Even if Basis 1 were within the scope of this proceeding, it must also be rejected because it is supported by a mistaken understanding of the facts in the Harris FSAR. In support of Basis 1, the Petitioner states that:

> The CCW system has two heat exchangers, each with a design heat transfer rate of 50 million BTU/hour. During the recirculation phase of a design-basis LOCA, the estimated maximum load on the CCW system is 160 million BTU/hour.

BCOC Supp. Pet. at 7 (footnotes omitted). From this, the Petitioner concludes that 160 MBTU/hour "exceeds the heat transfer rate of 100 million BTU/hour" provided by the two CCW heat exchangers, and therefore the CCW system, even prior to the activation of pools C and D, is incapable of handling a design-basis LOCA. See id. (emphasis added). However, the Petitioner's statements are based on a mistaken and outdated understating of the Harris FSAR.

BCOC has confused the capability of the CCW system to reject heat with the heat load into the CCW system. BCOC characterizes 160 MBTU/hour as the "estimated maximum heat load on the CCW system." Id. (emphasis added). BCOC cites this number from "Table 9.2.1-3,

Amendment No. 15" of the Harris FSAR. Id. at note 12. The table cited by BCOC, however, is from the Service Water System ("SWS") section of the FSAR and establishes the maximum design capability of SWS to accept heat loads during accident conditions from a variety of input sources, one system of which is the CCW. See Harris FSAR at 9.2.1-5 to 11 (SWS Safety Evaluation). Furthermore, the number offered by BCOC, 160 MBTU/hour cited from Amendment No. 15, is considerably out of date. The current version of the Harris FSAR is Amendment 48. Pursuant to Amendment 48, the maximum capability of the SWS to handle heat loads rejected from the CCW system heat exchangers is 272.6 MBTU/hour. See Harris FSAR, Table 9.2.1-3 ("Maximum Service Water System Heat Loads Following LOCA," Amendment No. 48). Thus, the capability to reject heat out of the CCW system during the recirculation phase of a design-basis LOCA is 272.6 MBTU/hour. To ensure there is sufficient margin, the FSAR must show that the heat load into the CCW system is less than 272.6 MBTU/hour.

Following a design-basis LOCA, the only heat loads on the CCW system are heat outputs from the RHR heat exchanger and the RHR pump; every other load on the CCW system is on the "non-essential header," and is isolated when the RHR system is initiated.[6] See Harris FSAR at 9.1.3-5 to 6. The Harris FSAR defines the maximum heat output from the RHR system (and therefore heat input to the CCW system) following a LOCA to be 222.2 MBTU/hour. See Harris FSAR at 9.2.1-7 to 8; Table 9.2.1-11 (RHR heat exchanger heat rejection rate).[7] Since 272.6

6 Isolation of the CCW non-essential header is performed by operating four switches in the Harris control room. See Harris FSAR at 6.3.2-13d.

7 The "50 million BTU/hour" number cited by BCOC for heat input to the CCW system is the "design heat transfer" rate for CCW during normal plant operation. See Harris FSAR, Table 9.2.2-1. This number represents normal plant operation, rather than accident conditions, and is based on a CCW outlet temperature of 105°F during normal plant operation. Id. at 9.2.2-1 and Table 9.2.2-1. Normal plant operation is not the correct heat load assumption for analyzing a LOCA event, which is an accident condition. During cooldown following a LOCA event, the CCW system operates under different temperature conditions, including a CCW outlet temperature of 120°F. Id. at 9.2.2-1. The actual maximum heat load from RHR to CCW following a LOCA event is 222.2 MBTU/hour from both RHR trains (111.1 MBTU/hour from each of two RHR trains). Id. at 9.2.1-7 to 8 and Table 9.2.1-11.

MBTU/hour, the ability of CCW to reject heat to SWS is greater than 222.2 MBTU/hour, the heat input to CCW from RHR, it is clear that the CCW system can handle the RHR system load during the recirculation phase of a design-basis LOCA. BCOC's assertions supporting Basis 1 are based on a mistaken and outdated understanding of the Harris FSAR. A petitioner's mistaken understanding of the facts regarding an application do not provide a basis for an admissible contention. See § II.B.3., supra. Therefore, even if Petitioner's Basis 1 were within the scope of this proceeding, it must still be rejected for lack of basis.

Basis 2 - The Analysis of CCW Margin Supporting the License Amendment Application Does Not Address the Time Dependence of the CCW System Heat Load During a Design-Basis LOCA

In Basis 2, BCOC alleges that the Applicant has failed to take into account the time dependence of the CCW system heat load during a design-basis LOCA. BCOC Supp. Pet. at 7. Since "the heat load on the CCW system from the RHR system will change over time," BCOC states that:

> Analysis must demonstrate that the CCW system has sufficient margin to accommodate both the RHR system and fuel pool heat loads over time, during the LOCA event and subsequently.

Id. In fact, the Applicant's analysis supporting the license amendment application does demonstrate that the CCW system has sufficient margin to accommodate the RHR system and spent fuel pool heat loads over time. Applicant agrees with BCOC that the heat load on the CCW system changes over time following a LOCA, and that the analysis must take this into account. These facts do not raise a genuine dispute with the Applicant.

Enclosure 9 of Applicant's license amendment application states that:

> [a] new thermal-hydraulic analysis was performed to evaluate the 1.0 MB[TU]/hr heat load that would be added to spent fuel pools 'C' and 'D' as a result of this [amendment].

Lic. Amend. App., Encl. 9 at 2. Based on this analysis, the license amendment application concludes that "the CCW system has adequate thermal-hydraulic capacity" to meet the additional heat loads from spent fuel pools C and D. Id. at 2-3. Enclosure 9 addresses the time dependent nature of the heat loads on the CCW system following a LOCA event, indicating that the thermal-hydraulic analysis addressed the significant post-LOCA heat loads as a function of time, including "the beginning of the sump recirculation phase," id. at 3, and "[t]he addition of spent fuel pools 'C' and 'D' to the CCW system," id. at 4. While copies of the detailed calculations supporting a license amendment application are not required to be included in the application itself, the Applicant has attached the CCW Calculation as Exhibit 1 to this pleading to aid in clarifying the Petitioner's concerns.[8]

CP&L's analysis supporting this license amendment accounts for the time dependence of the CCW system heat load during a design-basis LOCA, and demonstrates that the CCW system has sufficient margin to accommodate both the RHR system and spent fuel pool heat loads over time. The CCW Calculation evaluates the capability of the CCW system during each significant phase of post-LOCA operation to ensure the CCW system has adequate margin to handle both the RHR system load and the spent fuel pool cooling load, specifically including the additional 1.0 MBTU/hour from pools C and D. CCW Calculation at 1 (Section 1.0, "Purpose"). There are three significant phases to evaluate in order to demonstrate the post-LOCA adequacy of the CCW system:

1. LOCA: Safety Injection Phase;[9]

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8 See CP&L SF-0040, Spent Fuel Pools C and D Activation Project Thermal-Hydraulic Analysis, Shearon Harris Nuclear Power Plant (Rev. 0, 1998) ("CCW Calculation") (attached as Exhibit 1).

9 During this initial phase of post-LOCA operation, the RHR heat exchangers are not yet operating and the corresponding load on CCW is minimal. CCW Calculation at 3.

2. LOCA: Recirculation Phase, Containment Sump Recirculation with CCW Nonessential Header Isolated;[10]

3. LOCA: Recirculation Phase, Containment Sump Recirculation with Limited Fuel Pool Cooling.[11]

The CCW Calculation demonstrates that the CCW system has adequate capacity to handle the maximum heat loads during each of the three major phases of post-LOCA operation.[12] See id., Tables 7(g) (LOCA-Safety Injection), 7(h) (LOCA-Recirc., RHR Only), and 7(i) (LOCA-Recirc., RHR/SFP). Specifically for Phase 3, in which the spent fuel pool heat load (including pools C and D) is added to the CCW system, the analysis demonstrates that the maximum RHR heat load at the time the spent fuel pools are added is down to 80.53 MBTU/hour, which yields more than enough margin for the CCW system to accommodate the additional heat load of 16.2 MBTU/hour from the spent fuel pools (15.2 MBTU/hour from pools A and B, 1.0 MBTU/hour from pools C and D).[13] Id. at 14. Each of the three major CCW post-LOCA operating conditions was analyzed by CP&L in reaching its conclusion that:

> The analysis demonstrates that adequate margin exists during all normal and accident modes of system operation and that the CCW system has adequate thermal-hydraulic capacity to provide the minimum flow required by the fuel pool heat exchangers after the activation of Pools 'C' and 'D'.

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10 During this second phase of post-LOCA operation, the RHR heat exchanges are activated to perform core cooling, and the CCW non-essential header (which includes the spent fuel pools) is isolated. The maximum post-LOCA heat load on RHR occurs when recirculation is first initiated since core heat load continually decreases as a function of time following shutdown. CCW Calculation at 7.

11 During this third phase of post-LOCA operation, in addition to the RHR heat load, some CCW flow is diverted to the spent fuel pool heat exchangers. This occurs several hours after the LOCA when the core, and hence RHR, heat load has dropped. No other loads are added to the CCW system until the LOCA event has terminated. CCW Calculation at 9.

12 Of course, as discussed for Basis 1, the ability of CCW to handle post-LOCA heat load prior to the addition of spent fuel pools C an D had already been demonstrated.

13 Recall from the discussion of Basis 1 that the CCW system has a total heat rejection capability of 272.6 MBTU/hour. Even one of the two CCW loops (136.3 MBTU/hour) is capable of handling both the maximum RHR load at the time pool cooling is restarted (80.53 MBTU/hour) and the maximum heat load from the pools (16.2 MBTU/hour).

Lic. Amend. App., Encl. 9 at 2-3.

Thus, the Applicant's analysis supporting the license amendment did, in fact, take into account the time dependence of the CCW system heat load following a LOCA event, and demonstrated that the CCW system has adequate capacity to handle both the RHR load and the spent fuel pool load following a LOCA. BCOC's assertion that the Applicant has failed to take into account the time dependence of the CCW system heat load during a design-basis LOCA is mistaken. A mistaken claim that the applicant failed to address a relevant issue in an application must be dismissed. See § II.B.3., supra. BCOC's Basis 2 must be rejected because it lacks the basis for an admissible contention and fails to establish a genuine factual dispute warranting further inquiry.

Basis 3 - The Analysis of CCW Margin Supporting the License Amendment Application Does Not Address Degradation of CCW and RHR Heat Exchanger Performance Due To Heat Exchanger Fouling and Plugging

In Basis 3, BCOC alleges that the Applicant has failed to:

> address the sensitivity of CCW and RHR system performance to factors that may degrade performance from nominal levels. Relevant factors include heat exchanger fouling and plugging.

BCOC Supp. Pet. at 8. BCOC acknowledges that "CP&L itself has previously recognized that [the CCW system analysis should] include fouling factors and tube plugging limits," citing viewgraphs shown by CP&L to the NRC during a public meeting on this license amendment in March 1998. Id. Yet, BCOC mistakenly assumes that "CP&L fails to address this issue in Enclosure 9." Id.

As discussed above, the CCW Calculation is addressed in Enclosure 9 of the license amendment application and forms the basis for CP&L's conclusion that:

> adequate margin exists during all normal and accident modes of system operation and that the CCW system has adequate thermal-

> hydraulic capacity to provide the minimum flow required by the fuel pool heat exchangers after the activation of Pools 'C' and 'D'.

Lic. Amend. App., Encl. 9 at 2-3. In reference to the CCW Calculation, Enclosure 9 states that "[i]n support of this design change package, a thermal-hydraulic model was created to analyze the overall impact of this additional heat load." Id. at 1. The Applicant stated in its handout at the March 3, 1998 public meeting, cited in BCOC's contention, that analysis of the CCW system would include, inter alia, "fouling factors [and] tube plugging limits."[14] Thus, the Applicant made it clear that the "thermal-hydraulic model [discussed in Enclosure 9 of the license amendment application] . . . created to analyze the overall impact of this additional heat load" would include "fouling factors [and] tube plugging limits." See Lic. Amend. App., Encl. 9 at 1; NRC Meeting Summary, Encl. 2 at 8.

The CCW Calculation shows that these factors are, in fact, included in the analysis. The CCW Calculation clearly states that:

> All heat exchanger thermal models use design fouling factors . . . to ensure that design basis conditions can be met even with extreme fouling conditions.

CCW Calculation at 3 (emphasis added); see also id. at 5 (section 4.1.2). For example, the CCW heat exchanger, which rejects heat to SWS, uses a design fouling factor that "significantly (50.4 percent) exceeds the current worst case trended tubeside fouling factor" and assumes no additional tube plugging because any additional assumption on heat exchanger fouling and plugging would lead to results that are "overly conservative, given the excessive design fouling factor." Id. BCOC's belief that CP&L "recognized that exploitation of the margin in the CCW system could involve . . . fouling factors and tube plugging limits," but then somehow failed to

14 CP&L's viewgraph outlined options for providing cooling for pools C and D. The option implemented in this license amendment explicitly included consideration of fouling factors and tube plugging. See NRC Meeting Summary, Encl. 2 at 8 (PDR Accession # 9803200255) (Mar. 11, 1998).

include these factors in its thermal-hydraulic analysis, is mistaken. The Applicant's public statement that its analysis will address heat exchanger fouling and plugging is fully consistent with its CCW Calculation that does address heat exchanger fouling and plugging. BCOC's Basis 3 must be rejected because for lack of sufficient basis and failure to establish a genuine factual dispute warranting further inquiry. See § II.B.3., supra.

Basis 4 - The License Amendment Application Does Not Address the Potential for Failure to Comply with the Administrative Measure Limiting the Heat Load in Pools C and D to 1.0 MBTU/hour

In Basis 4, BCOC states that CP&L has failed to address:

> the potential for failure of administrative measures, such that the heat load in pools C and D will exceed 1.0 million BTU/hour.

BCOC Supp. Pet. at 8.

First, Basis 4 must be rejected because it lacks sufficient basis with specificity for an admissible contention. BCOC provides only three sentences in support of Basis 4. The Petitioner first generally alleges that such "administrative measures" "could be exceeded as a result of human errors," and requests that "such errors . . . be carefully considered." Id. However, the Petitioner fails to identify any specific "administrative measures" about which it is concerned, and fails to identify any specific "human errors" to consider. See id. Under the Commission's regulations, a contention "that simply alleges that some matter ought to be considered" does not provide a sufficient basis for an admissible contention. Rancho Seco, LBP-93-23, supra, 38 NRC at 246; see also § II.B.1., supra. BCOC's general assertion regarding failure of "administrative measures" due to "human errors" should be rejected by the Board due to its failure to provide sufficient basis for an admissible contention.

Second, Basis 4 must be rejected because, to the extent it challenges the Applicant's compliance with a Technical Specification, it must be rejected for lack of basis. The Applicant's

license amendment includes the addition of Technical Specification 5.6.3.d to the Harris operating license, which requires that "[t]he heat load from fuel stored in Pools 'C' and 'D' shall not exceed 1.0 MBtu/hr." Lic. Amend. App., Encl. 4 at 3. Pursuant to Commission regulations, Technical Specifications are required to be included in the "license authorizing operation" of a power reactor issued by the Commission. 10 C.F.R. § 50.36(b). Compliance with the terms of an operating license is required by the NRC. Therefore, clear regulatory constraints mandate that CP&L must keep the heat load in pools C and D from exceeding 1.0 MBtu/hr. A contention asserting that an applicant will violate clear regulatory constraints must be rejected unless the petitioner has made some "particularized demonstration that there is a reasonable basis to believe [the applicant] would act contrary to their explicit terms." Oyster Creek, LBP-96-23, supra, 44 NRC at 164; see § II.B.4., supra. BCOC has provided no basis upon which to believe the Applicant will violate the Technical Specifications in the Harris operating license. Basis 4 must be rejected for failure to provide sufficient basis to establish a material dispute warranting further inquiry.

Basis 5 - The License Amendment Application Does Not Address the Potential for Increased Operator Error In Diverting CCW System Flow to Meet the Cooling Needs of Pools C and D During a LOCA Event

In Basis 5, BCOC states that CP&L has failed to address:

> the potential for increased operator error associated with the need for the CCW system to meet the cooling loads of pools C and D while also serving other essential safety functions.

BCOC Supp. Pet. at 8. BCOC generally asserts that "[t]he operators' burden of observation, decision-making and action would be increased by the use of the CCW system to cool pools C and D." Id. Specifically, BCOC alleges that:

> The potential for operator error . . . during a LOCA event . . . would be further increased if, during this event, the operators were required to divert some CCW system flow from the RHR heat exchangers in order to meet the cooling needs of pools C and D.

Id. at 8-9. BCOC provides no other facts or discussion to support Basis 5.

Basis 5 must be rejected for failure to provide sufficient basis with specificity to establish an admissible contention. In its four-sentence statement for Basis 5, the Petitioner fails to identify any specific operator errors that would occur or any particularized reason to believe that the CP&L operators would fail to accomplish their actions in compliance with the Commission's regulations. See id. at 8-9. The Commission's regulations establish a comprehensive set of regulations for power reactor operator training and licensing. 10 C.F.R. § 50.120; 10 C.F.R. Part 55 ("Operator's Licenses"). BCOC provides no reasonable basis to believe that operators trained and licensed pursuant to the Commission's comprehensive regulatory scheme would be incapable of providing cooling flow to spent fuel pools C and D following a LOCA event.

Moreover, a review of the operator actions in question further demonstrates that Basis 5 fails to establish any material factual dispute warranting further inquiry. As discussed supra, when the RHR system is initiated following a LOCA event, the CCW system non-essential header, which includes the spent fuel pool cooling systems, is isolated by the operators from the control room. See Harris Plant Operating Manual, Emergency Operating Procedure EOP-EPP-010 at 12 (steps 8.a. and 8.b.; shut CCW non-essential supply and return valves) ("EOP Operating Manual").[15] This operation isolates the entire CCW non-essential header, including pools A and B and pools C and D, in a single step. Because this operator action is already included in the current Harris plant licensing basis, there is no incremental action added by pools C and D, and any challenge to this action is beyond the scope of this proceeding. The spent fuel pool cooling loads are added back to the CCW system 5.6 hours after the RHR system is

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15 Relevant excerpts from the Harris Plant Operating Manual including both the EOP Operating Manual and the OP Operating Manual, as cited in this response, are attached to this pleading as Exhibit 2.

initiated.[16] EOP Operating Manual at 20; Harris Plant Operating Manual, Operating Procedure OP-145 at 30 ("OP Operating Manual") (Exhibit 2); see also Harris FSAR at 9.1.3-6. Operator actions to add the spent fuel pool heat exchangers back to the CCW system first require operators to locally shut the isolation valves for all of the other (non-spent fuel pool) loads on the CCW non-essential header. OP Operating Manual at 30-31. However, since this operation is already performed for spent fuel pools A and B under the current licensing basis, and no additional action would be required following the addition of spent fuel pools C and D, this operator action is also beyond the scope of this proceeding. In fact, the only additional operator action required "to meet the cooling needs of pools C and D" is for the operators in the control room to start the pool C and D spent fuel pool cooling system pumps (which requires turning two switches in the control room). See id. at 31. The Petitioner provides no reasonable basis upon which to believe that turning two switches in the control room over five hours after a LOCA event would be a "stressful event" for operators that would result in "operator error." See BCOC Supp. Pet. at 8. Furthermore, because the maximum heat load of pools C and D is only about 7% that of pools A and B,[17] pools C and D would only heat up a small fraction as fast as would pools A and B, and would take about 85 hours to heat pools C and D up to the administrative limit of 137°F.[18] The Petitioner provides no reasonable basis to believe that, even if an operator error were to occur, it would not be readily corrected by the operators during the three days following a LOCA event.

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16 5.6 hours is the approximate time required to heat pools A and B, assuming their maximum heat load of 15.2 MBTU/hour, up to a temperature of 137°F, the administrative limit for the pools. It is estimated to require an additional 2.97 hours to heat pools A and B up to 150°F. Note that both of these administrative limits are far below the boiling temperature of water, 212°F.

17 The maximum pool C and D heat load (1.0 MBTU/hour) is about 7% of the maximum heat load for pools A and B (15.2 MBTU/hour).

18 Pools A and B, at 15.2 MBTU/hr, require 5.6 hours to heat up to 137°F; pools C and D, at 1.0 MBTU/hour, would require about 85 hours (15.2/1.0 times 5.6 hours) to heat up to the same temperature.

BCOC has failed to provide any support for its generalized assertion that the requirement to provide CCW system flow to pools C and D following a LOCA event would lead to operator errors and has failed to identify what operator errors would occur and why they are material. Basis 5 must be rejected for failure to establish a valid basis for an admissible contention.

Basis 6 - The Analysis Supporting the License Amendment Application Does Not Address the Ability of Unit 1 Electrical Systems to Meet the Needs of Pools C and D While Also Supporting Essential Safety Functions

In Basis 6, BCOC alleges that the Applicant failed to address the ability of on-site and off-site electrical power to support the additional electrical load of spent fuel pools C and D, in addition to meeting the electrical loads of other essential safety functions at the Harris plant. BCOC Supp. Pet. at 9. Specifically, BCOC states that an analysis must be performed:

> to indicate that the available margin in the Unit 1 electrical systems, with or without offsite power, is adequate to meet the needs of pools C and D while also supporting residual heat removal, emergency core cooling and other essential safety functions.

Id.

BCOC's assertion that the Applicant has not analyzed the ability of on-site and off-site electrical power systems at HNP to handle the additional load from pools C and D is mistaken. The Harris FSAR evaluates the capability of the plant's emergency diesel generators to handle safety-related electrical loads following a loss of off-site power ("LOOP"). See Harris FSAR, Tables 8.3.1-2a and 2b. The Harris plant has two emergency diesel generators, EDG-A and EDG-B. Each EDG has a continuous rating of 6500 kW, and an overload rating of 7150 kW for two hours in any 24-hour period. Harris FSAR at 8.3.1-58. The FSAR evaluates electrical loads for both the LOOP and LOCA/LOOP scenarios, with the purpose of "demonstrat[ing] that continuous loading is within the continuous rating of the emergency diesel generator." Harris FSAR at 8.3.1-58. The electrical loads on the EDGs are analyzed in CP&L Calculation E-

6000.[19] Harris FSAR at 8.3.1-58. The tables in the current version of the Harris FSAR, Amendment 48, show the available margin of the two EDGs prior to the addition of pools C and D. EDG-A shows a margin of 243 kW and EDG-B shows a margin of 321 kW, both with respect to the continuous loading rating of 6500 kW. Harris FSAR at 8.3.1-54 to 55. The addition of pools C and D adds an additional load of one 150-hp pump to each EDG.[20] The 150-hp pump load translates into an electrical load of 125-kW.[21] Therefore, the FSAR demonstrates sufficient margin for both EDG-A and EDG-B to handle the additional 125-kW electrical load required to place spent fuel pools C and D in service.

A comprehensive evaluation of HNP electrical loads confirmed that, as the FSAR indicates, the EDGs do have sufficient margin to accommodate the additional electrical loads from pools C and D. As the FSAR notes, there are "outstanding change documents posted . . . against Calculation E-6000." Harris FSAR at 8.3.1-58. Therefore, Calculation E-6000 was revised to incorporate all "outstanding change documents" as well as the additional 125-kW loads from adding pools C and D. Calculation E-6000 at ii. Table 6 of Calculation E-6000 shows that, even after the addition of pools C and D electrical loads, the two EDGs have remaining margin; EDG-1 has a remaining margin of 182.1 kW[22] and EDG-B has a remaining margin of 254.5 kW.[23] Id., Tables 6 and 7. Calculation E-6000 also evaluates the capability of off-site power to accommodate HNP safety-related loads, including spent fuel pools C and D.

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19 The relevant pages of Calculation E-6000 (Rev. 6, 1999) are attached as Exhibit 3.

20 There are two independent spent fuel pool cooling system pumps for pools C and D, each rated at 150 hp. Each of the pumps is connected to a separate EDG train to ensure that the loss of a single EDG will not eliminate cooling of pools C and D.

21 A 150-hp mechanical pump converts to an electrical load of 125-kW (unit conversion of 1 hp = 0.746kW and the standard conversion factor of 0.90). There are no other safety-related (and hence EDG) electrical loads associated with pools C and D.

22 6500 kW continuous rating minus 6317.9 kW maximum load.

23 6500 kW continuous rating minus 6245.5 kW maximum load.

See id. at 3-4. Based on its comprehensive evaluation of all Harris safety-related electrical loads (including electrical loads from pools C and D), Calculation E-6000 concludes that

> the electrical auxiliary system meets design requirements for proper operation of equipment via both onsite (emergency diesel generators) and offsite (230kV switchyard) power sources.

Id. at 5 (emphasis added). BCOC's assertion that the Applicant has failed to analyze the available margin in the Unit 1 electrical systems is mistaken. In support of this license amendment, CP&L has analyzed the margin of the Harris plant electrical systems, both with and without off-site power, and has demonstrated that the Harris plant electrical systems are adequate to meet the needs of pools C and D while also supporting other essential safety functions. Again, a contention based upon a mistaken claim that an applicant failed to address a relevant issue should be dismissed because it fails to establish a genuine factual dispute warranting further inquiry. See § II.B.3., supra. BCOC's Basis 6 must be rejected due to its failure to provide a sufficient basis to establish a genuine factual dispute warranting further inquiry.

B. Contention 2: Inadequate Criticality Prevention

1. The Contention

BCOC asserts in Contention 2 that:

> Storage of pressurized water reactor ("PWR") spent fuel in pools C and D at the Harris plant, in the manner proposed in CP&L's license amendment application, would violate Criterion 62 of the General Design Criteria ("GDC") set forth in Part 50, Appendix A. GDC 62 requires that: "Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations." In violation of GDC 62, CP&L proposes to prevent criticality of PWR fuel in pools C and D by employing administrative measures which limit the combination of burnup and enrichment for PWR fuel assemblies that are placed in those pools. This proposed reliance on administrative measures rather than physical systems or processes is inconsistent with GDC 62.

BCOC Supp. Pet. at 10-11. The asserted basis for the contention are set forth in three pages of discussion following the contention.[24] In order to facilitate the determination of admissibility of this contention, the Applicant has summarized the bases asserted by BCOC for Contention 2 as follows:[25]

> Basis 1 - CP&L's proposed use of credit for burnup to prevent criticality in pools C and D is unlawful because GDC 62 prohibits the use of administrative measures, and the use of credit for burnup is an administrative measure;
>
> Basis 2 - The use of credit for burnup is proscribed because Regulatory Guide 1.13 requires that criticality not occur without two independent failures, and one failure, misplacement of a fuel assembly, could cause criticality if credit for burnup is used.

Id. at 12-13.

2. Applicant's Response to the Contention

Contention 2 must be rejected in its entirety because it advocates stricter requirements than those imposed by the regulations, and therefore constitutes an impermissible collateral attack on the Commission's rules. See § II.B.4., supra. Each of the two bases asserted by BCOC in support of Contention 2 is addressed, in turn, below.

Basis 1 - CP&L's Proposed Use of Credit for Burnup to Prevent Criticality in Pools C and D is Unlawful Because GDC 62 Prohibits the Use of Administrative Measures, and the Use of Credit for Burnup is an Administrative Measure

In Basis 1, the Petitioner uses a textual analysis of General Design Criterion 62 ("GDC 62") to draw the conclusion that:

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24 The first page and a half of discussion in BCOC's basis recounts the criticality control features currently in place for Harris spent fuel pools A and B and those proposed by the Applicant for spent fuel pools C and D. Id. at 11-12.

25 See § II.C., supra.

> GDC 62 is quite clear that any measures relied on must be physical rather than administrative [and therefore] the administrative measures proposed by CP&L [credit for burnup] must be rejected as unlawful under GDC 62.

BCOC Supp. Pet. at 12 (emphasis added). The only "administrative measure" that BCOC addresses in Contention 2 is "credit for burnup." See id. at 13. BCOC also asserts that the Applicant's reliance on an NRC Regulatory Guide for the acceptability of taking credit for burnup is misplaced because Staff Regulatory Guides are "useful as guides" but "cannot be viewed as necessarily controlling." Id. at 12-13, citing Potomac Electric Power Co. (Douglas Point Nuclear Generating Station, Units 1 and 2), LBP-76-13, 3 NRC 425, 432 (1976).

BCOC's reading of GDC 62 is unsupported by the plain meaning of the words and is directly contrary to numerous Commission determinations. BCOC's Basis 1 is based on a loose and overbroad interpretation of the text of GDC 62, which interjects an additional term that is not part of the actual text. GDC 62 states:

> Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations.

10 C.F.R. Part 50, App. A, Criterion 62 (emphasis added). A literal reading of the text shows that GDC 62 can be met through the use of either "physical systems" or "processes." Id. The Petitioner chooses to read GDC 62 by adding an additional term, assuming that the text instead states "physical systems" or "physical processes." See BCOC Supp. Pet. at 12. BCOC emphatically asserts that "GDC 62 is quite clear that any measures relied on must be physical." Id. (emphasis added). BCOC's insistence, however, is not supported by the text of GDC 62. The use of the term "or" in GDC 62 indicates that "physical systems" and "processes" are alternatives. See American Heritage College Dictionary 959 (3d ed. 1993). "Process" is defined as a "a series of actions, changes, or functions," and "processes" as "to put through the steps of a prescribed procedure." Id. at 1090-91. There is no indication in the common usage that

"processes" "must be physical," as BCOC attempts to assert. Credit for burnup is a process which is implemented through a series of written procedures. See Lic. Amend. Appl., Encl. 7 at 4-4. BCOC provides no argument to counter the interpretation that "credit for burnup" is, in fact, consistent with the common definition of "processes."

Moreover, the NRC Staff has described the administrative measures required to implement credit for burnup as a "process" involving "written procedures." Draft Regulatory Guide 1.13 at 1.13-13, 15 (Prop. Rev. 2, 1981) ("Reg. Guide 1.13"). Reg. Guide 1.13 is the NRC Staff's specific guidance on acceptable methods for preventing criticality in spent fuel pool storage and complying with the GDC. See id. at 1.13-7, 9. With respect to compliance with the GDC, the Commission has determined that "[i]f there is conformance with regulatory guides, there is likely to be compliance with the GDC." Petition for Emergency and Remedial Action, CLI-78-6, 7 NRC 400, 407 (1978) (emphasis added). This is particularly true in the absence of other evidence. Long Island Lighting Co. (Shoreham Nuclear Power Station, Unit 1), LBP-83-22, 17 NRC 608, 616 (1983). Here, BCOC has provided nothing to counter Reg. Guide 1.13's interpretation that credit for burnup comprises "processes."

BCOC's flawed textual interpretation of GDC 62 cannot provide a valid basis for a litigable contention. Basis 1 of Contention 2 must be rejected for failure to provide sufficient basis for an admissible contention.

More importantly, however, BCOC's interpretation of GDC 62 runs directly afoul of the Commission's implementation of its regulations, and thereby advocates stricter requirements than the Commission's regulations require. In promulgating the General Design Criteria (including GDC 62), the Commission clearly stated that prior to issuing an operating license for a power reactor, or an amendment thereto,

> the Commission will require assurance that these criteria have been satisfied in the detailed design and construction of the facility.

36 Fed. Reg. 3255, 3255 (1971).[26] Therefore, when a license amendment is approved, the Commission has made a determination that the amendment complies with all of the GDC, including GDC 62. The Commission has approved numerous license amendments to allow the use of credit for burnup to prevent criticality with the use of high-density storage racks in spent fuel pools. See, e.g., 63 Fed. Reg. 40,551, 40,566 (1998) (Waterford); 61 Fed. Reg. at 7566 (Comanche Peak); 59 Fed. Reg. 27,049, 27,703 (1994) (Salem); 58 Fed. Reg. 28,050, 28,069 (1993) (Sequoyah). Each of these license amendment approvals is based on "[t]he Commission's related evaluation of the amendments . . . contained in . . . a Safety Evaluation." See, e.g., 61 Fed. Reg. at 7565-66 (Comanche Peak). As just one example, the Commission's Safety Evaluation for the Comanche Peak license amendment evaluates and approves "burnup dependent criticality analyses" using "reactivity equivalencing" based on "enrichment versus burnup ordered pairs." See Letter from NRC to TU Electric (issuing license amendments 46 and 32) and enclosed Safety Evaluation at 3-4 (Feb. 9, 1996) (PDR Accession ## 9602140197, 207) ("Comanche Peak Safety Evaluation"). In another, the Commission's Safety Evaluation for Waterford determines that "General Design Criterion 62 . . . is met" by "burnup reactivity equivalencing" using "enrichment versus burnup ordered pairs." See Letter from NRC to Entergy Operations (issuing license amendment 144) and enclosed Safety Evaluation at 2-3 (July 10, 1998) (PDR Accession ## 9807140341, 347) ("Waterford Safety Evaluation").[27] Just as in the instant case, in Waterford, the Commission approved a Technical Specification change to allow spent fuel storage in high-density racks that were limited by administrative measures to

26 An amendment to a power reactor operating license must comply with the same requirements as those applicable to an initial operating license. 10 C.F.R. § 50.90.

27 There are numerous other Commission approvals of credit for burnup for preventing criticality in spent fuel pools. See, e.g., letter from NRC to Public Service Electric and Gas Co. (issuing Salem license amendments 151 and 131) and enclosed Safety Evaluation at 6-7 (May 4, 1994) (PDR Accession ## 9405100311, 316) ("Salem Peak Safety Evaluation"); letter from NRC to Tennessee Valley Authority (issuing Sequoyah license amendments 167 and 157) and enclosed Safety Evaluation at 2-4 (Apr. 28, 1993) (PDR Accession ## 9504040161, 169) ("Sequoyah Safety Evaluation").

storing only "spent fuel in the 'acceptable range.'" Id., Approved License Amendment and Technical Specification at 5-6 (Tech. Spec. 5.6.1.g) (PDR Accession # 9807140346). As a condition precedent to approving all of these license amendments, the Commission "require[d] assurance that [all of the General Design Criteria] have been satisfied." See 36 Fed. Reg. at 3255.

Based on its mistaken reading of the text of GDC 62 and its failure to consider the Commission's many determinations approving the use of credit for burnup, BCOC attempts to require CP&L to meet stricter requirements than those imposed by the Commission's regulations. A contention that advocates stricter requirements than those imposed by the regulations must be rejected as an impermissible collateral attack on the Commission's regulations. See § II.B.4., supra. BCOC's Basis 1 asserts that the use of credit for burnup is unlawful under the Commission's regulations, thereby requiring the Applicant to use some other technique to prevent criticality in spent fuel storage pools C and D. See BCOC Supp. Pet. at 11-12. When the Commission's regulations permit the use of a particular analysis or technique, a contention which asserts a different technique must be used is inadmissible as a collateral attack on the Commission's regulations. Metropolitan Edison Co., (Three Mile Island Nuclear Station, Unit. No. 1), LBP-83-76, 18 NRC 1266, 1273 (1983). Basis 1 of Contention 2 must be rejected because it constitutes an impermissible collateral attack on the Commission's regulations, in violation of 10 C.F.R. § 2.758.

Basis 2 - The Use of Credit for Burnup is Proscribed Because Regulatory Guide 1.13 Requires that Criticality Not Occur Without Two Independent Failures, and One Failure, Misplacement of a Fuel Assembly, Could Cause Criticality if Credit for Burnup is Used

In Basis 2, the Petitioner asserts that the use of credit for burnup is proscribed because it is inconsistent with the statement in Reg. Guide 1.13 that

> The nuclear criticality safety analysis should demonstrate that criticality could not occur without at least two unlikely, independent, and concurring failures or operating limit violations.

BCOC Supp. Pet. at 13, citing Reg. Guide 1.13 at 1.13-9 (emphasis in original). Without explaining why, BCOC asserts that the Applicant's proposed use of credit for burnup:

> would not satisfy this requirement because only one failure or violation, namely placement in the racks of PWR fuel not within the 'acceptable range' of burnup, could cause criticality. Note that 'misplacement of a spent fuel assembly' is identified in the Draft Reg. Guide as one of nine 'credible normal and abnormal operating occurrences.'

BCOC Supp. Pet. at 13 (footnote and citation omitted) (emphasis added). Once again, a review of the Commission's determinations approving the use of credit for burnup is instructive. In Waterford, the Commission's evaluation addressed this very issue.[28] Waterford Safety Evaluation, supra, at 3. The Commission's evaluation states:

> Most abnormal storage conditions will not result in an increase in the k_{eff} of the racks. However, it is possible to postulate events, such as the inadvertent misloading of an assembly with a burnup and enrichment combination outside of the acceptable areas in TS Figures 5.6-1, 5.6-2, or 5.6-3, which could lead to an increase in reactivity. However, for such events, credit may be taken for the presence of at least 1720 parts per million (ppm) of soluble boron required in the pool whenever a fuel assembly is moved, since the staff does not require the assumption of two unlikely, independent, concurrent events to ensure protection against a criticality accident (Double Contingency Principle). The reduction in k_{eff} caused by the boron more than offsets the reactivity addition caused by credible accidents. In fact, calculations show that for the most severe accident condition, a soluble boron concentration of 700 ppm boron would be adequate to maintain k_{eff} less than 0.95.

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[28] Other Commission approvals of credit for burnup also address this issue. See Comanche Peak Safety Evaluation, supra, at 4; Salem Safety Evaluation supra, at 7; Sequoyah Safety Evaluation supra, at 4.

Id. (emphasis added). Thus, the Commission has determined that, in the event of "misplacement of a spent fuel assembly," credit for burnup does comply with the requirement that "criticality could not occur without at least two unlikely, independent, and concurring failures." See BCOC Supp. Pet. at 13, citing Reg. Guide 1.13 at 1.13-9. It is clear from the Commission's determinations that there is no conflict between the use of credit for burnup and the requirement that "criticality could not occur without at least two, unlikely, independent, and concurring failures." Id. Again, BCOC would have the Applicant meet more restrictive requirements than those imposed by the Commission's regulations.

Just as in Waterford, an analysis was performed to confirm that "misplacement of a spent fuel assembly" would not cause criticality. The presence of soluble boron in the spent fuel pool water, which is required in the Harris spent fuel pools at all times, more than offsets the reactivity addition of the most reactive "misplaced" fuel assembly. In its license amendment application, the Applicant stated that "[t]he use of the high-density region 2 racks has been shown to be acceptable based on the analysis performed by Holtec International." Lic. Amend. App., Encl. 1 at 2. The Harris spent fuel pools maintain a minimum of 2000 parts per million ("ppm") of soluble boron in the pool water at all times.[29] Holtec International analyzed misplacement of a spent fuel assembly with the highest possible enrichment into the spent fuel storage racks to be used in spent fuel pools C and D and confirmed that:

> [A] soluble poison concentration of 400 ppm boron would be sufficient to maintain a k_{inf} less than 0.95 (including uncertainties) under the maximum postulated accident condition.

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29 The Harris Plant Operating Manual, Chemistry and Radiochemistry, CRC-001 at 33, requires that spent fuel pool water maintain between 2000 and 2600 ppm soluble boron at all times.

Holtec Int'l, Study/Scoping Report for Fuel Storage in Harris Pools C and D, HI-971703 at 4-21 to 22 (July 1997).[30] The 400 ppm boron required by analysis is far below the 2000 ppm boron that must be maintained in the Harris spent fuel pools at all times. Thus, just as in Waterford, the Applicant here has demonstrated that the reduction in reactivity caused by the soluble boron in the pool water more than offsets the reactivity addition caused by misplacement of the worst case assembly, and therefore has complied with the Commission's requirements for taking credit for burnup to prevent criticality in spent fuel pool storage. BCOC's contention would have the Applicant meet more restrictive requirements than those imposed by the Commission's regulations. BCOC's Basis 2 must therefore be rejected as an impermissible collateral attack on the Commission's regulations, in violation of 10 C.F.R. § 2.758. See § II.B.4., supra.

C. Contention 3: Inadequate Quality Assurance

1. The Contention

BCOC's Contention 3 is multifaceted. Applicant proposes the following restatement of Contention 3 which incorporates the various allegations found both in the statement of Contention 3 and in the Basis.[31]

> CP&L's proposal to provide cooling of pools C & D by relying upon the use of previously completed portions of the Unit 2 Fuel Pool Cooling and Cleanup System and the Unit 2 Component Cooling Water System fails to satisfy the quality assurance criteria of 10 C.F.R. Part 50, Appendix B, specifically Criterion XIII (failure to show that the piping and equipment have been stored and preserved in a manner that prevents damage or deterioration), Criterion XVI (failure to institute measures to correct any damage or deterioration), and Criterion XVII (failure to maintain quality

30 The relevant pages of HI-971703 are attached as Exhibit 4. The worst case event at Harris is misplacement of a fresh unirradiated PWR fuel assembly with 5% enrichment. See HI-971703 at 4-21. Note that even with no soluble boron in the pool water, misplacement of the worst case assembly into pools C and D would not cause criticality, as the resulting maximum reactivity of 0.990 is still below 1.000.

31 See BCOC Supp. Pet. at 14-19.

records to show that all quality assurance requirements are satisfied).

The Alternative Plan submitted by Applicant fails to satisfy the requirements of 10 C.F.R. § 50.55a for an exception to the quality assurance criteria because it does not describe any program for maintaining the idle piping in good condition over the intervening years between construction and implementation of the proposed license amendment, nor does it describe a program for identifying and remediating potential corrosion and fouling.

The Alternative Plan submitted by Applicant is also deficient because 15 welds for which certain quality assurance records are missing are embedded in concrete and inspection of the welds to demonstrate weld quality cannot be adequately accomplished with a remote camera.

The Alternative Plan submitted by Applicant is also deficient because not all of the welds embedded in concrete will be inspected by the remote camera and the weld quality cannot be demonstrated by circumstantial evidence.[32]

As its Basis for Contention 3, BCOC first quotes from 10 C.F.R. Part 50, Appendix B, Criteria XIII, IVI and XVII.[33] Next BCOC points to Applicant's statement that certain of the piping isometric packages for field installation of the Unit 2 Fuel Pool Cooling and Cleanup System and Component Cooling Water System piping were inadvertently discarded during a

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32 BCOC raises two other issues. First, BCOC questions whether the missing Quality Assurance records are limited to the piping and might not apply to equipment as well. Id. at 15. Applicant's 50.55a Alternative Plan addresses field installation of piping. All Code piping (in the form of prefabricated pipe spools) and equipment in the scope of the Alternative Plan was supplied by an approved vendor having the requisite NPT authorization. The vendor data package (including the Code Data Report) for each such item is on hand. Any piping or equipment for which this quality documentation is not on hand will be replaced with appropriately qualified and documented replacement items. Second, BCOC presumes that the remote camera inspection of welds and the piping embedded in concrete will not be conducted until after the issuance of the license amendment. Id. at 18-19. In fact the remote camera inspection is scheduled to be conducted within the next month and the results will be reviewed by the NRC Staff. Neither of these issues forms the basis for a contention.

33 BCOC's purported Basis for Contention 3 is discussed at BCOC Supp. Pet. at 15-19; BCOC Supp. Pet., Ex. 2 (Declaration of Dr. Gordon Thompson at ¶ 23) ("Thompson Decl.") and Ex. 4 (Declaration of David A. Lochbaum) ("Lochbaum Decl.")

document control records cleanup effort for Unit 2 documents. BCOC also notes that Applicant is "silent" regarding storage and preservation of previously completed piping and equipment. BCOC Supp. Pet. at 17.

As basis for the assertion that the unused piping may be subject to fouling or degradation, BCOC relies on NRC Information Notices to licensees which discuss problems that have occurred during extended storage or lay-up of piping and equipment. Id.; Lochbaum Decl. at ¶¶ 7-9. BCOC faults Applicant's Alternative Plan for not describing "a program for identifying and remediating potential corrosion and fouling." BCOC Supp. Pet. at 18.

BCOC asserts without basis that a remote camera inspection can provide only limited information about weld quality and cannot provide the level of quality that is available from NDE.[34] Id.

Mr. Lochbaum cites to a number of 1981 NRC Inspection Reports with minor violations relating to construction activities at the Harris Plant to suggest that quality standards in the Fuel Pool piping may not have been met during construction up to the time of cancellation of Unit 2 in December 1983. Lochbaum Decl. at ¶¶ 10-14.

2. Applicant's Response to the Contention

Before addressing Contention 3, we note that on March 24, 1999, the NRC Staff forwarded to CP&L a "Request for Additional Information Regarding the Alternative Plan for Spent Fuel Pool Cooling and Cleanup System Piping." CP&L responded by letter dated April 30, 1999 ("RAI Response"). The detailed response to the NRC Staff's questions incorporates 17 enclosures, including isometric drawings and matrixes which elaborate on the

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34 Petitioner does not elaborate on what method of NDE—non-destructive examination – it has in mind. A camera inspection is one form of NDE.

information available regarding each weld subject to the 50.55a Alternative Plan. Some of the NRC Staff questions and Applicant's responses deal with issues raised by BCOC in Contention 3. Applicant hand-delivered a copy of the RAI Response with all enclosures to BCOC's counsel on May 3, 1999. The RAI Response with enclosures 1, 3, 13 and 16 are included with this Answer as Exhibit 5.

a. Lack of Adequate Quality Assurance for Piping

It is undisputed that the piping for the Harris Unit 2 Fuel Pool Cooling and Cleanup System ("FPCCS") was not maintained as part of the licensed HNP, and therefore was not subject to 10 C.F.R. Part 50, Appendix B, once construction of Unit 2 was abandoned in December 1983. The FPCCS piping was not stored or placed in lay-up pursuant to Criterion XIII. It was not subject to the HNP Corrective Action Program. A number of piping isometric packages for field installation of the completed portion of the FPCCS were discarded and are not available. Lic. Amend. App., Encl. 8, at 3. As a result, certain quality records required by the ASME Code, Section III, are no longer available for 37 of the large bore welds in the completed FPCCS piping. Id. at 3, 5. Accordingly, BCOC's recitation of the facts relating to the incomplete construction of the FPCCS, the inapplicability of the HNP Quality Assurance Program to the FPCCS once it was abandoned, and the discarded piping records fails to identify a genuine dispute with Applicant. The Commission's pleading requirements for contentions require that the petitioner "show that a genuine dispute exists with the applicant on a material issue of law or fact." See §II.B.2., supra. Applicant's own statements are not the basis of a contention.

However, once construction on the Harris Unit 2 FPCCS is completed and the system and spent fuel pools C and D are commissioned and placed in service, the FPCCS must meet the requirements of 10 C.F.R. Part 50, Appendix B. The 50.55a Alternative Plan addresses the existing situation where HNP is no longer under construction and certain quality documentation

was discarded concerning field welds. Under the circumstances, 10 C.F.R. §50.55a permits an alternative demonstration of an acceptable level of quality and safety in construction. However, the FPCCS will be subject to 10 C.F.R. Part 50, Appendix B, and must in the future comply with, inter alia, Criteria XIII, XVI, and XVII.

The licensed and operating portion of the HNP, including spent fuel pools A and B and the Unit 1 FPCCS, has been subject to the HNP Quality Assurance Program since construction. BCOC does not dispute the efficacy of the present HNP Quality Assurance Program. BCOC offers no basis for the contention that once placed in service the FPCCS will not successfully meet the requirements of the HNP Quality Assurance Program and 10 C.F.R. Part 50, including Criteria XIII, XVI, and XVII. The only facts presented which border on an attack of the HNP Quality Assurance Program are the presentation of four NRC inspections reports from 1981 which found minor deficiencies in construction quality control.[35] Mr. Lochbaum presents these inspection reports to "suggest that CP&L had problems protecting against deterioration before Unit 2 was cancelled." Lochbaum Decl., ¶¶ 10-14 (emphasis in original). He does not, however, suggest in any way that the HNP Quality Assurance Program is inadequate.[36] There is no basis advanced by BCOC for a contention that the HNP Quality Assurance Program is inadequate or,

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35 The 1981 inspection reports, which describe relatively minor deficiencies, certainly cannot support a contention that the HNP Quality Assurance Program is inadequate. Examples of past incidents "are not a sufficient basis to support an assertion that . . . operation might be unsafe [in] the future." Georgia Institute of Technology (Georgia Tech Research Reactor, Atlanta, Georgia), LBP-95-6, 41 NRC 281, 299-300 (1995).

36 Evidence of the efficacy of the HNP Quality Assurance Program is the fact that the Commission issued the Operating License for the Harris plant. In its "Safety Evaluation Report related to the Operation of Shearon Harris Nuclear Power Plant, Units 1 and 2," NUREG-1038 (November 1983), the NRC Staff concluded: "Construction of Shearon Harris Units 1 and 2 has proceeded, and there is reasonable assurance that it will be substantially completed, in conformity with Construction Permits Nos. CPPR-158 and 159, the application as amended, the provisions of the [Atomic Energy] Act, and the rules and regulations of the Commission." Id. at 23-1. The Staff further noted that "such completeness of construction as is required for safe operation at the authorized power levels must be verified by the Commission before the licenses are issued." Id. These conclusions were reached two years after the 1981 inspection reports.

that once placed in commission, the FPCCS will not meet all of the Criteria of 10 C.F.R. Part 50, Appendix B. Under the amended Rules of Practice a petitioner must set forth "[a] brief explanation of the bases of the contention." See § II.B.1., supra.

Thus, that part of Contention 3 that alleges CP&L's failure to satisfy 10 C.F.R. Part 50, Appendix B, Criteria XIII, XVI and XVII in the past cannot be a contention. There is no dispute regarding whether the HNP Unit 2 FPCCS was maintained subject to 10 C.F.R. Part 50, Appendix B, in the past. It was not. There is no issue to litigate. In the future, CP&L must and will maintain the FPCCS in accordance with the criteria set forth in 10 C.F.R. Part 50, Appendix B. BCOC has provided no basis for a contention that CP&L will not comply with 10 C.F.R. Part 50, Appendix B, in the future in its operation of the FPCCS and spent fuel pools C and D. A petitioner cannot challenge the applicant's future compliance with clear regulatory requirements without a particularized basis. See § II.B.4., supra. Nor has BCOC provided any basis for disputing that the HNP Quality Assurance Program will continue to meet the requirements of 10 C.F.R. Part 50, Appendix B, and will continue to provide reasonable assurance of the quality of systems, components and equipment at HNP. Without a basis, a contention cannot be admitted. See § II.B.1., supra. The generalized assertions regarding Applicant's "inadequate quality assurance" must be rejected.

Stripped to its essence, Contention 3 is not about "inadequate quality assurance." Rather, BCOC's discussion surrounding Contention 3 and the Lochbaum Declaration address what they perceive to be deficiencies in the 50.55a Alternative Plan. Specifically, BCOC faults the 50.55a Alternative Plan for (1) "failing to describe a program for identifying and remediating potential corrosion and fouling;" (2) attempting to demonstrate weld quality by use of a remote camera; and (3) in any event, not even looking at all of the embedded welds. We address each one in turn.

b. Potential Corrosion and Fouling

The 50.55a Alternative Plan does not describe a program for identifying and remediating potential corrosion and fouling. That is not the purpose of the 50.55a Alternative Plan, which deals only with an alternative means of demonstrating compliance with the ASME Code, Section III. Applicant is not taking exception to the requirement to install quality FPCCS piping that meets the HNP's design basis. Applicant has developed an "Equipment Commissioning Plan" which addresses inspections of the piping and acceptance criteria to ascertain whether the extended storage of the piping and equipment without controlled storage conditions and regular maintenance has resulted in any degradation, including corrosion (microbiologically induced or otherwise).[37] However, the Equipment Commissioning Plan is not, and need not be, part of the license amendment application. Rather, the Equipment Commissioning Plan is a CP&L internal document that establishes how Applicant will ensure compliance with NRC regulations, license requirements, and Technical Specification requirements.

The inspections of the piping to determine if degradation has occurred are described briefly in the RAI Response.[38] The portions of the piping attached to spent fuel pools C and D have been flooded with water from the spent fuel pools for a number of years.[39] RAI Response, Encl. 1 at 8. Before the FPCCS piping is inspected, the water will be drained and sampled for any potentially harmful contaminants or microorganisms. The piping will be inspected by a remote camera to determine whether corrosion or other degradation has occurred since

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37 The FPCCS piping is 304 or 316 stainless steel piping, 3/8 inch in thickness, and either 12 or 16 inches in diameter. The Equipment Commissioning Plan is found at RAI Response, Encl. 16 at 8-10.

38 RAI Response, Encl. 1 at 5, 8, 14 and 15.

39 The water in the FPCCS piping is the same water as found in the spent fuel pools, which has not corroded stainless steel components in the pools. Nor have there been observed any "minor pinhole leaks" in the FPCCS piping after years of in-place storage with standing water, as occurred in a relatively short time in piping systems in other plants subject to microbiologically induced corrosion. See IE Information Notice No. 85-30 (April 19, 1985).

construction. The camera will have sufficient resolution capability to identify and provide a basis for dispositioning discrepancies which could exist as a result of improper installation or subsequent degradation. The inspection will be conducted by an appropriately trained and qualified Level II NDE inspector and the inspection will be videotaped. RAI Response, Encl. 1 at 14-15.

Accordingly, BCOC has not presented an issue that raises a genuine and material issue in dispute. Applicant has a plan and procedure to inspect the FPCCS piping to determine if it has degraded in any way, including degradation due to corrosion. The NRC will be reviewing the results of the piping inspection.[40] With respect to the one issue raised by BCOC that was pleaded with specificity – the potential susceptibility of stainless steel piping to microbiologically induced corrosion, Applicant will determine whether the microorganisms found to be the cause of the corrosion at its Robinson Unit 2 or any other potentially harmful microorganisms are present in the water in the FPCCS piping at HNP.[41] The remote camera inspection will look for corrosion or degradation of any kind. Unless BCOC can establish with basis and specificity that this inspection plan is inadequate to ensure the piping meets its design

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40 The NRC Staff will be reviewing the results of the piping inspections to confirm that the Applicant will meet its design basis. "The NRC staff has the continuing responsibility to assure that all regulatory requirements are met by an applicant and continue to be met throughout the operating life of a nuclear power plant." Southern California Edison Co. (San Onofre Nuclear Generating Station, Units 2 and 3), ALAB-680, 16 NRC 127, 143 (1982).

41 The environment in the piping at Robinson, and at other plants where microbiologically induced corrosion has been observed, was quite different from that in the FPCCS piping at Harris. The water in the Robinson piping that was subject to microbiologically induced corrosion was service water (lake water) which has a high propensity for microorganisms. See IE Information Notice No. 85-30 (April 19, 1985). In contrast, the water in the FPCCS piping is chemically-treated, demineralized water, which does not afford a favorable environment for microorganisms. The IE Information Notice cited by Petitioner as a basis for microbiologically induced corrosion refers to microorganisms in "soils, sediments, natural fresh water (e.g., wells, rivers, lakes) brackish and sea water, as well as oil and other natural petroleum products." Id. at 2. None of these describe the water in the FPCCS. There is no indication that microorganisms have been found in internal plant, demineralized water that is chemically treated. Petitioner has not provided adequate basis for a contention that the FPCCS piping could be subject to attack by microorganisms.

requirements, there is no real dispute susceptible of resolution in an adjudication. This aspect of Contention 3 must also be dismissed.

c. Remote Camera Inspection of Weld Quality

BCOC's assertions regarding the adequacy of the remote camera inspection are not particularized or pled with any specificity. BCOC asserts that "remote camera inspection can provide only limited information about weld quality, and cannot provide the level of quality assurance that is available from NDE." BCOC Supp. Pet. at 18. After incorrectly speculating that the inspection will not be performed until after the license amendment is issued,[42] BCOC baldly asserts: "The results of the remote camera inspection are not likely to yield clear 'yes' or 'no' answers regarding weld quality or whether significant degradation or fouling has occurred. The interpretation of these results, and whether they satisfy section 50.55a, must be subject to questioning in this proceeding." Id. at 19. There are no facts or assertions regarding the adequacy of remote camera inspection of weld quality in the Declaration of Mr. Lochbaum or elsewhere in BCOC's Supplemental Petition.

Greater detail regarding the remote camera inspection is provided in the RAI Response, Encl. 1 at 14-15. A pipe crawler mounted camera will perform a detailed inspection of the interior surfaces of embedded field welds. The camera will be capable of camera resolution to at least 1/32 inch strand of wire. Embedded field welds will be inspected for cracks, lack of fusion, lack of penetration, oxidation, undercut greater than 1/32 inch, reinforcement greater than 1/16 inch, concavity greater than 1/32 inch, porosity greater than 1/16 inch, and inclusions. While this is not the same as NDE inspections performed at the time of the welding, it will provide direct physical evidence of quality of the embedded welds. Lic. Amend. App., Encl. 8, at 10.

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42 The remote camera inspection of the piping is scheduled for late May or early June of 1999. RAI Response, Encl. 1 at 15.

Furthermore, hydrotest records are available for piping lines that include 13 of the 15 embedded welds. The hydrotest records confirm that each weld had successfully completed NDE and a Weld Data Record had been reviewed prior to the hydrotest.[43] Successful reinspection by NDE of all 22 accessible field welds -- with no rejections -- on the same piping provides additional assurance of weld quality.[44] Lic. Amend. App., Encl. 8, at 9-10.

Accordingly, BCOC has not presented an issue relating to the remote camera inspection that raises a genuine and material issue in dispute. Applicant has an inspection plan and acceptance criteria to inspect the FPCCS piping to determine the physical condition of accessible embedded field welds. The NRC will be reviewing the results of the piping inspection. Unless BCOC can establish with basis and specificity that this inspection plan is inadequate to ensure the piping welds meet design requirements, there is no real dispute susceptible of resolution in a hearing. This aspect of Contention 3 must also be dismissed.

d. Inspection of Fewer than All Embedded Welds

BCOC contends that "CP&L's approach for the two-thirds of the embedded welds that will receive no inspection is inadequate to provide the level of quality and safety required by section 50.55a." BCOC Supp. Pet. at 19. BCOC asserts that the "circumstantial evidence" that confirms that the welds were actually inspected is "not an adequate substitute for actual documented evidence that inspections were conducted and the welds found to be in acceptable condition."[45] Id. However, neither the Declaration of Mr. Lochbaum nor the Declaration of

43 RAI Response, Encl. 3, lists each field weld and the records available to support the weld quality.

44 All accessible field welds in the scope of the 50.55a Alternative Plan have been reinspected using original construction criteria from ASME Section III, 1974-winter 1976 Addenda, ND-5000. See RAI Response, Encl. 1 at 5.

45 Indeed, the hydrotest records for 13 of the 15 welds are "actual documented evidence that inspections were conducted and the welds found to be in acceptable condition." It is only the specific Weld Data Record itself that is missing.

Dr. Thompson offers any basis for the assertion that Applicant's 50.55a Alternative Plan is inadequate if all of the welds cannot be inspected.[46]

Currently 6 of the 15 embedded field welds are included in the inspection plan for the remote camera, including the two field welds for which hydrotest records are not available. RAI Response, Encl. 1 at 17. The quality of those embedded field welds which are not accessible for remote camera inspection is assured by virtue of the HNP Quality Assurance Program and ASME Quality Assurance Program that was in effect at the time of the welding of the large bore piping and throughout construction of the HNP. Considerable evidence exists that the welds of the FPCCS piping were conducted in strict adherence to the programmatic requirements of the HNP Quality Assurance Program, including: (1) the quality of the construction of the licensed HNP; (2) re-performance of Code required inspections on accessible field welds in the same piping with no rejectable indications identified; and (3) the existence of numerous Quality Assurance records from the time of plant construction which supports this conclusion. Id. The 50.55a Alternative Plan has been endorsed by CP&L's nuclear insurer, Hartford Steam Boiler Inspection and Insurance Company. The endorsement letter is authored by Dr. Richard Fiegel, Vice President of Hartford and Chairman of the ASME Council on Codes and Standards. Id., Encl. 1 at 18, Encl. 13.

There is no basis to support a contention that the 50.55a Alternative Plan is not acceptable because all of the welds will not be inspected by remote camera. In light of the detailed discussion of the adequacy of the 50.55a Alternative Plan in Enclosure 8 to Applicant's license amendment application and in the Response to the NRC Staff's RAIs, BCOC must provide something more, with specificity, to support this aspect of Contention 3.

46 Dr. Thompson simply asserts that "failure to satisfy ASME code requirements could increase the probability of design-basis or severe accidents at pools C and D." Thompson Decl., Ex. 2, at 5-6. No basis is provided for this assertion. Dr. Thompson never suggests what about Applicant's 50.55a Alternative Plan is unacceptable.

e. **Failure to Show a Specific, Tangible Link between Alleged Errors in the 50.55a Alternative Plan and Health and Safety Impacts**

Contention 3 must also be rejected in its entirety because BCOC has failed to show a specific, tangible link between the alleged deficiencies in the 50.55a Alternative Plan and public health and safety. See §II.B.6, supra. The suction and discharge of the FPCCS piping in the spent fuel pools are located approximately five feet below the surface of the water and well above the level of the spent fuel to be stored in spent fuel pools C and D.[47] The piping lines are not subject to high pressure because they are open to the pools, which are open to atmospheric pressure. If one of the piping lines developed a leak, the spent fuel pools could not empty and the fuel would remain covered with water. If a weld that is embedded in concrete had a defect, there is nothing that could happen that would have any impact on public health and safety. There is no significant pressure in the piping to propagate the defect in the weld. If the weld were to develop a crack, there would be nowhere for the water to go with concrete encasing the piping. As noted previously, Dr. Thompson offers no factual basis or even a theoretical explanation for his bald assertion that lack of Quality Assurance documents could "increase the probability of design-basis or severe accidents at [spent fuel] pools C and D." See Thompson Decl. at 6. Mr. Lochbaum's concerns regarding safety are limited to the "failure . . . to provide reasonable assurance against possible deterioration of the installed Unit 2 spent fuel pool cooling system." Lochbaum Decl. at ¶ 11. But even here, Mr. Lochbaum fails to show a specific, tangible link between the purported failure in the plan to provide for the possibility of deterioration of the piping and any health and safety impacts. A contention must be dismissed where the

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[47] Harris FSAR at 9.1.3-6a to 6b. "The reduction of the normal pool water level by approximately 5 ft. due to any postulated [FPCCS] pipe failure will have no adverse impact on the capability of the cooling system to maintain the required temperature and it does not affect the required shield water depth for limiting exposures from the spent fuel. The slow heatup rate of the fuel pool would allow sufficient time to take any necessary action to provide adequate cooling using the backup provided while the cooling capability for the fuel pool is being restored." Id. at 9.1.3-6b.

"contention, if proven, would be of no consequence . . . because it would not entitle [the] petitioner to relief." 10 C.F.R. § 2.714(d)(2)(ii); Yankee Atomic, LBP-96-2, supra, 43 NRC at 78, aff'd, CLI-96-7, supra, 43 NRC 235. Here BCOC has utterly failed to show that the consequences of its alleged deficiencies could in any way affect public health and safety. For this reason alone, Contention 3 must be rejected.

3. Summary of Response to Contention 3

Contention 3 is broadly worded with basis and specificity offered for only a narrow segment of the Contention advanced. First, Contention 3 must be rejected because there is no genuine issue in dispute regarding the fact that the FPCCS was not subject to 10 C.F.R. Part 50, Appendix B, and the HNP Quality Assurance Plan once construction of Unit 2 was abandoned. Second, there is no basis advanced for a Contention regarding "inadequate quality assurance," either past or future. Petitioner has made no particularized demonstration that Applicant will not conform to the Commission's explicit requirements for Quality Assurance of the FPCCS and pools C and D. Third, BCOC has not advanced a basis for a challenge to the adequacy of Applicant's planned inspections to determine if the FPCCS piping has been subject to any corrosion or fouling. Nor has Petitioner provided an adequate basis for its assertion that stainless steel piping with chemically-treated, demineralized water could be subject to microbiologically-induced corrosion. Fourth, BCOC has not provided a basis for its generalized contention of the inadequacy of the 50.55a Alternative Plan using remote camera inspection to confirm existing quality documentation. Fifth, BCOC has not explained why inspection of less than 100% of the embedded welds does not provide adequate assurance of weld quality, assuming the remote camera inspection of 6 of 15 welds confirms what the NDE inspection found in 22 similar field welds in the same piping. Finally, BCOC has not shown any link between the alleged inadequacies in the 50.55a Alternative Plan and public health and safety. For all of these reasons, Contention 3 must be rejected.

IV. GROUP II: ENVIRONMENTAL CONTENTIONS

At the outset, we note that the NRC Staff and NRC Counsel have advised Applicant that the NRC Staff, in its discretion, will prepare an environmental assessment ("EA") in connection with its consideration of the instant license amendment application. Thus, the NRC Staff has elected to travel a well-worn path where the destination is inevitable. Because of the Department of Energy's delay in implementing the Nuclear Waste Policy Act of 1982 and in developing the permanent repository for spent nuclear fuel, license amendments to expand spent fuel storage capacity have been requested and granted at almost every nuclear operating facility – often more than once. In each case an environmental assessment has been prepared. In each case there has been a finding of "no significant [] environmental impacts associated with the proposed action." See, e.g., 64 Fed. Reg. 2,688 (Union Electric Company, Callaway Plant) (1999); 64 Fed. Reg. 23,133 (Florida Power & Light Company, St. Lucie Plant) (1999). Accordingly, the NRC has never prepared an environmental impact statement ("EIS") in connection with the many expansions of on-site spent fuel storage in existing spent fuel pools. See, e.g., Vermont Yankee Nuclear Power Corporation (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 42 n. 13 (1989); Pacific Gas and Electric Co. (Diablo Canyon Nuclear Power Plant, Units 1 and 2), LBP-87-24, 26 NRC 159, 166 (1987).

The Commission has expressly addressed the environmental and radiological effects of on-site spent fuel storage generically in the context of license renewal. See "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses," 61 Fed. Reg. 66,537, 66,538 (1996). The Commission has found by rule:

> [I]f necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations.

10 C.F.R. § 51.23(a). See also Oconee, CLI-99-11, supra, slip op. at 20 (1999). This generic finding is focused on the storage of spent fuel after cessation of reactor operation. The specific assessment regarding additional spent fuel storage in pools at HNP will inevitably dictate the same finding of "no significant environmental impacts associated with the proposed action."

Accordingly, Applicant sought to have this license amendment treated as a "categorical exclusion" not requiring an environmental review or environmental assessment, pursuant to 10 C.F.R. § 51.22(c)(9). However, the NRC Staff's decision to prepare an environmental assessment in its discretion simply either moots, or requires rejection as premature, Contentions 4 through 8. In addition, Contention 6 raises an issue outside of the scope of this proceeding. Contention 8 asks the Licensing Board to take an action outside the scope of its authority. We address each environmental contention in turn.

A. Contention 4: Proposed License Amendment Not Exempt from NEPA

1. The Contention

BCOC asserts in Contention 4 that:

> CP&L errs in claiming that the proposed license amendment is exempt from NEPA under 10 C.F.R. § 51.22.

BCOC Supp. Pet. at 22. As its bases for Contention 4, BCOC repeats the allegations in Contentions 1 though 3 (id. at 21-22) and argues that Applicant does not qualify for a "categorical exclusion" pursuant to 10 C.F.R. § 51.22(c)(9) by repeating its comments on the NRC Staff's preliminary determination of "no significant hazards consideration" (id. at 22-36).[48] As will become clear, it is unnecessary to discuss Petitioner's purported basis for this contention.

[48] The bulk of the Petitioner's arguments directly and impermissibly would challenge the NRC Staff's "no significant hazards consideration" determination. "No petition or other request for review or hearing on the staff's significant hazards consideration determination will be entertained by the

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2. Applicant's Response to the Contention

Applicant never claimed that it was "exempt from NEPA." Applicant believes that this license amendment application falls within the "categorical exclusion" set forth at 10 C.F.R. § 51.22(c)(9). The categorical exclusions are part of the Commission's implementation of the National Environmental Policy Act ("NEPA"). The Commission has found by rule that a certain "category of actions does not individually or cumulatively have a significant effect on the human environment." 10 C.F.R. § 51.22(a). In any event, this contention is moot because the NRC Staff is preparing an environmental assessment pursuant to its regulations implementing NEPA. The NRC Staff is neither treating the license amendment application "as exempt from NEPA" nor as a "categorical exclusion." Contention 4 does not raise a genuine issue in dispute and must be rejected.

B. Contention 5: Environmental Impact Statement Required

1. The Contention

BCOC's Contention 5 asserts the following:

> The proposed license amendment is not supported by an Environmental Impact Statement ("EIS"), in violation of NEPA and NRC's implementing regulations. An EIS should examine the effects of the proposed license amendment on the probability and consequences of accidents at the Harris plant. As required by NEPA and Commission policy, it should also examine the costs and benefits of the proposed action in comparison to various

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Commission. The staff's determination is final, subject only to the Commission's discretion, on its own initiative, to review the determination." 10 C.F.R. § 50.58(b)(6). Yankee Atomic Electric Co. (Yankee Nuclear Power Station), CLI-98-21, 48 NRC 185, 204 n.7 (1998); Florida Power & Light Co. (St. Lucie Nuclear Power Plant, Unit 1), LBP-88-10A, 27 NRC 452, 456-457 (1988) (holding that the "Board is barred as a matter of Commission regulation" from granting a hearing on the Staff's significant hazards consideration determination). BCOC is precluded by 10 C.F.R. § 50.58(b)(6) from challenging the first prong of the test for "categorical exclusion" under 10 C.F.R. § 51.22(c)(9).

> alternatives, including Severe Accident Mitigation Alternatives and the alternative of dry cask storage.

BCOC Supp. Pet. at 36. As its basis for this Contention 5, BCOC incorporates by reference the bases advanced for Contention 4 and legal argument as to the requirements of NEPA. Id. at 36-38. Again, it is unnecessary to discuss Petitioner's purported basis for this contention for the reasons discussed below.

2. Applicant's Response to the Contention

The Commission's rules at 10 C.F.R. § 51.31 provide that "[u]pon completion of an environmental assessment, the appropriate NRC staff director will determine whether to prepare an environmental impact statement or a finding of no significant impact on the proposed action." Consequently, it is premature to admit a contention asserting that an environmental impact statement is required until the NRC Staff has issued its environmental assessment. Pursuant to 10 C.F.R. § 51.20, a prerequisite for the instant licensing action to require preparation of an environmental impact statement is an NRC Staff finding that the proposed action is "a major Federal action significantly affecting the quality of the human environment." Absent such a finding, an environmental impact statement is not required pursuant to the criteria set forth in § 51.20. A contention that an environmental impact statement is required where the criteria in § 51.20 are not met would impermissibly challenge the Commission's rules. As discussed in Section II.B.4., supra, a contention may not challenge a Commission rule.

In Diablo Canyon, LBP-93-1, supra, 37 NRC 5, this exact issue was addressed by the licensing board in connection with a contention that an environmental impact statement must be prepared in connection with the issuance of a license amendment. At the time of the prehearing conference, the Staff had not yet prepared its environmental assessment. The Diablo Canyon licensing board held that admitting such a contention was premature:

> Insofar as this contention seeks an EIS, therefore, it is premature. We are denying it on that basis. After the Staff issues its EA, and

assuming that the EA will not call for an EIS, [intervenor] may submit a late-filed contention calling for an EIS. Such a contention, to be accepted, would have to be based on substantial and significant information indicating why an EIS is called for.

Id. At 36. See also Consumers Power Co. (Big Rock Point Nuclear Plant), ALAB-636, 13 NRC 312, 350 (1981) (reversing the licensing board's order to the NRC Staff to prepare an EIS on a proposed spent fuel pool expansion prior to the Staff's preparation of its environmental assessment).[49]

Both the Commission's rules and precedent require that Contention 5 be rejected as premature. Consequently, while Applicant strongly disagrees with the legal and factual arguments advanced in support of Contention 5, it serves no purpose to argue them in the abstract. Certainly if an environmental impact statement is not required and the Commission does not decide to prepare one in its discretion, what should be considered in such an environmental impact statement is an academic issue. If Petitioner disagrees with the NRC Staff's findings in the environmental assessment, the Commission's rules provide an opportunity for late-filed contentions. 10 C.F.R. § 2.714(a)(3).

C. Contention 6: Scope of EIS Should Include Brunswick and Robinson Storage

1. The Contention

BCOC asserts in Contention 6 that:

> The EIS for the proposed license amendment should include within its scope the storage of spent fuel from the Brunswick and Robinson nuclear power plants.

[49] See generally Kelley v. Selin, 42 F.3d 1501, 1518 (6th Cir.) cert. denied, 515 U.S. 1159 (1995) ("An agency decision, based on an EA, that no EIS is required, can be overturned only if it is arbitrary, capricious, or an abuse of 'discretion'. . . . We will not 'substitute our judgment of the environmental impact for the judgment of the agency, once the agency has adequately studied the issue.'") citing Crounse Corp. v. I.C.C., 781 F.2d 1176, 1193 (6th Cir.) cert. denied, 479 U.S. 890 (1986).

BCOC Supp. Pet. at 38. BCOC provides two brief paragraphs as basis for this contention.

First, BCOC asserts that "there is no independent utility to the racking of a spent fuel pool: the only reason for the application is to permit the expansion of spent fuel storage at the plant[,] . . . not only . . . spent fuel generated by Harris, but also . . . fuel from Brunswick and Robinson." Id. (emphasis added).

Second, BCOC contends that "CP&L has a global plan for storage of spent fuel from its three North Carolina reactors, including the option of dry cask storage at Brunswick." Id. (emphasis added). BCOC bases this allegation on the fact that CP&L submitted an application for an ISFSI at Brunswick 10 years ago, and BCOC's assumption that "the application is still pending."[50] Id. BCOC also bases its contention on the fact that a Department of Energy (DOE) report from 1994 states that an ISFSI at Brunswick will be used as a backup for storage if transshipment to Harris "is prohibited." Id. at 39.

2. Applicant's Response to the Contention

Just as Contention 5 must be rejected as premature, so should Contention 6. However, Contention 6 should also be rejected with prejudice at this stage because it attempts to raise issues that are beyond the scope of this proceeding, and runs directly counter to Commission precedent. Furthermore, the specific bases asserted by the Petitioner fail to meet the Commission's pleading requirements because the first part of the bases fails to identify a genuine dispute with Applicant, and the second part is factually incorrect.

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[50] BCOC states that it was unable to determine if the application was still pending based on its review of the correspondence index in the NRC Public Document Room. BCOC Supp. Pet. at 38.

a. BCOC's Basis Fails to Meet the Commission's Pleading Requirements

BCOC's first specific basis fails to identify a genuine dispute with Applicant. The Commission's pleading requirements for contentions require that the Petitioner "show that a genuine dispute exists with the applicant on a material issue of law or fact." 10 C.F.R. § 2.714(b)(2)(iii). Any contention not meeting the Commission's contention requirements "must be rejected." Palo Verde, CLI-91-12, supra, 34 NRC at 155; see also § II.A., supra. BCOC's first basis states that the reason for CP&L's amendment application is to permit the expansion of spent fuel storage at Harris for "spent fuel generated by Harris" as well as "fuel from Brunswick and Robinson." BCOC Supp. Pet. at 38. CP&L concurs with this statement and, in fact, specifically stated in its license amendment application that:

> Activation of these two pools [C and D] will provide storage capacity for all four CP&L nuclear units (Harris, Brunswick 1 and 2, and Robinson) through the end of their current licenses.

Lic. Amend. App., Encl. 1 at 1 (emphasis added). NRC granted CP&L a license for Harris to receive and possess spent fuel transshipped from Brunswick and Robinson at Harris as part of Harris's initial operating license approval in 1987. See Shearon Harris Nuclear Power Plant, Unit 1, Facility Operating License, License NPF-63 at 3 (Jan. 12, 1987) (Section 2.B(8)). The instant license amendment application does not involve the legal ability of Harris to accept and store spent fuel from Harris, Brunswick, and Robinson; the NRC approved this over 12 years ago. See id. The only issue presented by this amendment is how spent fuel at Harris, including fuel from Harris, Brunswick and Robinson, will be stored. Applicant fully agrees with the Petitioner that the reason for activating Harris spent fuel pools C and D is specifically to store "spent fuel generated by Harris" as well as "fuel from Brunswick and Robinson."[51] See BCOC

[51] However, even if spent fuel were no longer shipped from Brunswick and Robinson to Harris, there is "independent utility" in the instant license amendment application to store spent fuel from Harris alone.

Supp. Pet. at 38. BCOC's first specific basis does not identify a dispute with Applicant, and therefore this basis must be rejected because it fails to comply with the Commission's pleading requirements to "show that a genuine dispute exists with the applicant." See § II.B.2., supra.

BCOC's second specific basis asserts that "CP&L has a global plan for storage of spent fuel" which includes "the option of dry cask storage at Brunswick." BCOC Supp. Pet. at 38. BCOC asserts as its support the fact that CP&L submitted an application for an ISFSI license at Brunswick 10 years ago, and BCOC's mistaken belief that "the application is still pending." Id. (emphasis added). However, in September 1991, CP&L requested the NRC to delay issuing the license pending further notice. Letter from G. Vaughn (CP&L) to NRC (Sept. 17, 1991) (PDR Accession No. 9109260069). By letter dated November 2, 1994, the NRC informed CP&L that:

> Because of your circumstances and inactivity in the licensing process, we have determined that to continue the review is not an effective use of resources and, therefore, are suspending review of your license application.

Letter from C. Haughney (NRC) to R. Anderson (CP&L) at 1 (Nov. 2, 1994) (PDR Accession No. 9411090152) (emphasis added). Since that time, no further activity has been performed on an ISFSI at Brunswick. BCOC's assertion that the "application is still pending" is mistaken.

The only other support cited by Petitioner for this basis is a DOE report from 1994. This report does not provide a basis for the contention. The statement in the DOE report is predicated on use of the Brunswick ISFSI if transshipment to Harris "is prohibited." See BCOC Supp. Pet. at 39. As discussed above, the Harris license explicitly allows receipt of spent fuel transshipped from Brunswick. Therefore, transshipment to Harris is clearly not prohibited and thus the predicate for the statement in the DOE report is not correct. A petitioner's mistaken understanding of the facts regarding an application does not provide a basis for a litigable contention. See § II.B.3., supra. BCOC's assertion that the application for an ISFSI at Brunswick "is still pending" is both unsubstantiated and mistaken. The DOE statement cited by

BCOC for support is reliant on a predicate circumstance (prohibition of transshipment) that does not exist. Because BCOC's statements supporting this basis are unsubstantiated and mistaken, BCOC's second asserted basis for Contention 6 must be rejected for failing to provide a sufficient basis for an admissible contention, as required by the Commission's regulations.

b. BCOC's Contention is Outside of the Scope of this Proceeding

BCOC's Contention 6 must also be rejected because it raises an issue that is outside of the scope of this proceeding. The alternative of spent fuel storage at Brunswick and Robinson would have been within the scope of the hearings on receipt of Brunswick and Robinson fuel at Harris, as part of the initial operating license for Harris in 1987. However, the alternative of spent fuel storage at Brunswick and Robinson is outside the scope of this license amendment proceeding to expand the capacity of the Harris spent fuel storage pools.

BCOC's Contention 6 asserts that the EIS for this license amendment should include "Brunswick and Robinson storage," including "the option of dry cask storage at Brunswick." BCOC Supp. Pet. at 38. This very issue has previously been addressed in a prior agency proceeding. See Virginia Electric and Power Co. (North Anna Power Station, Units 1 and 2), LBP-84-40A, 20 NRC 1195, 1200, aff'd, ALAB-790, 20 NRC 1450, 1453-54 (1984). In North Anna, the applicant ("VEPCO") had submitted two separate license amendment requests: (1) one license amendment request was to receive spent fuel shipped from VEPCO's Surry plant at North Anna (Case OLA-1); and (2) a second license amendment request was to expand the storage capacity of the North Anna spent fuel pools (Case OLA-2). North Anna, LBP-84-40A, supra, 20 NRC at 1195; see also North Anna, ALAB-790, supra, 20 NRC at 1451-52. The petitioner in that case attempted to include a contention in the North Anna spent fuel pool expansion proceeding, OLA-2, asserting that the environmental analysis for the North Anna spent fuel pool expansion amendment must "consider[] the alternative method of constructing a dry cask storage facility at the Surry Station." North Anna, LBP-84-40A, supra, 20 NRC at 1199

(emphasis added). The petitioner's contention, therefore, asserted that the amendment for spent fuel pool expansion at the North Anna plant must consider the alternative of dry storage at VEPCO's Surry plant. The Board rejected this contention as beyond the scope of the spent fuel pool expansion proceeding (OLA-2), stating that the contention was "directed solely to the transshipment of Surry spent fuel assemblies or to an alternative thereto." Id. at 1200. The Board concluded that the two proceedings were separate actions and that the contention regarding dry storage the Surry plant lacked basis with respect to the North Anna spent fuel pool expansion proceeding.

The Atomic Safety and Licensing Appeal Board affirmed the Licensing Board's decision. North Anna, ALAB-790, supra, 20 NRC at 1454. The Appeal Board agreed that the two proceedings were separate, and that the petitioner's "bases . . . were inadequate to allow [the petitioner] to be heard with regard to the proposed modification of the North Anna spent fuel pool." Id. at 1453. The Appeal Board concluded that:

> As a matter of both fact and law, a modification to the North Anna spent fuel pool can and will have no bearing upon whether . . . VEPCO is given the green light to transport Surry assemblies for receipt and storage at North Anna.

Id. at 1454.

Just as in North Anna OLA-2, in this proceeding the Applicant is seeking approval to expand the capacity of the Harris spent fuel pools. Just as the petitioner asserted in North Anna, BCOC has asserted here that the environmental analyses to support the Harris spent fuel pool expansion must consider storage at the Applicant's other licensed plants as an alternative. BCOC Supp. Pet. at 37-38. Again, as in North Anna, the proceeding to address receipt of spent

fuel at Harris from the Applicant's other reactors was a separate licensing proceeding.[52] Just as in North Anna, the Petitioner's contention asserting that storage at Brunswick and Robinson must be considered in the license amendment for spent fuel pool expansion at Harris is beyond the scope of this license amendment proceeding.

Contention 6 must be rejected because it lacks basis, is beyond the scope of this proceeding, and is contrary to NRC case law precedent.

D. Contention 7: Environmental Assessment Required

1. The Contention

BCOC asserts in Contention 7 that:

> Even if the Licensing Board finds that no EIS is required, it must order the preparation of an EA.

BCOC Supp. Pet. at 39. Again, it is unnecessary to discuss Petitioner's purported basis for this contention as the NRC Staff has stated that it will prepare an environmental assessment.

2. Applicant's Response to the Contention

Contention 7 must be rejected as moot in light of the NRC Staff's decision to prepare an environmental assessment in connection with its consideration of the license amendment application. See § III.D.2., supra.

E. Contention 8: Discretionary EIS Warranted

1. The Contention

BCOC Contention 8 asserts the following:

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52 Indeed, the proceeding to approve receipt of Brunswick and Robinson spent fuel at Harris occurred over 12 years ago. See Carolina Power and Light Co. (Shearon Harris Nuclear Power Plant), ALAB-837, 23 NRC 525, 542-44 (1986).

> Even if the Licensing Board determines that an EIS is not required under NEPA and 10 C.F.R. § 51.20(a), the Board should nevertheless require an EIS as an exercise of its discretion, as permitted by 10 C.F.R. §§ 51.20(b)(14) and 51.22(b).

BCOC Supp. Pet. at 40. BCOC provides four pages of text as the basis for its contention. To facilitate the determination of admissibility of this contention, the Applicant has summarized the bases asserted by BCOC for Contention 8 as follows:

> 10 C.F.R. §§ 51.20(b)(14) and 51.22(b) provide for the preparation of an EIS where, upon its own initiative or request from any party, the Commission finds that "special circumstances" exist, and this case presents special circumstances;
>
> The NRC should prepare an EIS as an exercise of its discretion;
>
> An EIS should include storage of spent fuel at Brunswick and Robinson;
>
> The NRC should evaluate the apparent conflict between the CP&L proposal and the NRC's Waste Confidence decision.

BCOC Supp. Pet. at 40-43.

2. Applicant's Response to the Contention

As with Contention 5, it would be inappropriate to consider whether an environmental impact statement should be prepared until after the NRC Staff publishes its environmental assessment. However, Contention 8 should also be rejected with prejudice because the Licensing Board has no authority to direct the Commission to perform a discretionary act. Furthermore, Petitioner has made no showing of "special circumstances" which would warrant such a discretionary environmental impact statement. Finally, preparation of an environmental impact statement regarding additional spent fuel storage at HNP in a spent fuel pool would simply be redundant of a number of definitive, generic findings by the Commission regarding the "small" and "insignificant" environmental impacts from many decades of on-site spent fuel storage.

a. Outside the Scope of the Licensing Board's Authority

This Licensing Board was established to preside over any proceeding pursuant to Petitioner's hearing request in connection with CP&L's license amendment application. The delegation of authority from the Commission is set forth in the Federal Register notice establishing the Licensing Board. 64 Fed. Reg. 10,165 (1999). The delegation refers specifically to a number of sections in 10 C.F.R. Part 2. Nowhere does the Commission delegate to the Licensing Board the authority to order the preparation of a discretionary environmental impact statement pursuant to 10 C.F.R. § 51.20(b)(14) or § 51.22(b).

Indeed, in promulgating its environmental rules, the Commission stated that

> Section[s] 51.20(a) and (b)(13) [now renumbered as (b)(14)] also provides that the Commission may prepare an [EIS] in connection with other types of proposed actions . . . when the Commission determines, in the exercise of its discretion, that it is advisable to do so. It is not possible to predict how often or under what circumstances the Commission might wish to exercise this discretion.

49 Fed. Reg. 9352, 9362 (1984) (emphasis added). The Commission goes on to say that:

> the Commission believes that its responsibilities for protecting the public health and safety and giving appropriate consideration to environmental values will be best served if it retains the flexibility and authority to direct its staff to prepare environmental assessments or environmental impact statements very early in the decisionmaking process.

Id. at 9366 (emphasis added). The Commission reserved to itself the discretion to direct the NRC Staff to prepare environmental assessments and environmental impact statements that were not required by its regulations.[53] The Commission also notes that:

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[53] In a similar circumstance in St. Lucie, LBP-88-10A, supra, 27 NRC at 457, the Licensing Board found that in promulgating 10 C.F.R. § 50.58(b)(6), "the Commission made it clear that the reference

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> the Commission may wish, as a matter of discretion, to have the benefit of an environmental assessment or an environmental impact statement in considering the desirability of a proposed course of action, even though, as a strict legal matter, neither may be required. A major purpose of § 51.22(b) is to preserve this necessary flexibility.

Id. The Commission goes on to say that:

> It is not possible to predict how often or under what circumstances the Commission might wish to exercise this discretion. However, there are likely to be at least a few occasions on which actions, which in normal circumstances might qualify for a categorical exclusion or only result in a finding of no significant impact following the completion of an environmental assessment, would, because of unique, unusual or controversial circumstances, require extensive environmental review.

Id. at 9362 (emphasis added). Here there are certainly no unique, unusual or controversial circumstances to the Commission, as amendments to expand spent fuel storage at reactor sites have become commonplace.[54] However, the Commission has reserved to itself the determination of when such a test might be met. Absent a specific delegation of authority, the Licensing Board cannot order the preparation of a discretionary environmental impact statement.

Contention 8 must be rejected because the Licensing Board could not order the relief requested.

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to the 'Commission' meant the Commissioners themselves and that this Board had no authority to act on the Staff's finding as such."

54 The standard would be rendered meaningless if a petitioner's intervention and contention itself rendered the circumstances "controversial."

b. Petitioner Offers No Basis for "Special Circumstances" That Could Warrant a Discretionary Environmental Impact Statement

10 C.F.R. §§ 51.20(b)(14) and 51.22(b) provides for the preparation of an environmental assessment or an EIS where, upon its own initiative or request from any party, the Commission finds that "special circumstances" exist. See also 10 C.F.R. § 51.21. Petitioner refers to CP&L's plan to store spent fuel from Brunswick and Robinson at Harris and Petitioner's preference for dry cask storage at Brunswick and Robinson as part of the "special circumstances" here. BCOC Supp. Pet. at 40 – 42. For the reasons set forth in response to Contention 6, CP&L's plans for storage of spent fuel at Brunswick and Robinson are outside the scope of this proceeding. The HNP is already licensed to accept and store spent fuel from those CP&L-owned units.

The second "special circumstance" cited by Petitioner is an "apparent conflict" between the CP&L license amendment request to expand its spent fuel storage capacity at the Harris facility and the NRC's Waste Confidence decision. See BCOC Supp. Pet. at 42. Supporting its assertion, the Petitioner quotes Enclosure 1 of the Applicant's license amendment request, "DOE spent fuel storage facilities are not available and are not expected to be available for the foreseeable future." BCOC Supp. Pet. at 42 (emphasis added by Petitioner). The Petitioner also provides an excerpt from the Commission's Waste Confidence determination that "[t]here is reasonable assurance that at least one mined geologic repository will be available within the first quarter of the twenty-first century . . ." Id. (citing 10 C.F.R. § 51.23).

There is no conflict between the Applicant's statement and the Commission's determination. The Applicant states that the DOE repository is not expected to be available for over 10 years and that CP&L's storage needs begin in the year 2000, which is long before the DOE expected availability date in 2010. Lic. Amend. App., Encl. 1 at 1. The Applicant's statement and its need for storage in the year 2000, before the DOE expected availability date of the repository in 2010, is certainly not in conflict with the Commission's determination that a

repository would be available "within the first quarter of the twenty-first century," or before the year 2025. The Petitioner's mistaken understanding of the Applicant's statement in the amendment request does not form the basis for any "special circumstance." Indeed, the entire nuclear utility industry is faced with the same delay by the Department of Energy.

c. Preparation of a Discretionary Environmental Impact Statement Would Be Redundant to Generic Environmental Impact Statements Prepared by the Commission

The Commission has prepared a number of generic environmental impact statements that have looked at the environmental consequences of long-term storage of spent nuclear fuel in on-site spent fuel pools and elsewhere. The Commission's findings have been consistent for over two decades and were repeated approvingly just last month, as noted in the introduction to the discussion of environmental contentions, supra at 53. In its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," NUREG-1437, at Vol. 1, xlviii (May 1996), the Commission found:

> [T]here is ample basis to conclude that continued storage of existing spent fuel and storage of spent fuel generated during the license renewal period can be accomplished safely and without significant environmental impacts. Radiological impacts will be well within regulatory limits; thus radiological impacts of on-site storage meet the standard for a conclusion of small impact. The nonradiological environmental impacts have been shown to be not significant; thus they are classified as small. The overall conclusion for on-site storage of spent fuel during the term of a renewed license is that the environmental impacts will be small for each plant.

(Emphasis added.) The Commission defined "small" to mean "not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource." Id. at Vol. 1, xxxv. See also "Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," NUREG-0575, Vol. 1 (August 1979). These facts would not change with a new, discretionary environmental impact statement.

Contention 8 must be rejected.

IV. CONCLUSION

For the reasons set forth with respect to each contention, Applicant submits that Contentions 1 through 8 must be rejected and, consequently, BCOC's Petition to Intervene must be dismissed.

Respectfully submitted,

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Dated: May 5, 1999

DOCKETED
USNRC

'99 MAY -7 P2:52

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
CAROLINA POWER & LIGHT COMPANY	)	Docket No. 50-400-LA
	)	
(Shearon Harris Nuclear Power Plant)	)	ASLBP No. 99-762-02-LA

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing "Applicant's Answer to Petitioner Board of Commissioners of Orange County's Contentions," dated May 5, 1999, was served on the persons listed below by U.S. mail, first class, postage prepaid, and by electronic mail transmission, this 5th day of May, 1999.

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Exhibit 1

Title/Approval Sheet

SYSTEM# 4065

CALC. TYPE Mechanical

CAROLINA POWER & LIGHT COMPANY

SF-0040
(CALCULATION #)

FOR

Spent Fuel Pools C and D Activation Project Thermal-Hydraulic Analysis
(TITLE INCLUDING STRUCTURE/SYSTEM/COMPONENT)

FOR

SHEARON HARRIS NUCLEAR POWER PLANT X

NUCLEAR ENGINEERING DEPARTMENT

QUALITY CLASS X A ☐ B ☐ C ☐ D ☐ E

REV. NO.	RESPONSIBLE ENGINEER DATE	☒ DESIGN VERIFIED BY ☐ ENGINEERING REVIEW BY DATE	APPROVED BY RESPONSIBLE SUPERVISOR DATE
0	[signature] 10/27/98	[signature] 10/27/98	R. Steve Edwards 11-10-98
REASON FOR CHANGE			
REASON FOR CHANGE			

List of Effective Pages

PAGE	REV	PAGE	REV	PAGE	REV
i	0	28	0	B	0
ii	0	29	0	C	0
iii	0	30	0	D	0
1	0	31	0	E	0
2	0	32	0	F	0
3	0			G	0
4	0			H	0
5	0			I	0
6	0			J	0
7	0			K	0
8	0			L	0
9	0			M	0
10	0			N	0
11	0			O	0
12	0			P	0
13	0			Q	0
14	0			R	0
15	0			S	0
16	0			T	0
17	0			U	0
18	0			V	0
19	0			W	0
20	0			X	0
21	0			Y	0
22	0			Z	0
23	0			AA	0
24	0			BB	0
25	0			CC	0
26	0	**Attachments**		DD	0
27	0	A	0	EE	0

Table of Contents

1.0 PURPOSE

The purpose of this calculation is to document the thermal hydraulic capacity of the Component Cooling Water System (CCWS) to support the activation of Spent Fuel Pools C and D at CP&L's Harris Nuclear Plant (HNP). This calculation is only valid for Spent Fuel Pool C and D heat loads up to 1.0 MBTU/hr and does not consider the effect of potential increases in core thermal power due to the Steam Generator Replacement/Power Uprate Project.

2.0 REFERENCES

(1) Harris Nuclear Plant Calculation CC-0039 Revision 0, Development of Component Cooling Water System PROTO-FLO Thermal-Hydraulic Model

(2) Harris Nuclear Plant Calculation SW-0088 Revision 0, Development of Emergency Service Water System PROTO-FLO Thermal-Hydraulic Model

(3) Harris Nuclear Plant Calculation HNP-M/MECH-1011 Revision 2, Pump Degradation Limits for ESW, CCW & ESCW, dated 5/10/97

(4) Stone & Webster Feasibility Study for Pool Cooling and Clean-Up of Harris Nuclear Plant Spent Fuel Pools C & D, Revision 0, prepared 10/6/97

(5) Preliminary Harris Nuclear Plant Drawing CAR 2166-G-412 Rev 11, dated 10/6/97

(6) Preliminary Harris Nuclear Plant Drawing CAR 2165-G-255 Rev 16, dated 4/4/97

(7) Preliminary Harris Nuclear Plant Drawing CAR 2165-G-127 Rev 15, dated 10/4/97

(8) Crane Technical Paper 410, ©1988 Crane Company

(9) Harris Nuclear Plant Calculation NSSS-38 Revision 2, RHR Heat Exchanger and Pump Cooler Cooling Water Outlet Temperatures, dated 4/30/97

(10) Harris Nuclear Plant Engineering Service Request 9700536 Rev 0, Emergency Service Water System - FSAR Table 9.2.1-5 Supporting Documentation, dated 10/16/97

(11) Harris Nuclear Plant Engineering Service Request 9600126 Rev 0, Spent Fuel Pool Cooling System, dated 3/5/97

(12) Harris Nuclear Plant Final Safety Analysis Report Section 9.2.2 Component Cooling System Table 9.2.2-3 Amendment No. 35 (Superseded by RAF 2160)

(13) Harris Nuclear Plant Design Basis Document, Component Cooling Water System, DBD-131 Revision 6, dated 6/19/97

Computed by: Jeff Lundy	Date:	CAROLINA POWER & LIGHT COMPANY	Calculation ID: SF-0040	
Checked by:	Date:		Pg 2 of 32	Rev 0
Project No.:		CALCULATION SHEET	File:	
Project Title: Spent Fuel Pools C and D Activation Project				
Calculation Title: Spent Fuel Pools C and D Activation Project Thermal-Hydraulic Analysis				

(14) Harris Nuclear Plant Calculation CC-0038 Revision 0, CCW Heat Exchanger Performance During Post-Accident Recirc Alignment, dated 4/21/97

(15) Harris Nuclear Plant Calculation SW-0085 Revision 0, Ultimate Heat Sink Analysis, dated 1/6/96

(16) Harris Nuclear Plant Calculation CC-0037 Revision 2, CCW Flow Rates for Various Valve Alignments, dated 4/8/97

(17) Reactor Coolant Pumps, Technical Manual VM-MRF

(18) Harris Nuclear Plant Design Basis Document, Service Water System - Traveling Screens and Screen Wash System - Waste Processing Building Cooling Water System, DBD-128, Revision 6, dated 6/18/97

(19) Harris Nuclear Plant Technical Specification Section 3/4.7.5 Ultimate Heat Sink, Tech Spec Interpretation 95-03

(20) Harris Nuclear Plant Calculation SW-0078 Revision 4, ESW System Performance Evaluation, dated 6/11/96

(21) Harris Nuclear Plant Calculation HNP-M/MECH-1008, Revised Containment Analysis for an Increase in the Initial Temperature from 120°F to 135°F Revision 1, dated 4/8/97

(22) Harris Nuclear Plant Calculation CC-0020, Revision 1, Component Cooling Water System Performance, dated 9/3/96

(23) Meeting Minutes of 11/25/97 Meeting Between CP&L and Proto-Power Corporation

(24) Harris Nuclear Plant Engineering Service Request - Action Item, ESR 9500442 Revision 0 AI#2, dated 8/11/97

(25) Harris Nuclear Plant Final Safety Analysis report Amendment no. 45 p. 5.4.7-10I, "Boration and Inventory Control"

(26) Harris Nuclear Plant Calculation HNP-F/NFSA-0026 Revision 0, Maximum Decay Heat Load for Spent Fuel Pools A, B & C Through the End of Year 2001, dated 4/16/98

(27) Not Used.

(28) CP&L-Harris Nuclear Plant Letter 10003481-Model-00, Estimated Impact of Power Uprate, dated November 6, 1997

(29) Harris Nuclear Plant Calculation SW-0080 Revision 5, ESW Flow Requirements Based on Reservoir Level, dated 5/2/97

(30) Harris Nuclear Plant Operating Procedure OP-145, Section 8.9

(31) Harris Nuclear Plant Final Safety Analysis Report Table 9.2.1-7, Amendment 15

(32) Westinghouse letter CQL-290, dated 6/5/79

(33) Harris Nuclear Plant Engineering Service Request 9700272 Revision 0, dated 5/6/97

(34) Harris Nuclear Plant Calculation 9-FHB-2 Revision 1, Fuel Handling Building Air Conditioning System, dated 5/24/86

(35) Harris Nuclear Plant Engineering Service request 9700252 Revision 0, Evaluation of EPT-174 Data, dated 4/7/97

3.0 ENGINEERING ANALYSIS SOFTWARE

This calculation was performed using PROTO-FLO™ 3.04 and PROTO-HX™ 3.02. The default PROTO-FLO™ database, CCW2.DBD (dated 10/14/98, Size 800KB) is included in Attachment (A).

4.0 CALCULATION

Reference (1) was used as a starting point for the analysis of the CCWS system to determine thermal and hydraulic margins. The default benchmarked PROTO-FLO™ database, CCW.DBD, was modified to create a new PROTO-FLO™ default database, CCW2.DBD, which incorporates the proposed CCWS tie-ins for the fuel pool C and D heat exchangers as well as other modifications defined in Table 1. Case alignments for:

- Startup Operations (A CCWS Train Operating)
- Normal Operations (A CCWS Train Operating)
- Hot Shutdown at 350°F (A and B CCWS Trains Operating, Split),
- Safe Shutdown at 350°F (A CCWS Train Operating, Single Failure),
- Refueling: Core Shuffle (A CCWS Train Operating, Single Failure),
- Refueling: Full Core Offload (A CCWS Train Operating, Single Failure),
- Refueling: Abnormal Full Core Offload (A and B CCWS Trains Operating, Split),
- LOCA: Safety Injection Phase (A CCWS Train Operating),
- LOCA: Containment Sump Recirculation with CCWS Nonessential Header Isolated [Recirc(a)] (A CCWS Train Operating, Single Failure) and
- LOCA: Containment Sump Recirculation with Limited Fuel Pool Cooling [Recirc(b)] (A CCWS Train Operating, Single Failure).

were developed to capture all the major CCWS system operating conditions. All heat exchanger thermal models use design fouling factors rather than IST results to ensure that design basis conditions can be met even with extreme fouling conditions. CCW pump degradation to the 10% IST limit, Reference (3), was included for the flow margin portion of this analysis.

Table 1
Modified CCWS Pipe Sections

Pipe Section	Service	Modification
64	BRS Supply	Replaced MiscK of 1100 with MiscK=18.11 from Reference (22) Adjusted 1CC-356 to 24.17% Open Adjusted 1CC-353 to 0.75% Open Adjusted 1CC-363 to 20.56% Open
64	BRSEC	Added isolation valve to simulate CP&L direction to assume the BRS Skid is abandoned inplace.
85	BRSEC	Added isolation valve to simulate CP&L direction to assume the BRS Skid is abandoned inplace.
41/53/60/64	LOCAIsolate	Added simulation valve for LOCA case alignments, References (12) and (13)
Node0001 Node0026	Pressure In-line Node	Changed to in-line pressure node to eliminate bypass flow through the Surge Tank which is not consistent with actual CCWS operation
Fixed1/Fixed2	Deleted Nodes	Eliminated Surge Tank nodes and lines to properly model CCWS and eliminate recirculating flow through the Surge Tank
105	RHR Pmp B Clr	Corrected Heat Load Tag
121	AHXIsol	Added SFP Hx A Isolation Valve
-	FP1/FP2	Added simulated fuel pool cooling pumps
-	DummySFPCPump	Added simulated fuel pool cooling pump curves calibrated to 3750 gpm per Reference (11)
	BRS Evap Cooler	Deleted fixed heat load per Assumption 4.1.12
Pump1	DegradedPump1	Added 10% TDH Degraded CCW Pump Curve
Pump2	DegradedPump2	Added 10% TDH Degraded CCW Pump Curve
Pump3	DegradedPump3	Added 10% TDH Degraded CCW Pump Curve
314	TEMP1	Added TEMP1 Isolation Valve to Enhance Computational Stability
300-319	Proposed CCWS Tie-Ins to FP Hx C and D	Additions are denoted by Altxx. See Attachment A
900-905	Fuel Pools A/B and C/D	Added simulation for fuel pools A/B and C/D to provide fuel pool equilibrium temperature as a function of fuel pool heat load.
27/28/29	P1Isolate	Added Pump1 Isolation valves with Cv=1000000 to allow for Pump2 (B Train) Operation
SFP Hx D	Fixed Heat Load	Changed SFP Hx D to a fixed heat load to improve computational efficiency at low CCWS flow rates and light FP C/D heat load.
33	DischXTie	Added gate valve with Cv=1000000 to simulate split CCW train ops, Reference (30)
20	SuctXTie	Added gate valve with Cv=1000000 to simulate split CCW train ops, Reference (30)
43	XSLD HX	Added Simulation Isolation Valve with Cv=100000 to isolate the Excess Letdown Heat Exchanger Only

4.1 Bases and Assumptions

4.1.1 Case alignments which specify a single CCWS train operation assume the use of the "A" train as CCW Pump A delivers slightly less total developed head and therefore is the least hydraulically capable CCW pump.

4.1.2 All CCWS cooled heat exchangers use design fouling factors. This assumption is unconservative when analyzing the performance of individual heat exchangers but is conservative and realistic in terms of overall CCWS thermal performance as the CCW heat exchanger fouling factor significantly exceeds the other CCWS cooled heat exchangers and limits the heat rejection capability of the CCWS. The tube plugging for the CCW heat exchanger is also assumed to be 0% as the design CCW heat exchanger tubeside fouling factor of 0.00176 hr-sqft-°F/BTU significantly (50.4 percent) exceeds the current worst case trended tubeside fouling factor, Reference (35), of 0.00117 hr-sqft-°F/BTU thus the assumption of additional CCW heat exchanger degradation from tube failures would be overly conservative, given the excessive design fouling factor.

4.1.3 CVCS flow to the letdown heat exchanger is assumed to be at design Letdown flow conditions of 120 gpm per CP&L direction, Reference (23).

4.1.4 Both RHR pumps and oil coolers are assumed to be operating and rejecting heat whenever the RHR system is activated for conservatism except for single CCW train failure cases which include Safe Shutdown (350°F), Refuel-Core Shuffle, Refuel-Normal Full Core Offload and all LOCA cases.

4.1.5 The minimum ESWS flow to the CCW heat exchangers is 8500 gpm.

4.1.6 A maximum ESWS supply temperature to the CCW heat exchangers is assumed to be 95°F, Reference (13).

4.1.7 For the purposes of this analysis, Spent Fuel Pool heat exchangers A and D are in operation. It is assumed that the hydraulic resistance of CCWS piping to and from Spent Fuel Pool heat exchangers B and C are equivalent to Spent Fuel Pool heat exchanger A and D supply and return piping.

4.1.8 A maximum CCWS supply temperature of 105°F is assumed to be applicable during all operating modes except for Hot and Safe Shutdown Cases and LOCA: Containment Sump Recirculation Cases, Reference (13).

4.1.9 A maximum CCWS supply temperature of 120°F is assumed for all CCWS system lineups other than those identified in Assumption 4.1.8. Reference (13) states that the CCWS is designed for a maximum temperature of 120°F (for approximately 4 hours) which is based on the maximum permissible temperature to the reactor coolant pumps. A review of the reactor coolant pump technical manual, Reference (17), with the cognizant plant engineer shows that there is no explicit time limitation on operation of the reactor coolant pumps with thermal barrier cooling in excess of 105°F so long as RCS temperature is less than 400°F. Therefore, it is assumed that the statement of "approximately 4 hours" is descriptive in that the CCWS supply temperature is only expected to be in excess of 105°F for 4 hours during plant cooldown operations.

4.1.10 The reactor coolant pumps are assumed to be secured during Safe Shutdown, Refueling Operations and LOCA:Recirc cases. The CCWS flow is assumed to be supplied to the RCPs, for the Safe Shutdown and

Refueling operations cases, even though they are not rejecting heat to the CCWS. This assumption is conservative in terms of CCWS flow margins.

4.1.11 The heat load from the Gross Fuel Failure Detector (GFFD) and the Primary Sample Coolers are considered to be transient relative to the total steady state CCWS heat load and are assumed to be negligible for a steady state system thermal-hydraulic calculation per discussions with HNP System Engineering.

4.1.12 The CCWS alignments assume that the Boron Recovery Skid is abandoned in place and does not require heat removal or CCWS flow, per CP&L System Engineering direction, Reference (23).

4.1.13 Analytical thermal uncertainty on overall CCWS heat transfer is assumed to be inherent and included in individual shell and tube heat exchanger models which were developed from manufacturer data sheets.

4.1.14 Letdown heat exchanger operation is NOT required during Safe Shutdown conditions as boration capacity is required to be maintained by the Boric Acid Tank, the Boric Acid Transfer Pumps, the Refueling Water Storage Tank and the Centrifugal Charging Pumps, Reference (25).

4.1.15 CCW trains 'A' and 'B' are split whenever both RHR heat exchangers are in service, Reference (30), with the nonessential header assumed to be aligned to the 'A' CCW train.

4.1.16 CCWS flow to the letdown heat exchanger is set to 610 gpm (575 gpm, Reference (12) + 6% hydraulic uncertainty, Reference (1)) for the purposes of establishing a hydraulic design basis for the CCW system.

4.1.17 It is assumed that this calculation is only valid for Spent Fuel Pool C and D heat loads less than 1.0 MBTU/hr.

4.1.18 The thermal effect of the HNP Power Uprate project increased core thermal rating is not accounted for in this calculation.

4.1.19 Excess letdown heat exchanger process side parameters are only specified for the plant Startup case alignment when maximum letdown system capacity is required. Excess letdown heat exchanger CCWS flow is maintained for all alignments except for the LOCA:Recirc (RHR Only) and LOCA:Recirc (RHR and SFP) alignments during which the excess letdown heat exchanger is isolated by the Phase A containment isolation signal.

4.2 CCWS Alignments

The baseline CCWS alignments were developed based on Reference (12) defined lineups with the exception of the excess letdown heat exchanger. Thermal and hydraulic margins for the CCWS are not compared to the values in Reference (12). Rather, all margin comparisons are to either design data sheet values or to inferred flow and heat load values from other design basis documents or calculated values provided herein. All alignments assume the operation of one or two CCW trains, consistent with plant operating requirements. For Safe Shutdown, single failure Refueling operations and LOCA case alignments, the CCW "A" cooling train is considered to be in operation. Table 2 summarizes each operating CCWS lineup.

Table 2
Major CCWS Alignments

	Startup	Normal	Hot S/D	Safe S/D	Refuel	Refuel	Refuel	LOCA	LOCA	LOCA
Load		Mode 1	@ 4 hrs (350F)	@ 4 hrs (350F)	1/3 Core Shuffle (Mode 6)	Normal Full Core Offload (Mode 6)	Abnormal Full Core Offload (Mode 6)	Safety Injection Phase	Sump Recirc with Essential Header Only	Sump Recirc with Limited SFP Cooling
RHR Pmp B	Flow Only	Flow Only	x				x	Flow Only		
RHR Hx B			x				Flow Only			
RHR Pmp A	Flow Only	Flow Only	x	x	x	x	x	Flow Only	x	x
RHR Hx A			x	x	Flow Only	Flow Only	Flow Only		x	x
BRS: Dist Clr										
BRS: Evap Clr										
BRS: Vent Cond										
Letdown Hx	x	x	x					x		
XSLD Hx	x	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only		
RCDT Hx	x	x	x	x	x	x	x	x		
Seal Water Hx	x	x	x	x	x	x	x	x		
SFP Hx A	x	x	x	x	x	x	x	x		x
SFP Hx B										
RCP A	x	x	x	Flow Only	Flow Only	Flow Only	Flow Only	x		
RCP B	x	x	x	Flow Only	Flow Only	Flow Only	Flow Only	x		
RCP C	x	x	x	Flow Only	Flow Only	Flow Only	Flow Only	x		
SFP Hx C										
SFP Hx D	x	x	x	x	x	x	x	x		x
GFFD	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only			
Sample Coolers	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only	Flow Only			
Operating CCW Trains	1	1	2 (Split)	1	1	1	2 (Split)	1	1/0	1/0
Notes	-	-	-	Single Failure	Single Failure of 'B' CCW Train	Single Failure of 'B' CCW Train	-	GFFD and Sample Coolers Isolated By "S" Signal	B' CCW Single Failure. Containment Isolated (RCPs, XSLD Hx, RCDT Hx Secured). Only RHR Loads Operating	B' CCW Single Failure. All Nonessential Loads Isolated Except for SFP Hxs

All operating lineups use the benchmarked CCW pump curves for the thermal margin analysis and the IST program 10 percent degraded pump curves for the flow margin analysis. CCW flow to the cooled components for normal operations is consistent with the benchmarked values of Reference (1).

The thermal conditions applied in each CCWS alignment are the design values included in Reference (1) and summarized in Table 3, except where specifically noted.

The RHR heat exchanger flow for all cooldown conditions is based on maintaining the CCWS supply temperature at the design basis limit of 120°F at an RHR heat exchanger inlet temperature consistent with the lineup up to a maximum RHR system flow rate of 4500 gpm, which is the RHR pump runout limit, Reference (28). The RHR heat exchanger inlet temperature is specified to be consistent with the corresponding Reactor Coolant System temperature for that condition. The RHR heat exchanger conditions for post LOCA containment sump recirculation operations are those identified in References (9) and (14).

The RHR pump oil cooler heat loads are applied for each lineup in which RHR system operation is indicated, Table 2.

The thermal-hydraulic conditions of the spent fuel pools are based on the estimated heat load which would occur immediately prior and following the refueling outage in the Year 2000 at a Spent Fuel Pool Cooling (SFPC) system mass flow rate of 1.88E6 lbm/hr, Reference (11), which conservatively results a specified SFPC volumetric flow rate of 3750 gpm. Table 4 summarizes the assumed heat loads for Spent Fuel Pools A/B and C/D as well as the applicable dates as the limiting heat load for each CCW system alignment does not necessarily correspond to operations at the completion of the Year 2000 outage.

Refueling case alignment maximum heat loads are identified in Reference (26) for the Normal Full Core Offload scenario. An estimate of Core Shuffle and Abnormal Full Core Offload scenario heat loads is performed to satisfy the analysis requirements of NUREG-0800.

The base heat load for fuel pool A/B is estimated as follows:

Normal Full Core Offload (RFO7)	= 35.06 MBTU/hr	[Reference (11)]
Fuel Pool A/B Base Heat Load (RFO7)	= 5.16 MBTU/hr	[Reference (11)]
Calculated Refueling Heat Load (RFO7)	= 29.9 MBTU/hr	
Specified fuel pool A/B and C Heat Load	= 44.13 MBTU/hr	[Attachment 5 of Reference (26)]
Fuel Pool C Heat Load	= 0.9957 MBTU/hr	[Attachment 8 of Reference (26)]
Refueling Heat Load	= 29.9 MBTU/hr	
Estimated Fuel Pool A/B Base Ht Load	= 13.23 MBTU/hr, use 13.3 MBTU/hr for conservatism.	

The Core Shuffle refueling alignment heat load of 25.0 MBTU/hr is estimated as follows:

Fuel Pool A/B Base Heat Load As of 9/26/2001 = 13.3 MBTU/hr
Fuel Pool A/B Core Shuffle Heat Load = 11.68 MBTU/hr = 16.84 -5.16 MBTU/hr [Reference (11)]
Fuel Pool A/B Core Shuffle Total Heat Load As of 9/26/2001 = 13.3 + 11.68 = 25 MBTU/hr

The maximum Abnormal Full Core Offload alignment heat load of 44.1 MBTU/hr is estimated as follows:

Fuel Pool A/B Base Heat Load As of 9/26/2001 = 13.3 MBTU/hr
Fuel Pool A/B Abnormal Full Core Offload Heat Load = 30.71 MBTU/hr = 35.87 -5.16 MBTU/hr [Reference (11)]
Fuel Pool A/B Abnormal Full Core Offload Total Heat Load As of 9/26/2001 = 13.3 + 30.71 = 44.1 MBTU/hr
These heat loads do not include the effect of any change in HNP core thermal power rating.

Table 3
Summary of CCWS Operating Alignment Thermal Boundary Conditions

		Alignment										
		Startup	Normal	Hot S/D (350°F)	Safe S/D (350°F)	Refuel (Mode 6)	Refuel (Mode 6)	Refuel (Mode 6)	LOCA	LOCA	LOCA	
Load	Units		Mode 1	@ 4 hrs	@ 4 hrs	Core Shuffle	Full Offload	Abnormal	SI	Recirc (RHR)	Recirc (RHR and SFP)	Reference
RHR Pump B	Heat Load (BTU/hr)	0	0	70,000	N/A	N/A	N/A	70,000	0	N/A	N/A	Calc NSSS-38 R2
RHR Hx B	Flow (gpm) / Tin (°F)	N/A	N/A	650/ 350	N/A	N/A	N/A	0/ 140	N/A	N/A	N/A	Calc NSSS-38 R2/CC-0038 R0
RHR Pump A	Heat Load (BTU/hr)	0	0	70000	70000	70000	70000	70000	0	70000	70000	Calc NSSS-38 R2
RHR Hx A	Flow (gpm) / Tin (°F)	N/A	N/A	650/350	800/350	0/140	0/140	0/140	N/A	3903/244.1	3903/209	Calc NSSS-38 R2/CC-0038 R0
BRS: Dist Clr	Heat Load (BTU/hr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assumed BRS Skid Abandoned Inplace
BRS: Evap Clr	Heat Load (BTU/hr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assumed BRS Skid Abandoned Inplace
BRS: Vent Cond	Heat Load (BTU/hr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Assumed BRS Skid Abandoned Inplace
Letdown Hx	Flow (gpm) / Tin (°F)	120/ 380	120/ 380	120/ 350	Secured	0	0	0	120/ 380	0	0	Design CVCS Flow at RCS Temp
XSLD Hx	Flow (gpm) / Tin (°F)	24.8/560	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Spec Sheet in VM-MRK
RCDT Hx	Flow (gpm) / Tin (°F)	89.12/ 180	89.12/ 180	89.12/ 180	89.12/ 180	89.12/ 180	89.12/ 180	89.12/ 180	89.12/ 180	0	0	Spec Sheet in VM-MRK
Seal Water Hx	Flow (gpm) / Tin (°F)	128.1/ 138.5	128.1/ 138.5	128.1/ 138.5	128.1/ 138.5	128.1/ 138.5	128.1/ 138.5	128.1/ 138.5	128.1/ 138.5	0	0	Spec Sheet in VM-MRK
SFP Hx A	Heat Load (BTU/hr)	15200000	15200000	13500000	13500000	25000000	31780000	31780000	15200000	0	15200000	Estimated from Reference (26)
SFP Hx B	Heat Load (BTU/hr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Secured
RCP A	Heat Load (BTU/hr)	367000	367000	367000	0	0	0	0	367000	0	0	1/3 of WEC CQL-5361 6/5/79 Value
RCP B	Heat Load (BTU/hr)	367000	367000	367000	0	0	0	0	367000	0	0	1/3 of WEC CQL-5361 6/5/79 Value
RCP C	Heat Load (BTU/hr)	367000	367000	367000	0	0	0	0	367000	0	0	1/3 of WEC CQL-5361 6/5/79 Value
SFP Hx C	Heat Load (BTU/hr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Secured
SFP Hx D	Heat Load (BTU/hr)	1000000 N/A	1000000	1000000	1000000	1000000	1000000	1000000	1000000	0	1000000	Estimated from Reference (26)
GFFD	Heat Load (BTU/hr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Assumed Negligible. Ht Load = 0.24 MBTU/hr
Sample Coolers	Heat Load (BTU/hr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	0	Assumed Negligible Due to Transient Load
Fuel Pool A/B	Heat Load (BTU/hr)	15200000	15200000	13500000	13500000	25000000	31780000	31780000	15200000	15200000	15200000	Estimated from Reference (26)
Fuel Pool C/D	Heat Load (BTU/hr)	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	Estimated from Reference (26)
CCW Trains	No Operating	1	1	Split (1/1)	1	1	1	Split(1/1)	1	Split (1/0)	Split (1/0)	Consistent with DBD-131

Table 4
Summary of Spent Fuel Pool A/B Heat Loads for Various CCW System Alignments

Alignment	As of Date	CCW Temperature Limit (°F)	SFP A/B Temp Limit (°F)	SFP A/B Heat Load (MBTU/hr)
Normal	10/22/2001	105	137	15.2
Hot S/D (350)	9/15/2001	120	137	13.5
Safe S/D(350°F)	9/15/2001	120	137	13.5
Refuel-Core Shuffle	9/22/2001	105	137	25.0
Refuel-Normal Full Core Offload (1)	9/22/2001	105	137	31.78
Refuel-Abnormal Full Core Offload (1)	9/22/2001	105	137	31.78
LOCA-Safety Injection	10/22/2001	105	137	15.2
LOCA-Recirc (RHR Only)	10/22/2001	120	137	15.2
LOCA-Recirc (RHR/SFP)	10/22/2001	120	137	15.2

Notes: 1) Assumes that 265.4 hours have elapsed since reactor shutdown to reduce core decay heat to within the heat removal capacity of the SFP heat exchangers.

4.3 Evaluation of Minimum RHR Heat Exchanger CCWS Flow

The post-modification CCW flow balance evaluated in this analysis maintains a maximum design CCW temperature of 120°F, while considering the addition of 1.0 MBTU/hr to the C and D Spent Fuel Pools, 6 percent modeling uncertainty per Reference (1), and a RHR heat exchanger UA value which is modeled to change with fluid properties. The licensing basis previous to this calculation is based on an assumed RHR heat exchanger UA of 1.635E6 BTU/hr-°F, derived from the design RHR heat exchanger overall heat transfer coefficient of 382 BTU/hr-sqft-°F which is in turn based on an RHR heat exchanger inlet temperature of 139°F and the overall heat transfer surface area of 4280 sqft. However, during the initial phase of containment sump recirculation, the RHR tube side inlet temperature rises to 244.1°F, which increases the calculated overall heat transfer coefficient to 421.2 BTU/hr-°F due to the change in the RHR heat exchanger tube side fluid viscosity. These conditions would tend to increase heat transfer through the RHR heat exchanger and increase CCW system supply temperatures above the maximum CCW supply temperature of 120°F for the given limiting conditions of minimum CCW heat exchanger Service Water flow and maximum Service Water supply temperature.

Two changes are prescribed herein to address the heat loads and conditions above in the post-modification CCW flow balance. First, the minimum specified CCWS flow to the RHR heat exchanger must be reduced to a level consistent with heat rejection value of 111.1 MBTU/hr, consistent with Reference (9). An analysis of RHR heat exchanger thermal performance, Attachment (C), was performed to determine the minimum shell side flow rate at 120°F shell side inlet temperature, 244.1°F tube side inlet temperature and 1.846E6 lbm/hr tube side flow rate, consistent with Reference (21). This analysis shows that a minimum CCWS flow rate of 4874 gpm at 120°F is required at the beginning of the sump recirculation phase. The specified CCWS flow to the RHR heat exchanger under these conditions, assuming 6 percent modeling uncertainty consistent with

Reference (1), is 5166 gpm or approximately 5200 gpm. As the containment sump temperature decreases, the minimum required CCWS flow also decreases, as shown in Figure 1 of Attachment (C), based on maintaining a maximum RHR heat exchanger tube side outlet temperature of 180°F, Reference (21). The CCWS was initially rebalanced using the CCWS PROTO-FLO™ model in the LOCA:Recirc (RHR Only) alignment, Attachment (F), with a 10 percent degraded CCW pump curve, by adjusting 1CC-146 to 47.9 percent open. When the nominal CCW pump curve is applied to the previously balanced CCWS, CCWS flow to the RHR heat exchanger increases to approximately 5440 gpm resulting in an increased RHR heat exchanger heat duty of 118 MBTU/hr. The increased RHR heat exchanger heat duty results in an excessive CCWS supply temperature which cannot be maintained below 120°F, given 8250 gpm ESWS flow to the CCW heat exchanger. Holding the position of 1CC-146 (or 1CC-166) constant, the specified ESWS flow to the CCW heat exchanger was increased to 8500 gpm which results in a CCW heat exchanger outlet temperature of 120°F, Attachment (G), consistent with the original assumption used in setting the minimum CCWS flow to the RHR heat exchanger, documented in Attachment (D).

Therefore, a reduction in the minimum specified RHR heat exchanger CCWS flow to 5200 gpm from the original 5600 gpm specification and an increase in the minimum specified CCW heat exchanger ESWS flow to 8500 gpm from the original 8250 gpm are necessary to meet all the thermal-hydraulic assumptions which are used in the HNP Containment Analysis, Reference (21). A minimum specified ESWS flow of 8500 gpm to the CCW heat exchangers was verified to be within the capacity of the current ESWS system, Reference (20), even considering the most limiting ESWS single failure of a MCC 1B35-SB feeder breaker failure, Reference (29).

4.4 Evaluation of Maximum RHR Heat Exchanger CCWS Flow

An evaluation was performed, using the RHR heat exchanger PROTO-HX™ model developed in Reference (1), to estimate the maximum CCWS flow rate which could be accommodated during the initial phase of containment sump recirculation. This analysis shows that a maximum CCWS flow of 5220 gpm is attainable for a CCW heat exchanger ESWS flow of 8250 gpm and a maximum CCWS flow of 5440 gpm is attainable for an ESWS flow of 8500 gpm in order to maintain a CCWS supply temperature of 120°F. Given that the RHR heat exchanger throttle valves (1CC-146 and 1CC-166) are set on the basis of maintaining a minimum CCWS flow rate under all hydraulic conditions, including modeling uncertainty and CCW pump degradation limits, when the CCWS is in the LOCA recirculation alignment, there will be excess flow to the RHR heat exchanger, approximately 5440 gpm total, Attachment (D). The thermal effect of the excess RHR heat exchanger flow can be mitigated with an increase in the minimum ESWS flow to the CCW heat exchanger of 250 gpm.

4.5 Evaluation of Minimum Spent Fuel Pool Heat Exchanger CCWS Flow

An evaluation of the minimum thermally required CCWS flow to the Spent Fuel Pool heat exchangers was performed by generating heat duty versus CCWS flow for all combinations of design CCWS supply temperatures and SFP temperature limits. This analysis is performed using the PROTO-HX™ model developed in Reference (1) and assumes 5 percent tube plugging and design fouling factors. CCWS design supply temperatures of 105°F for normal and refueling system alignments and 120°F for cooldown and LOCA:Recirculation alignments are used in the analysis. A maximum SFP temperature limit of 137°F for all fuel pool operations is also assumed. Figure 1 and Table 5 summarize and Attachment (E) documents the results of this analysis.

Figure 1

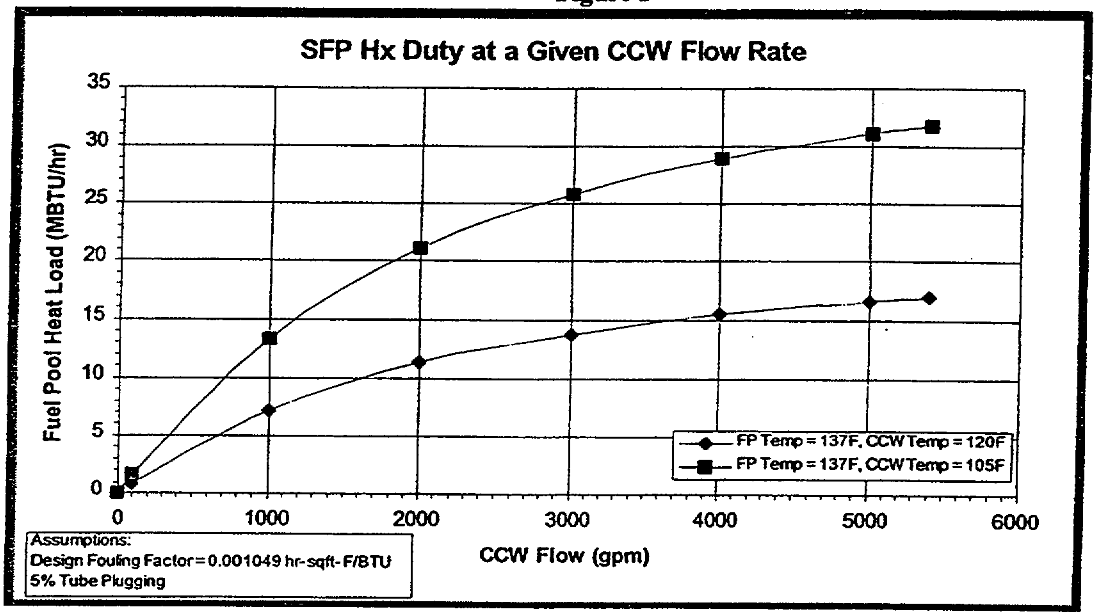

Table 5
Minimum SFP Heat Exchanger CCW Flow Requirements

Alignment	As of Date	SFP Hx A/B Thermal Flow Requirement (gpm)	SFP Hx A/B Minimum Flow (1) (gpm)	SFP Hx C/D Thermal Flow Requirement (gpm)	SFP Hx C/D Minimum Flow (1) (gpm)
Normal	10/22/2001	1200	1272	60	63.6
Hot S/D (350F)	9/15/2001	2800	2968	125	132.5
Safe S/D(350F)	9/15/2001	2800	2968	125	132.5
Refuel-Core Shuffle	9/22/2001	2800	2968	60	63.6
Refuel-Normal Full Core Offload (2)	9/22/2001	5400	5400 (3)	60	63.6
Refuel-Abnormal Full Core Offload (2)	9/22/2001	5400	5400 (3)	60	63.6
LOCA-Safety Injection	10/22/2001	1200	1272	60	63.6
LOCA-Recirc (RHR Only)	10/22/2001	0	0	0	0
LOCA-Recirc (RHR/SFP)	10/22/2001	3830	4059.8	125	132.5

Note 1: Minimum Heat Exchanger Flow Includes 6% Hydraulic Uncertainty Per CP&L HNP Calculation CC-0039 Revision 0
Note 2: Assumes Sufficient Decay Time to Reach 31.78 MBTU/hr (265.36 hours after S/D)
Note 3: SFP Hx A/B Max Flow is 5400 gpm per design data sheet which should not be exceeded to ensure flow induced tube vibration problems do not occur.

4.6 CCWS Hydraulic Margins

In order to accommodate the changes in the CCWS load flow requirements identified above, the CCWS PROTO-FLO™ model was rebalanced. Based on previous analysis, it was determined that the most limiting CCWS alignment is the Hot S/D (350F) 'A' CCW Train with the Nonessential header case in which the CCW pump develops the least head due to the maximum CCWS flow requirements. Therefore, the CCWS was rebalanced using the Hot S/D (350F) alignment, the 10 percent degraded CCW pump curve and minimum CCWS flows to each load with the exception of the RHR heat exchangers which were balanced in the LOCA:Recirc (RHR Only) alignment. The results of this analysis are documented in Attachments (F) and (H). The resulting changes in throttle valve position or miscellaneous loss coefficients are shown in Table 6. It is noted that the SFP heat exchanger C/D throttle valves, AltV-15 and AltV-11, are heavily throttled and will require a suitably sized bypass line with a smaller throttle valve in order to achieve acceptable throttling characteristics. This modification to the CCWS return line from SFP heat exchangers is a design detail which will have to be resolved at a later date by the cognizant design organization.

Table 6
Estimated Change in CCWS Throttle Valve Positions and RCP Line Miscellaneous Loss Coefficients

Service	Throttle Valve	Old Position/Misc K	New Position/Misc K
RHR Heat Exchanger A	1CC-146	49.24 % Open	48.61 % Open
RHR Heat Exchanger B	1CC-166	49.24 % Open	47.91 % Open
RCDT Heat Exchanger	1CC-187	8.85 % Open	41.98 % Open
XSLD Heat Exchanger	1CC-197	12.91% Open	80.23% Open
SFP Heat Exchanger A(B)	1CC-382(398)	34.35 % Open	27.94% Open
SFP Heat Exchanger D(C)	AltV-15(11)	Not Installed	2.03 % Open
RCP A Upper Bearing Cooler	1CC-258	194.00	14.14
RCP A Lower Bearing Cooler	1CC-264	90000	11971
RCP A Thermal Barrier	1CC-224	510.00	58.28
RCP B Upper Bearing Cooler	1CC-273	211.00	14.14
RCP B Lower Bearing Cooler	1CC-279	30584.00	11971
RCP B Thermal Barrier	1CC-235	320.00	58.28
RCP C Upper Bearing Cooler	1CC-284	206.00	14.14
RCP C Lower Bearing Cooler	1CC-290	80610.00	11965
RCP C Thermal Barrier	1CC-246	404.00	52.87

The hydraulic margins for the CCWS were evaluated utilizing the system throttle valve positions documented in Attachments (F) and (H) and degrading the operating CCW pump curves by 10 percent of the total developed head, Reference (3). The effect of the letdown heat exchanger was simulated by changing 1CC-TCV-337 to a flow control valve with a setpoint of 610 gpm per Assumption 4.1.16, the specified letdown heat exchanger CCWS flow rate under non-startup conditions with hydraulic uncertainty. For the plant Startup case alignment, 1CC-TCV-337 was restored to a temperature control valve with a setpoint of 120°F. ESWS flow to the operating CCW heat exchangers was set to 8500 gpm at 95°F. The resulting CCWS flows were tabulated and reduced by 6 percent to account for modeling and instrument uncertainty as established in Reference (1).

This process is repeated for each of the major CCWS system lineups with the results documented in Attachments (I) through (Q) and summarized in Tables 7a through 7j.

Minimum CCWS flow requirements in Tables 7a through 7j to cooled components are established from design data sheet values, Reference (1), for all components except for the RHR Pump Coolers, Reference (9), the RHR heat exchangers, Section 4.3, the Letdown heat exchanger, Reference (31), and the Spent Fuel Pool heat exchangers, Section 4.5.

The Hot Shutdown (350F) and Safe Shutdown (350F) RHR heat exchanger minimum CCW flow limits were determined, Attachments (J) and (K), by using the RHR heat exchanger PROTO-HX™ model, Reference (1), to meet a heat duty of 118.9 MBTU/hr and 177.76 MBTU/hr with the maximum RHR pump flow of 4500 gpm at an RCS temperature of 350°F. The Hot Shutdown case required heat duty of 118.9 MBTU/hr is determined as follows:

RCS Sensible Heat Removal	= 66.96 MBTU/hr	[Table 9.2.1-7 of Reference (31)]
Decay Heat 4 hours after S/D	= 110.8 MBTU/hr	[Table 9.2.1-7 of Reference (31)]
RCP Heat (3 Pumps Operating)	= 60 MBTU/hr	[Reference (32)]
Total Heat Removal Required	= 237.76 MBTU/hr with 2 RHR/CCW trains in operation	
or	= 118.9 MBTU/hr per RHR heat exchanger	

The Safe Shutdown case RHR heat exchanger required heat duty of 177.76 MBTU/hr is taken from Table 9.2.1-7 of Reference (31). The minimum required CCW flow to the RHR heat exchanger, assuming design fouling factors and 120°F CCW supply temperature is 1300 gpm and 2560 gpm per operating heat exchanger for the Hot Shutdown and Safe Shutdown cases, respectively.

The LOCA: Recirc (RHR and SFP) case represents maintaining CCWS flow to both the Spent Fuel Pool and RHR heat exchangers. It is assumed that the operators do not adjust flow to the Spent Fuel Pool heat exchanger in order to maintain RHR heat exchanger flow as the estimated CCWS flow to the RHR heat exchangers exceeds the thermally required CCWS flow of 2250 gpm for a containment sump temperature of 209°F, Attachment (C), to maintain a 180°F RHR heat exchanger outlet temperature, Reference (21). When the containment sump temperature reaches 209°F, the CCWS flow to the RHR heat exchanger is 4450 gpm, Attachment (Z). The worst case CCWS flow to the RHR heat exchanger at the point of bringing the Spent Fuel Pool heat exchangers online is 4430 gpm with a corresponding heat removal of 80.53 MBTU/hr, consistent with Reference (14).

The results of this analysis, Tables 7a through 7j, show that sufficient CCWS flow is available to cooled components under most major system alignments, given the 10% IST pump degradation limits assumed by Reference (3), with the exception of the Spent Fuel Pool heat exchanger A (or B) under the LOCA: Recirculation (RHR and SFP) alignment and the nonessential header loads under the Refuel-Normal (or Abnormal) Full Core Offload case. Evaluation of the system thermal analysis results during the LOCA:Recirculation (RHR and SFP) alignment, Attachment (Z), shows that the steady state equilibrium temperature of fuel pool A/B does not exceed 136°F, even with the assumptions of 10% percent degraded CCWS flow, minimum ESWS flow of 8500 gpm to the CCW heat exchangers, use of design fouling factors for all heat exchangers and design (maximum) Ultimate Heat Sink temperature of 95°F. Acceptable fuel pool A/B temperature indicates that the minimum specified CCWS flows to the Spent Fuel Pool heat exchangers are very

conservative and that acceptable operation of the Spent Fuel Pool heat exchangers under limiting conditions can be achieved. These results demonstrate that the redistribution of CCWS flow is adequate for the limiting CCW pump developed head.

For the Refuel-Normal and Abnormal Full Core Offload cases in which a single failure of the 'B' CCW train or when the CCW trains are split, insufficient CCW flow is provided to the SFP heat exchanger A (or B), the Seal Water heat exchanger and the RCDT heat exchanger for the limiting hydraulic case of 10% degraded CCW pump curve operation. A separate heat exchanger performance analysis was done for each heat exchanger assuming all other thermal conditions were specified as design values except for the CCW flow and supply temperature, documented in Attachments (M) and (N). The results of this analysis indicates that the SFP Hx A (or B) can just accommodate an assumed full core offload heat load of 31.7 MBTU/hr at design SFPC thermal conditions, therefore the negative CCW flow margin is acceptable under these extreme thermal-hydraulic conditions.

The results of the Seal Water heat exchanger performance analysis show that the estimated heat duty is 3.1 percent less than the design heat duty but this is judged to be acceptable as the reactor coolant pumps are not operating during refueling operations and the seal injection supply temperature only rises from 115.0 to 115.7°F.

The results of the RCDT heat exchanger performance analysis show that the estimated heat duty is 0.9 percent less than the design heat duty of the heat exchanger, resulting in an increase in RCDT heat exchanger outlet temperature from 130.0 to 130.5°F. It is considered that this small increase in RCDT heat outlet temperature is acceptable as RCS temperature is less than 140°F during this operating mode while the design RCDT heat exchanger inlet temperature is 180°F.

Table 7a
Summary of CCWS Flow Margins

		Normal Ops			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	6.9	6.5	5	30%
108	RHR Hx B	36	34.0	0	N/A
115	RHR Pump A	7	6.6	5	32%
112	RHR Hx A	36.9	34.8	0	N/A
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	1158	1092.5	575	90%
45	XSLD Hx	318	300.0	247	21%
44	RCDT Hx	303	285.8	225	27%
54	Seal Water Hx	308	290.6	230	26%
98	SFP Hx A	3613	3408.5	1200	184%
91	SFP Hx B	N/A	N/A	0	N/A
204	RCP A Upper Oil Cooler	194.2	183.2	150	22%
203	RCP A Lower Oil Cooler	6.7	6.3	5	26%
205	RCP A Thermal Barrier	51.6	48.7	40	22%
208	RCP B Upper Oil Cooler	194.2	183.2	150	22%
207	RCP B Lower Oil Cooler	6.7	6.3	5	26%
209	RCP B Thermal Barrier	51.6	48.7	40	22%
214	RCP C Upper Oil Cooler	194.2	183.2	150	22%
212	RCP C Lower Oil Cooler	6.7	6.3	5	26%
215	RCP C Thermal Barrier	51.6	48.7	40	22%
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	160.9	151.8	59	157%
Node0401	GFFD	14	-	14	Specified
Node0028	Sample Coolers	160	-	160	Specified
5 and 28	Total CCWS Flow	6887	6497.2	3305	97%
	Operating CCW Train	A		A	
	Notes	RHR Hx Outlet Isolation Valves are Shut			
		LD HX Flow is set based on maintaining 120F LD Outlet Temp.			

Table 7b
Summary of CCWS Flow Margins

		Hot S/D (350F)			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	7.2	6.8	5	36%
108	RHR Hx B	5199	4904.7	1300	277%
115	RHR Pump A	5.6	5.3	5	6%
112	RHR Hx A	3983	3757.5	1300	189%
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	610	575.5	575	0%
45	XSLD Hx	262	247.2	247	0%
44	RCDT Hx	249.5	235.4	225	5%
54	Seal Water Hx	253.9	239.5	230	4%
98	SFP Hx A	2980.3	2811.6	2800	0%
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	160	150.9	150	1%
203	RCP A Lower Oil Cooler	5.5	5.2	5	4%
205	RCP A Thermal Barrier	42.5	40.1	40	0%
208	RCP B Upper Oil Cooler	160	150.9	150	1%
207	RCP B Lower Oil Cooler	5.5	5.2	5	4%
209	RCP B Thermal Barrier	42.5	40.1	40	0%
214	RCP C Upper Oil Cooler	160	150.9	150	1%
212	RCP C Lower Oil Cooler	5.5	5.2	5	4%
215	RCP C Thermal Barrier	42.5	40.1	40	0%
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	132.7	125.2	125	0%
Node0401	GFFD	14	-	14	Specified
Node0028	Sample Coolers	160	-	160	Specified
5 and 28	Total CCWS Flow	14529.3	13706.9	7571	81%
	Operating CCW Train	A/B Split		A/B Split	
	Notes	LD Hx Flow Limited to a 575 GPM Nominal Value Defined in FSAR			

Table 7c
Summary of CCWS Flow Margins

Section	Component	Safe S/D (350F)			
		Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	0	0.0	0	N/A
108	RHR Hx B	0	0.0	0	N/A
115	RHR Pump A	5.8	5.5	5	9%
112	RHR Hx A	4119	3885.8	2560	52%
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	0	0.0	0	N/A
45	XSLD Hx	271.6	256.2	247	4%
44	RCDT Hx	258.8	244.2	225	9%
54	Seal Water Hx	263.5	248.6	230	8%
98	SFP Hx A	3096	2920.8	2800	4%
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	165.9	156.5	150	4%
203	RCP A Lower Oil Cooler	5.7	5.4	5	8%
205	RCP A Thermal Barrier	44.1	41.6	40	4%
208	RCP B Upper Oil Cooler	165.9	156.5	150	4%
207	RCP B Lower Oil Cooler	5.7	5.4	5	8%
209	RCP B Thermal Barrier	44.1	41.6	40	4%
214	RCP C Upper Oil Cooler	165.9	156.5	150	4%
212	RCP C Lower Oil Cooler	5.7	5.4	5	8%
215	RCP C Thermal Barrier	44.1	41.6	40	4%
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	137.9	130.1	125	4%
Node0401	GFFD	14	-	14	Specified
Node0028	Sample Coolers	160	-	160	Specified
5 and 28	Total CCWS Flow	9003	8493.4	6951	22%
	Operating CCW Train	A		A	
	Notes	a) RCPs are secured but CCWS flow is maintained. b) Letdown secured c) 'B' CCW Train Single Failure			

Table 7d
Summary of CCWS Flow Margins

		Refuel - Core Shuffle			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	0	0.0	0	N/A
108	RHR Hx B	0	0.0	0	N/A
115	RHR Pump A	5.8	5.5	0	N/A
112	RHR Hx A	4125	3891.5	0	N/A
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	0	0.0	0	N/A
45	XSLD Hx	272	256.6	247	4%
44	RCDT Hx	259.3	244.6	225	9%
54	Seal Water Hx	264	249.1	230	8%
98	SFP Hx A	3103	2927.4	2900	1%
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	166.3	156.9	150	5%
203	RCP A Lower Oil Cooler	5.7	5.4	5	8%
205	RCP A Thermal Barrier	44.1	41.6	40	4%
208	RCP B Upper Oil Cooler	166.3	156.9	150	5%
207	RCP B Lower Oil Cooler	5.7	5.4	5	8%
209	RCP B Thermal Barrier	44.1	41.6	40	4%
214	RCP C Upper Oil Cooler	166.3	156.9	150	5%
212	RCP C Lower Oil Cooler	5.7	5.4	5	8%
215	RCP C Thermal Barrier	44.1	41.6	40	4%
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	138.2	130.4	59	121%
Node0401	GFFD	14	-	14	Specified
Node0028	Sample Coolers	160	-	160	Specified
5 and 28	Total CCWS Flow	8997.6	8488.3	4420	92%
	Operating CCW Train	A		A	
	Notes	a) RCPs are secured but CCWS flow is maintained.			
		b) 'B' CCW Train Single Failure			
		c) No min flow is defined for the RHR hx as RPV is defueled			

Table 7e
Summary of CCWS Flow Margins

		Refuel - Normal Core Offload			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	0	0.0	0	N/A
108	RHR Hx B	0	0.0	0	N/A
115	RHR Pump A	4.9	4.6	0	N/A
112	RHR Hx A	3470	3273.6	0	N/A
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	0	0.0	0	N/A
45	XSLD Hx	224	211.3	0	N/A
44	RCDT Hx	213.8	201.7	225	-10%
54	Seal Water Hx	217.1	204.8	230	-11%
98	SFP Hx A	5325.9	5024.4	5400	-7%
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	137.1	129.3	0	N/A
203	RCP A Lower Oil Cooler	4.7	4.4	0	N/A
205	RCP A Thermal Barrier	36.3	34.2	0	N/A
208	RCP B Upper Oil Cooler	137.1	129.3	0	N/A
207	RCP B Lower Oil Cooler	4.7	4.4	0	N/A
209	RCP B Thermal Barrier	36.3	34.2	0	N/A
214	RCP C Upper Oil Cooler	137.1	129.3	0	N/A
212	RCP C Lower Oil Cooler	4.7	4.4	0	N/A
215	RCP C Thermal Barrier	36.3	34.2	0	N/A
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	110.6	104.3	60	74%
Node0401	GFFD	14	-	14	Specified
Node0028	Sample Coolers	160	150.9	160	Specified
5 and 28	Total CCWS Flow	10285	9702.8	6089	59%
	Operating CCW Train	A		A	
	Notes	a) RCPs are secured but CCWS flow is maintained.			
		b) 'B' CCW Train Single Failure			
		c) No min flow is defined for the RHR hx as RPV is defueled			
		d) SFP A/B hx CCW set to 5400 gpm			
		e) RCDT, Seal Wtr Hx and SFP A/B Hx performance exceeds the design requirements			
		f) No min flow is defined for XSLD Hx as LD is secured			

Table 7f
Summary of CCWS Flow Margins

		Refuel - Abnormal Core Offload			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	7.2	6.8	5	36%
108	RHR Hx B	5213	4917.9	0	N/A
115	RHR Pump A	4.9	4.6	5	-8%
112	RHR Hx A	3470.3	3273.9	0	N/A
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	0	0.0	0	N/A
45	XSLD Hx	224.1	211.4	0	N/A
44	RCDT Hx	213.8	201.7	225	-10%
54	Seal Water Hx	217.1	204.8	230	-11%
98	SFP Hx A	5326	5024.5	5400	-7%
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	137.1	129.3	0	N/A
203	RCP A Lower Oil Cooler	4.7	4.4	0	N/A
205	RCP A Thermal Barrier	36.3	34.2	0	N/A
208	RCP B Upper Oil Cooler	137.1	129.3	0	N/A
207	RCP B Lower Oil Cooler	4.7	4.4	0	N/A
209	RCP B Thermal Barrier	36.3	34.2	0	N/A
214	RCP C Upper Oil Cooler	137.1	129.3	0	N/A
212	RCP C Lower Oil Cooler	4.7	4.4	0	N/A
215	RCP C Thermal Barrier	36.4	34.3	0	N/A
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	110.6	104.3	59	77%
Node0401	GFFD	14	-	14	Specified
Node0028	Sample Coolers	160	-	160	Specified
5 and 28	Total CCWS Flow	15505.2	14627.5	6098	140%
	Operating CCW Train	A/B		A/B	
	Notes	a) RCPs are secured but CCWS is maintained.			
		b) No min flow is defined for the RHR hx as RPV is defueled			
		c) SFP A/B hx CCW set to 5400 gpm			
		d) RCDT, Seal Wtr Hx and SFP A/B Hx performance exceeds the design requirements			
		e) No min flow is defined for XSLD Hx as LD is secured			

Table 7g
Summary of CCWS Flow Margins

		LOCA - Safety Injection			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	6.9	6.5	5	30%
108	RHR Hx B	36.3	34.2	0	N/A
115	RHR Pump A	7	6.6	5	32%
112	RHR Hx A	37.1	35.0	0	N/A
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	1145	1080.2	575	88%
45	XSLD Hx	321	302.8	247	23%
44	RCDT Hx	305.8	288.5	225	28%
54	Seal Water Hx	310.5	292.9	230	27%
98	SFP Hx A	3641.6	3435.5	1200	186%
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	196.1	185.0	150	23%
203	RCP A Lower Oil Cooler	6.7	6.3	5	26%
205	RCP A Thermal Barrier	52.1	49.2	40	23%
208	RCP B Upper Oil Cooler	196.1	185.0	150	23%
207	RCP B Lower Oil Cooler	6.7	6.3	5	26%
209	RCP B Thermal Barrier	52.1	49.2	40	23%
214	RCP C Upper Oil Cooler	196.1	185.0	150	23%
212	RCP C Lower Oil Cooler	6.7	6.3	5	26%
215	RCP C Thermal Barrier	52.1	49.2	40	23%
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	162.2	153.0	59	159%
Node0401	GFFD	0	0.0	0	Isolated
Node0028	Sample Coolers	0	0.0	0	Isolated
5 and 28	Total CCWS Flow	6746	6364.2	3131	103%
	Operating CCW Train	A		A	
	Notes	a) System configuration is immediately after 'S' Signal			

Table 7h
Summary of CCWS Flow Margins

		LOCA - Sump Recirc (RHR Only)			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	0	0.0	0	N/A
108	RHR Hx B	0	0.0	0	N/A
115	RHR Pump A	7.3	6.9	5	37%
112	RHR Hx A	5193	4881.4	4874	0%
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	0	0.0	0	N/A
45	XSLD Hx	0	0.0	0	N/A
44	RCDT Hx	0	0.0	0	N/A
54	Seal Water Hx	0	0.0	0	N/A
98	SFP Hx A	0	0.0	0	N/A
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	0	0.0	0	N/A
203	RCP A Lower Oil Cooler	0	0.0	0	N/A
205	RCP A Thermal Barrier	0	0.0	0	N/A
208	RCP B Upper Oil Cooler	0	0.0	0	N/A
207	RCP B Lower Oil Cooler	0	0.0	0	N/A
209	RCP B Thermal Barrier	0	0.0	0	N/A
214	RCP C Upper Oil Cooler	0	0.0	0	N/A
212	RCP C Lower Oil Cooler	0	0.0	0	N/A
215	RCP C Thermal Barrier	0	0.0	0	N/A
304	SFP Hx C	N/A	N/A	0	N/A
305	SFP Hx D	N/A	N/A	0	N/A
Node0401	GFFD	0	-	0	Isolated
Node0028	Sample Coolers	0	-	0	Isolated
5 and 28	Total CCWS Flow	5238	4923.7	4879	1%
	Operating CCW Train	A (Split)		A (Split)	
	Notes	a) Only operator action is splitting CCW Trains			

Table 7i
Summary of CCWS Flow Margins

		LOCA - Sump Recirc (RHR/SFP)			
Section	Component	Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	0	0.0	0	N/A
108	RHR Hx B	0	0.0	0	N/A
115	RHR Pump A	6.3	5.9	5	18%
112	RHR Hx A	4472	4203.7	2250	87%
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	0	0.0	0	N/A
45	XSLD Hx	0	0.0	0	N/A
44	RCDT Hx	0	0.0	0	N/A
54	Seal Water Hx	0	0.0	0	N/A
98	SFP Hx A	3381.5	3178.6	3830	-17%
91	SFP Hx B	-	-	0	N/A
204	RCP A Upper Oil Cooler	0	0.0	0	N/A
203	RCP A Lower Oil Cooler	0	0.0	0	N/A
205	RCP A Thermal Barrier	0	0.0	0	N/A
208	RCP B Upper Oil Cooler	0	0.0	0	N/A
207	RCP B Lower Oil Cooler	0	0.0	0	N/A
209	RCP B Thermal Barrier	0	0.0	0	N/A
214	RCP C Upper Oil Cooler	0	0.0	0	N/A
212	RCP C Lower Oil Cooler	0	0.0	0	N/A
215	RCP C Thermal Barrier	0	0.0	0	N/A
304	SFP Hx C	N/A	N/A	0	N/A
305	SFP Hx D	150.6	141.6	125	13%
Node0401	GFFD	0	-	0	Isolated
Node0028	Sample Coolers	0	-	0	Isolated
5 and 28	Total CCWS Flow	8038	7555.7	6210	22%
	Operating CCW Train	A (Split)		A (Split)	
	Notes	a) Operators manually bring SFP hxs online by opening upstream isolation valves			

Table 7j
Summary of CCWS Flow Margins

Section	Component	Startup Ops			
		Calculated Flow (gpm)	With 6% Uncertainty	Min Flow (gpm)	Flow Margin (%)
105	RHR Pump B	6.9	6.5	5	30%
108	RHR Hx B	35.9	33.9	0	N/A
115	RHR Pump A	6.9	6.5	5	30%
112	RHR Hx A	36.7	34.6	0	N/A
66	BRS: Dist Clr	0	0.0	0	N/A
80	BRS: Evap Clr	0	0.0	0	N/A
73	BRS: Vent Cond	0	0.0	0	N/A
61	Letdown Hx	1250	1179.2	1100	7%
45	XSLD Hx	317.4	299.4	247	21%
44	RCDT Hx	301.6	284.5	225	26%
54	Seal Water Hx	306.8	289.4	230	26%
98	SFP Hx A	3597.4	3393.8	1200	183%
91	SFP Hx B	N/A	N/A	0	N/A
204	RCP A Upper Oil Cooler	193.4	182.5	150	22%
203	RCP A Lower Oil Cooler	6.7	6.3	5	26%
205	RCP A Thermal Barrier	51.4	48.5	40	21%
208	RCP B Upper Oil Cooler	193.4	182.5	150	22%
207	RCP B Lower Oil Cooler	6.7	6.3	5	26%
209	RCP B Thermal Barrier	51.4	48.5	40	21%
214	RCP C Upper Oil Cooler	193.4	182.5	150	22%
212	RCP C Lower Oil Cooler	6.7	6.3	5	26%
215	RCP C Thermal Barrier	51.4	48.5	40	21%
304	SFP Hx C	N/A	-	0	N/A
305	SFP Hx D	160.2	151.1	59	156%
Node0401	GFFD	14	-	14	Specified
Node0028	Sample Coolers	160	-	160	Specified
5 and 28	Total CCWS Flow	6958	6564.2	3830	71%
	Operating CCW Train	A		A	
	Notes	RHR Hx Outlet Isolation Valves are Shut			

4.7 Estimate of CCWS Thermal Performance

The design basis thermal performance of the CCWS was developed by setting the CCWS system thermal boundary conditions to the values defined in Table 3. A steady state thermal-hydraulic balance of the CCWS was performed using PROTO-FLO™ 3.04. For case alignments in which RHR system flow can vary (notably Cooldown and Refueling alignments), RHR heat exchanger tube side flow is adjusted (up to a maximum of 4500 gpm) to maintain CCWS supply temperatures at approximately 120°F, consistent with Reference (13). The ESWS flow conditions are assumed to be at the maximum design temperature of 95°F and the minimum design flow of 8500 gpm, Reference (20), and the CCWS supply temperature is either 105°F or 120°F, depending on the system alignment, Reference (13). Long term steady state spent fuel pool equilibrium temperatures are estimated from the PROTO-FLO™ and PROTO-HX™ results. The temperature and heat duty constraints for the CCWS are all satisfied with the current design basis assumptions with the exception of the Startup case alignment in which the CCW supply temperature of 105.1°F slightly exceeds the design vaue of 105.0°F. The slight increase in CCW supply temperature is considered to be acceptable as the following conditions would not occur simultaneously:

- The CCW heat exchanger model assumes design fouling when trended fouling indicates at least 50 percent margin in the fouling factor.

- The CCW heat exchanger Service Water supply conditions of 8500 gpm and 95°F represent the worst case conditions associated with the limiting single active failure of the 1MCC-1B35-SB feeder breaker with the ESW system operating on the Main Reservoir at the minimum design basis level of 205.7 feet.

- Maximum letdown flow is assumed on the CVCS side of the Letdown heat exchanger simultaneously with operation of the Excess Letdown heat exchanger at it's design CVCS side conditions.

Attachments (R) through (Z) and Attachment (EE) document and Tables 8a and 8b summarize the results of this analysis.

4.8 Estimate of Transient Spent Fuel Pool Thermal Performance

An estimate of the short term transient thermal performance, Attachment (BB), of the spent fuel pools was performed to determine the maximum bulk fuel pool temperature during plant cooldown operations. The transient analysis calculates the bulk fuel pool temperature in 15 minute increments using an estimated fuel pool decay curve correlation, estimated fuel pool heat exchanger thermal performance correlation developed from several PROTO-HX™ runs, only accounting for the water volume of the fuel pool and neglecting changes in the water thermal properties.

Fuel pool heatup thermal transients are calculated from:

$$\rho \cdot C_p \cdot V \frac{dT}{dt} = Q_{FuelPool} - Q_{SFPHx} \qquad \text{Equation (1)}$$

where:

ρ = Pool Water Density (lbm / cuft) at temperature T_i
C_p = Pool Water Specific Heat (BTU / lbm / F) at temperature T_i
V = Pool Water Volume (cu.ft)
T_i = Pool Water Bulk Temperature (F) at time t_i
T_{i+1} = Pool Water Bulk Temperature (F) at time t_{i+1}
$Q_{FuelPool} = DecayHt(t_i)$
$Q_{SFPHx} = f(T_i)$

Discretizing the pool heat up rate term:

$$\frac{dT}{dt} \approx \frac{T_{i+1} - T_i}{t_{i+1} - t_i} \qquad \text{Equation (2)}$$

Solving for T at the *i*+1 time step results in:

$$T_{i+1} = T_i + \frac{t_{i+1} - t_i}{\rho \cdot C_p \cdot V} \cdot \left(Q_{FuelPool} - Q_{SFPHx}\right) \qquad \text{Equation (3)}$$

Equation (3) is solved at each time step using the updated decay heat and Spent Fuel Pool heat exchanger correlations described below.

The decay heat correlation for Fuel Pools A/B and C are conservatively estimated from Attachments 5 and 8 of Reference (26) as follows. The Fuel Pool A/B decay heat correlation is calculated by subtracting the values in Attachment 8 for Fuel Pool C from the values in Attachment 5 for Fuel Pools A/B and C. This data is then curve fit, as shown in Figures 1 and 2 of Attachment (BB), to a generalized decay curve using TableCurve™.

The Fuel Pool decay heat curves of Reference (26) must be adjusted to represent the decay heat generated from the previous refueling (RFO9) which would be representative of the fuel pool inventory during the plant cooldown prior to refueling outage 10. This calculation assumes that the basic decay heat correlation is conservatively representative of the fuel pool inventory after RFO9 as the decay heat curves from Reference (26) are for the last RPV defueling prior to the Power Uprate outage of late 2001 (RFO10). The decay time between RFO9 and RFO10 is calculated to be 519 days (4/15/2000 to 9/22/2001) from Attachment 3 of Reference (26). The adjusted curves are used as input into an Excel spreadsheet for calculating the transient thermal performance of the spent fuel pools during the plant cooldown prior to RFO10.

The Spent Fuel Pool heat exchanger performance correlation is developed by using the Spent Fuel Pool heat exchanger PROTO-HX™ model developed in Reference (1) at the minimum CCW flows and maximum CCW supply temperatures identified in Attachment (E). The Fuel Pool Cooling System inlet temperature to the SFP heat exchanger is varied to calculate a corresponding heat removal rate for the SFP heat exchanger. These runs, attached, are then curve fit using

TableCurve™ to develop a correlation of heat removal capacity versus fuel pool outlet (SFP Hx inlet) temperature. These correlations are input into the fuel pool thermal transient spreadsheet.

It is conservatively assumed that the fuel pools are at the maximum temperature limit of 105°F, Reference (33), prior to the thermal transient. It is also assumed that CCWS supply temperature is a step change to 120°F at the beginning of the cooldown for an RCS temperature of 350°F. The CCWS supply temperature is maintained at 120°F throughout the cooldown transient. This analysis also assumes no operator action with respect to the fuel pools during the plant cooldown.

The thermal transient for Spent Fuel Pools A/B, summarized in Table 1 of Attachment (BB), shows that 17 hours, Reference (13), after the start of the plant cooldown, the fuel pool A/B temperature is 135.7°F which is less than the administrative temperature limit of 137°F. Table 2 of Attachment (BB) shows that fuel pool C will not exceed 113.8°F which is less than the administrative limit of 137°F and less than the 126°F, assumed for design basis HVAC conditions in Reference (34). Therefore, it is concluded that acceptable spent fuel pool temperatures will be maintained even during a plant cooldown from 350°F to 200°F when elevated CCWS supply temperatures are likely to occur, although the fuel pool A/B and C temperatures are bounded by the refueling cases in which the maximum steady state bulk pool temperature of 136.3°F and 122.0°F for fuel pools A/B and C, respectively.

The Fuel Handling Building (FHB) design basis HVAC analysis, Reference (34), shows that four installed air handler cooling coils are sufficient to maintain ambient conditions of 80°F dry bulb temperature and 70 percent Relative Humidity. The as-built FHB HVAC system only includes three air handler cooling coils, which is justified in Attachment G of Reference (34). A thermal transient analysis of Spent Fuel Pool C was performed to establish the bulk pool temperature at the completion of fuel handling (39 hours), Reference (11), in order to reduce the conservatism in Reference (34). This analysis assumes a step change in CCWS supply temperature to 105°F at the minimum CCWS flow rate defined in Tables 7d through 7f and that Spent Fuel Pool C is at the maximum allowable normal operating temperature of 105°F, Reference (33). These thermal conditions are assumed to be maintained throughout the transient even though the CCWS supply temperature will decrease after 39 hours as the decay heat generated by the recently discharged fuel assemblies in Spent Fuel Pool A/B is decreasing due to longer decay times. The transient fuel pool C temperature is estimated to be 113.8°F at 39 hours after commencing fuel handling in the A/B fuel pools which are also assumed to be at the administrative temperature limit of 137°F.

Table 8a
Summary of CCWS Steady-State Thermal Capacity

		Alignment				
		Startup	Normal	Hot S/D (350F)	Safe S/D (350F)	
Load	Units		Mode 1	@ 4 hrs	@ 4 hrs	Reference
RHR Pump B	Heat Load (BTU/hr)	0	0	70000	0	Calc NSSS-38 R2
RHR Hx B	Heat Load (BTU/hr)	0	0	71926000	0	Calculated
RHR Pump A	Heat Load (BTU/hr)	0	0	70000	70000	Calc NSSS-38 R2
RHR Hx A	Heat Load (BTU/hr)	0	0	67817000	81098000	Calculated
BRS: Dist Clr	Heat Load (BTU/hr)	0	0	0	0	Assumed BRS Skid Abandoned Inplace
BRS: Evap Clr	Heat Load (BTU/hr)	0	0	0	0	Assumed BRS Skid Abandoned Inplace
BRS: Vent Cond	Heat Load (BTU/hr)	0	0	0	0	Assumed BRS Skid Abandoned Inplace
Letdown Hx	Heat Load (BTU/hr)	15827000	15827000	12536000	0	Calculated
XSLD Hx	Heat Load (BTU/hr)	5290000	0	0	0	Calculated
RCDT Hx	Heat Load (BTU/hr)	2386000	2428000	1871000	1890000	Calculated
Seal Water Hx	Heat Load (BTU/hr)	1626000	1689000	881000	898000	Calculated
SFP Hx A	Heat Load (BTU/hr)	15345000	15343000	13683000	13680000	Calculated
SFP Hx B	Heat Load (BTU/hr)	0	0	0	0	Secured
RCP A	Heat Load (BTU/hr)	367000	367000	367000	0	1/3 of WEC CQL-5361 6/5/79 Value
RCP B	Heat Load (BTU/hr)	367000	367000	367000	0	1/3 of WEC CQL-5361 6/5/79 Value
RCP C	Heat Load (BTU/hr)	367000	367000	367000	0	1/3 of WEC CQL-5361 6/5/79 Value
SFP Hx C	Heat Load (BTU/hr)	0	0	0	0	Secured
SFP Hx D	Heat Load (BTU/hr)	1000000	1000000	1000000	1000000	Fixed
GFFD	Heat Load (BTU/hr)	0	0	0	0	
Sample Coolers	Heat Load (BTU/hr)	0	0	0	0	
CCW Trains	No Operating	1	1	2 (Split)	1	Consistent w/DBD-131
CCW Hx Ht Duty	BTU/hr	42,913,000	36,852,000	171,612,748	99,528,000	Calculated
CCW Supply Temp	(F)	105.1	103.8	119.6/110.5	119.4	Calculated @ Node0011
Design CCW Supply Temp	(F)	105	105	120	120	Consistent w/ DBD-131
ESW Flow (Design)	(gpm)	8500	8500	8500	8500	
Design Basis ESW Inlet Temp	(F)	95	95	95	95	
Fuel Pool A/B Temp	(F)	122.3	121.0	136.0	135.6	
Fuel Pool A/B Temp Limt	(F)	137.0	137.0	137.0	137.0	
Fuel Pool C/D Temp	(F)	117.2	115.8	134.0	133.3	
Fuel Pool C/D Temp Limit	(F)	137.0	137.0	137.0	137.0	

Table 8b
Summary of CCWS Steady-State Thermal Capacity

Load	Units	Refuel Core Shuffle	Refuel Full Offload	Refuel Abnormal	LOCA SI	LOCA Recirc (A)	LOCA Recirc (B)	Reference
RHR Pump B	Heat Load (BTU/hr)	0	0	70000	0	0	0	Calc NSSS-38 R2
RHR Hx B	Heat Load (BTU/hr)	0	0	0	0	0	0	Calculated
RHR Pump A	Heat Load (BTU/hr)	70000	70000	70000	0	70000	70000	Calc NSSS-38 R2
RHR Hx A	Heat Load (BTU/hr)	0	0	0	0	118077000	81336000	Calculated
BRS: Dist Clr	Heat Load (BTU/hr)	0	0	0	0	0	0	Assumed BRS Skid Abandoned Inplace
BRS: Evap Clr	Heat Load (BTU/hr)	0	0	0	0	0	0	Assumed BRS Skid Abandoned Inplace
BRS: Vent Cond	Heat Load (BTU/hr)	0	0	0	0	0	0	Assumed BRS Skid Abandoned Inplace
Letdown Hx	Heat Load (BTU/hr)	0	0	0	15827000	0	0	Calculated
XSLD Hx	Heat Load (BTU/hr)	0	0	0	0	0	0	Calculated
RCDT Hx	Heat Load (BTU/hr)	2394000	2249000	2248000	2437000	0	0	Calculated
Seal Water Hx	Heat Load (BTU/hr)	1673000	1498000	1497000	1701000	0	0	Calculated
SFP Hx A	Heat Load (BTU/hr)	25271000	32121000	32122000	15341000	0	15399000	Calculated
SFP Hx B	Heat Load (BTU/hr)	0	0	0	0	0	0	Secured
RCP A	Heat Load (BTU/hr)	0	0	0	367000	0	0	1/3 of WEC CQL-5361 6/5/79 Value
RCP B	Heat Load (BTU/hr)	0	0	0	367000	0	0	1/3 of WEC CQL-5361 6/5/79 Value
RCP C	Heat Load (BTU/hr)	0	0	0	367000	0	0	1/3 of WEC CQL-5361 6/5/79 Value
SFP Hx C	Heat Load (BTU/hr)	0	0	0	0	0	0	Secured
SFP Hx D	Heat Load (BTU/hr)	1000000	1000000	1000000	1000000	0	1000000	Fixed
GFFD	Heat Load (BTU/hr)	0	0	0	0	0	0	
Sample Coolers	Heat Load (BTU/hr)	0	0	0	0	0	0	
CCW Trains	No Operating	1	1	2 (Split)	1	Split (1/1)	Split (1/1)	Consistent w/DBD-131
CCW Hx Ht Duty	BTU/hr	31,258,000	38,239,000	38,388,629	36,992,000	188,153,000	97,728,000	Calculated
CCW Supply Temp	(F)	102.8	104.8	104.8/95.0	103.6	120.0	118.4	Calculated @ Node0011
Design CCW Supply Temp	(F)	105	105	105	105	120	120	Consistent w/ DBD-131
ESW Flow (Design)	(gpm)	8500	8500	8500	8500	8500	8500	
Design Basis ESW Inlet Temp	(F)	95	95	95	95	95	95	
Fuel Pool A/B Temp	(F)	132.9	136.4	136.4	120.8	Isolated	135.9	
Fuel Pool A/B Temp Limt	(F)	137.0	137.0	137.0	137.0	137.0	137.0	
Fuel Pool C/D Temp	(F)	116.9	122.5	122.5	115.5	Isolated	131.8	
Fuel Pool C/D Temp Limit	(F)	137.0	137.0	137.0	137.0	137.0	137.0	

4.9 ESWS Hydraulic Margins

Assumption 4.1.5 is critical to this analysis. Table 14 of Reference (20) shows that the minimum available ESWS flow to the CCW heat exchangers is 8797 gpm, including 4 percent ESWS model uncertainty and a single active failure, when operating on the Main Reservoir at the minimum design basis reservoir level. As the worst case calculated single failure flow exceeds the assumed minimum ESWS flow to the CCW heat exchangers, the assumption of a minimum CCW heat exchanger flow of 8500 gpm is considered to be valid and achievable.

4.10 ESWS Ultimate Heat Sink Margins

An evaluation of the available thermal and reservoir level margins was performed, Attachment (AA). The current UHS analysis of record, Reference (15), evaluated the time dependent effect of a design basis LOCA, given worst case historical meteorological conditions of 9+1 days. Reference (15) documents a means of evaluating the overall energy balance of the HNP main and auxiliary reservoirs. The results from Reference (15) are that the worst case UHS temperature is 94.2°F which occurs approximately 30 days after a design basis LOCA. The design temperature of the UHS is currently specified as 95°F, Reference (19).

The thermal margin of the UHS is defined as the difference between the heat rejected from the reservoir at the design temperature and the heat rejection at the maximum estimated water temperature. Using the UHS heat loss relationship developed in Reference (15) and neglecting the thermal capacitance of the auxiliary reservoir, it was determined, Attachment (AA), that the change in surface heat flux was 6.3 BTU/hr-°F-sq.ft (-3.9 BTU/hr-sqft at 95°F and -10.2 BTU/hr-sqft at 94.2°F) due to a change in the reservoir surface temperature from 94.2°F to 95.0°F. The change in heat flux accounts for changes in the convective and evaporative heat fluxes which are a direct function of the reservoir surface temperature. The change in the surface heat flux results in a change in the heat rejection capability of 85.17 MBTU/hr, given a reservoir surface area of 1.3519E7 square feet at 249.6 feet, Reference (15).

The activation of Spent Fuel Pools C and D results in an increase in CCWS and ESWS heat load of approximately 1.0 MBTU/hr, Reference (26). The available thermal margin of the Ultimate Heat Sink is 85.17 MBTU/hr. The change in Ultimate Heat Sink peak temperature is less than 0.01°F, Attachment (AA). It is concluded that the activation of Spent Fuel Pools C and D are within the current thermal capacity of the Ultimate Heat Sink and have a negligible impact on the design Ultimate Heat Sink temperature.

Reference (15) also evaluated the impact of a design basis LOCA on reservoir levels 30 days after the event which resulted in the Technical Specification minimum UHS level requirements. The reservoir temperature used in the Reference (15) analysis was 95°F for conservatism in order to maximize the surface evaporation rate. Based on these considerations, the current UHS level requirements are not impacted so long as UHS thermal margin is available.

5.0 CONCLUSIONS

This analysis documents the estimated thermal and hydraulic margins in the CCW system, the ESW system and the UHS. It is concluded that sufficient thermal and hydraulic margins exist in the CCW and ESW systems to support the proposed CCWS tie-in for the Fuel Pool C/D heat exchangers up to a maximum fuel pool C heat load of 1.0 MBTU/hr. It is further concluded that the available thermal margin in the Ultimate Heat Sink is sufficient to accommodate the added Fuel Pool C/D heat load of 1.0 MBTU/hr which will have a negligible impact on the design Ultimate Heat Sink temperature or level.