UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR VERMONT YANKEE, LLC AND ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket No. 50-271-LR
	)	ASLBP No. 06-849-03-LR
(Vermont Yankee Nuclear Power Station)	)	

NRC STAFF'S ANSWER IN OPPOSITION TO NEC'S MOTION FOR LEAVE TO FILE A NEW CONTENTION

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May 19, 2009

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Pursuant to 10 C.F.R. § 2.309(h)(1), the staff of the Nuclear Regulatory Commission ("Staff") hereby answers the request for leave to file a new contention in "New England Coalition, Inc.'s Motion for Leave to File a Timely New Contention and Motion to Hold in Abeyance Action on This Proposed Contention until Issuance of NRC Staff Supplemental Safety Evaluation Report" ("NEC Motion").[1] For the reasons discussed below, the Staff submits that the proposed new contention is (1) not based on new information, (2) attempts to relitigate issues already resolved during this proceeding, and (3) does not contain sufficient factual support for its claims. Thus, the Atomic Safety and Licensing Board ("Board") should reject New England Coalition's ("NEC") motion.

[1] The NRC Staff previously answered the motion to hold the proceedings in abeyance. NRC Staff's Answer in Opposition to NEC Motion to Hold in Abeyance Action on Proposed Contention until Issuance of NRC Staff Supplemental Safety Evaluation Report (April 30, 2009) (ADAMS Accession No. ML060300085).

BACKGROUND

By letter dated January 25, 2006, Entergy submitted to the U.S. Nuclear Regulatory Commission ("NRC" or "Commission") an application for renewal,[2] pursuant to 10 C.F.R. Part 54, of Operating License No. DPR-28 for the Vermont Yankee Nuclear Power Station ("VYNPS"). The current operating license expires on March 21, 2012.

The NEC filed a petition for leave to intervene on May 26, 2006.[3] As relevant to the instant motion, the Board admitted NEC Contention 2 from that Petition. NEC Contention 2 alleged that Entergy's License Renewal Application ("LRA") did not include an adequate plan to monitor and manage the effects of aging due to metal fatigue on key reactor components. *Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station), LBP-06-20, 64 NRC 131, 183 (2006).

On September 4, 2007, NEC filed a motion to file a timely new or amended contention challenging Entergy's August 2, 2007, environmentally adjusted cumulative usage factor ("CUFen") analyses for nine key locations ("refined CUFen analyses"). The Board admitted the contention as Contention 2A and held NEC's original Contention 2 in abeyance. *Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station), LBP-07-16, 66 NRC 261, 270-71 (2007).

On March 17, 2008, NEC filed a motion for leave to file a new or amended contention challenging Entergy's February 15, 2008, confirmatory CUFen analysis for the feed water

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[2] Vermont Yankee Nuclear Power Station License Renewal Application (Jan. 25, 2006) (ADAMS Accession No. ML060300085). Entergy has since supplemented and amended its application several times.

[3] Vermont Department of Public Service ("DPS"), the Massachusetts Attorney General ("AG"), and the Town of Marlboro, Vermont ("Marlboro") also filed petitions to intervene.

("FW") nozzle ("confirmatory CUFen analysis"). NEC alleged that the confirmatory CUFen analysis was flawed, that it did not bound the refined CUFen analyses for other components, and that it only addressed the use of the Green's function methodology (i.e. the confirmatory CUFen analysis did not address NEC's other concerns with the refined CUFens raised by Contention 2A). The Board admitted this contention as Contention 2B. Order (Granting Motion to Amend Contention 2A) (April 24, 2008) (Unpublished) (ADAMS Accession No. ML081150600).

After a hearing, the Board issued a Partial Initial Decision ("PID"). Therein the Board found the confirmatory CUFen analysis for the FW nozzle met all regulatory requirements. *Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station), Partial Initial Decision, LBP-08-25, 68 NRC ___, (November 24, 2008) (slip op. at 54). The Board also found that Entergy's refined CUFen analyses met all regulatory requirements but one. The Board concluded that Entergy's use of the simplified Green's function methodology in calculating the refined CUFen analyses for the core spray ("CS") and reactor recirculation outlet ("RO") nozzles did not comply with NRC regulations. PID at 66. Thus, the Board concluded,

> Assuming Entergy still wishes to pursue this license renewal, it must (1) recalculate the CUFen analyses for the CS and [RO] nozzles, in accordance with the ASME Code, NUREG 6583 and 5704, and all other regulatory guidance, (2) resubmit these results to the NRC Staff and serve them on the other parties herein, and (3) either demonstrate that the TLAAs are less than unity or submit an adequate AMP for these components. . . .
>
> If the CUFen analyses are (1) done in accordance with the above stated guidance and the basic approach used in the Confirmatory CUFen Analysis for the FW nozzle, (2) contain no significantly different scientific or technical judgments, and (3) demonstrate values less than unity, then this adjudicatory proceeding terminates. If not, NEC may file a new or amended contention challenging the adequacy of the CUFen calculation . . . .

PID at 67. In a subsequent order clarifying the PID, the Board stated that such a new or amended contention must meet the requirements of 10 C.F.R. § 2.309(f)(1) and (2). Memorandum and Order Clarifying Deadline for Filing New or Amended Contention, at 3 (Mar. 9, 2009) (ADAMS Accession No. ML090680620) ("March 9, 2009, Order"). Last, the Board cautioned NEC not to file proposed new contentions "to rehash or renew any technical challenges that have already been raised and resolved in this proceeding (e.g., dissolved oxygen, outdated equations, etc.)." PID at 67 n. 95.

Entergy confirmed the refined CUFen analyses for the CS and RO nozzles without relying on the simplified Green's function methodology ("final CUFen analyses") and submitted them to the NRC on March 10, 2009. Letter from Matias F. Travieso-Diaz, Counsel for Entergy to Atomic Safety and Licensing Board (Mar. 10, 2009) (ADAMS Accession No. ML090840422) ("March 10, 2009 Entergy Letter").

On April 24, 2009, NEC filed the instant motion and attached "Declaration of Dr. Joram Hopenfeld In Support of New England Coalition's Motion to File a New of Amended Contention on Entergy's Fatigue Reanalysis" (Apr. 22, 2009) ("Hopenfeld Declaration"). Therein, NEC argues that "Entergy has not *properly* recalculated the Core Spray and Recirculation Outlet nozzle CUFens such that they demonstrate that these important components will not fail during the period of extended operation." NEC Motion at 1 (emphasis in original). NEC asserts that, contrary to regulatory guidance, Entergy relied on technically and factually flawed scientific judgments to calculate the final CS and RO nozzle CUFen analyses. *Id*. at 2. Specifically, NEC states that in preparing the final CUFen analyses for the RO and CS nozzles, Entergy incorrectly assumed (1) a fully developed, uniform flow in calculating the heat transfer coefficient during forced convection flow, (2) that the heat transfer coefficient did not vary in the vertical direction within the nozzles during natural convection flow, (3) a constant dissolved

oxygen ("DO") concentration, and (4) the absence of cracks in the RO nozzle. Hopenfeld Declaration at 5-12.

DISCUSSION

I. NEC's New Proposed Contention Does Not Meet the Requirements for Filing a Contention under 10 C.F.R. § 2.309(f)(1) and Rests on Several Unsupported Assertions

A. NEC Does Not Provide a Brief Explanation of the Basis for its Proposed New Contention as required by 10 C.F.R. § 2.309(f)(1)(ii) or a Concise Statement of the Facts and Expert Opinions that Support the Contention as Required by 10 C.F.R. § 2.309(f)(1)(v)

The Board specifically stated that any contention NEC files must meet the normal contention admission requirements of 10 C.F.R. § 2.309(f)(1). March 9, 2009, Order. Under that standard, a contention must satisfy the following requirements:

> (f) Contentions. (1) A request for hearing or petition for leave to intervene must set forth with particularity the contentions sought to be raised. For each contention, the request or petition must:
>
> (i) Provide a specific statement of the issue of law or fact to be raised or controverted…;
>
> (ii) Provide a brief explanation of the basis for the contention;
>
> (iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding;
>
> (iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding;
>
> (v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to supports its position on the issue; and
>
> (vi) …[p]rovide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material

> issue of law or fact. This information must include references to specific portions of the application (including the applicant's environmental report and safety report) that the petition 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.
>
> (2) Contentions must be based on documents or other information available at the time the petition is to be filed, such as the application, supporting safety analysis report, environmental report or other supporting document filed by an applicant or licensee, or otherwise available to a petitioner. On issues arising under the National Environmental Policy Act, the petitioner shall file contentions based on the applicant's environmental report…

10 C.F.R. § 2.309(f)(1)-(2).[4]

At the outset, NEC's proposed new contention does not meet the requirements of 10 C.F.R. §§ 2.309(f)(1)(ii) and (v). As stated above, those sections require petitioners to provide a brief explanation of the basis of the contention and concise statement of the facts that support the contention. NEC failed to provide this information. Rather, NEC vaguely asserts that Entergy's final confirmatory CUFen analyses for the RO and CS nozzles are flawed and do not conform to American Society of Mechanical Engineers ("ASME"), NRC, or National Laboratory Guidance. NEC Motion at 1-2. This allegation is far from specific. To determine NEC's actual complaint, a reader must delve through the general declaration of Dr. Hopenfeld and guess

[4] Similarly, long-standing Commission precedent establishes that contentions may only be admitted in an NRC licensing proceeding if they fall within the scope of issues set forth in the Federal Register notice of hearing and comply with the requirements of former § 2.714(b) (subsequently restated in 2.309(f)), and applicable Commission case law. *See, e.g., Public Service Co. of Indiana* (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-316, 3 NRC 167, 170-71 (1976); *Philadelphia Electric Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974); *Duquesne Light Co.* (Beaver Valley Power Station, Unit 1), ALAB-109, 6 AEC 243, 245 (1973); *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 and 2), ALAB-107, 6 AEC 188, 194 (1973), *aff'd sub nom. BPI v. Atomic Energy Commission*, 502 F.2d 424, 429 (D.C. Cir. 1974).

which assertions therein, if any, form the primary basis of NEC's contention. NEC exacerbates the difficulty of this endeavor by claiming that "DO and flow discussions are not a major part of NEC's motion" when the Hopenfeld Declaration focuses almost exclusively on these concerns. *Id*. at 7. Therefore, NEC's Motion fails to provide an explanation of the basis for the contention and a statement of the supporting facts as required by 10 CFR §§ 2.309(f)(1)(ii) and (v).

B. Several of the Grounds upon Which NEC's Proposed New Contention Rests Do Not Involve Genuine Disputes on a Material Issue of Law or Fact as Required by 10 C.F.R. § 2.309(f)(1)(vi)

The challenges NEC raises in support of its new proposed contention fail to demonstrate the existence of a genuine dispute with respect to a material issue of law or fact, as required by 10 C.F.R. § 2.309(f)(1)(vi).

1. Cracks in the RO Nozzle

NEC maintains that, in calculating the final CUFen analyses for the RO nozzle, Entergy erroneously assumed that no cracks existed in the RO nozzle. Hopenfeld Declaration at 12. NEC notes that recently two similar nuclear power plants, Oyster Creek Nuclear Generating Station ("Oyster Creek") and James A. Fitzpatrick Nuclear Power Station ("Fitzpatrick"), reported cracks in their RO nozzles. *Id*. However, the cracks at these plants appeared on the nozzle-to-safe-end weld.[5] The nozzle-to-safe-end-weld is not the controlling location for determining metal fatigue. To determine metal fatigue, the location with the highest CUFen value is the controlling location. For the RO nozzle, the controlling location with the highest CUFen value is

[5] Letter from Pete Dietrich, Site Vice President, James A. Fitzpatrick Nuclear Power Plant, Entergy to NRC, Licensee Event Report, 2008-002-00, Enclosure at 1 (Nov. 20, 2008) (ADAMS Accession No. ML083300360); Letter from Pamela B. Cowan, Director – Licensing and Regulatory Affairs, Exelon, to NRC, Submittal of Analytical Evaluation in Accordance with IWB-3134(b), at 1 (Jan. 21, 2008) (ADAMS Accession No. ML090280055).

the blend radius, not the-safe-end weld. *See* March 10, 2009 Letter from Entergy, Design Inputs and Methodology for ASME Code Fatigue Usage Analysis of Reactor Recirculation Outlet Nozzle, file number 0801038.304 ("Calculation 304") at 17. As a result, cracks in the-safe-end nozzle would be unlikely to impact the final CUFen analysis for the RO nozzle. Moreover, Entergy's witness established that ASME Code Section III governs fatigue analyses and does not require the analyst to postulate cracks in conducting such analyses. Tr. 1051 (Fitzpatrick); Tr. 1059 (Stevens). Thus, because cracks in the safe-end weld would be unlikely to impact the final CUFen analyses for the RO nozzle, NEC has failed to show that this dispute is genuine.

2. Heat Transfer Coefficient During Forced Convection Flow

In addition, NEC claims that to calculate the heat transfer coefficient for the RO nozzle, Entergy uses equations that are appropriate for a straight pipe with fully developed flow, not a convergent channel such as the RO nozzle. *Id*. at 6. However, Attachment 3 to the Hopenfeld Declaration indicates that as the flow velocity increases, the local velocities throughout a cross section of the pipe become more uniform. Given that the flow velocity through the RO nozzle is significantly greater than the velocities depicted, NEC's attachment supports Entergy's decision to assume a uniform flow throughout the RO nozzle. Calculation 304 at 6-7. Thus, NEC has failed to demonstrate or support a genuine dispute with the applicant on this basis as required by 10 C.F.R. § 2.309(f)(1)(vi).

3. Heat Transfer Coefficients During Natural Convection Flow

NEC further contends that Entergy has incorrectly calculated the coefficient for heat transfer during natural convection. To support this assertion, NEC relies on Attachment 4 to the Hopenfeld Declaration. This attachment is taken from Chapter 11 on free convection in E. R. G. Eckert and R. M. Drake, "Heat and Mass Transfer", 2nd Edition, McGraw-Hill, 1959. It is part of

the section that treats *external* laminar heat transfer on a vertical plate and a horizontal tube. It does not pertain to free convection in enclosed spaces such as horizontal tubes. However, this cited reference discusses internal free convection on pages 324-25 (not submitted by NEC). Pages 324-25 report the results of experiments on heat transfer from the surface of a sphere enclosing a fluid-filled interior. The results are summarized by an empirical relation of the same form as that used by Entergy. Eckert and Drake at 324-25. For this configuration, the Nusselt and the Grashof numbers are based on the inside diameter of the sphere. Therefore, the use of the inside diameter by Entergy for "x" in the free convection heat transfer coefficient calculation in an enclosure like the RO nozzle is acceptable. The symbol "x" is not a variable. It is used to indicate the characteristic dimension to be used either for a horizontal tube or for a horizontal annulus.

The equation quoted in the Hopenfeld Declaration that Entergy relied on to calculate the heat transfer coefficient for natural convection flow is an empirical equation referenced in J. P. Holman, "Heat Transfer", 8th edition, McGraw-Hill, 1997. It pertains to transient natural convection heating or cooling in *closed* vertical or horizontal cylinders, in the range $0.75<L/D<2.0$ (L is the cylinder length and D is the cylinder diameter). Holman at 363. The reference states clearly that the Grashof number in this equation is formed with L. *Id*. Where L is approximately equal to the diameter, the Grashof number can be formed with the diameter of the cylinder. *Id*. Therefore, "x" here has only one value, the diameter. In addition, the reference states that the characteristic dimensions to be used with the Nusselt and Grashof numbers for a horizontal cylinder is the diameter of the cylinder. *Id* at 345. Thus, NEC has not established a genuine dispute over a material issue because its argument appears to confuse

external free convection with free convection in an enclosed space, such as inside a tube or an annulus.[6]

II. NEC's New Proposed Contention Does not Meet the Requirements for Filing a New Contention under 10 C.F.R. §§ 2.309(f)(2)

A. Standards for New Contentions Under 10 C.F.R. § 2.309(f)(2)

Another Atomic Safety and Licensing Board recently observed that when new contentions are based on breaking new developments or information, they are to be treated as "new or amended" under 10 C.F.R. § 2.309(f)(2)(i)-(iii). *Shaw Areva Mox Services* (Mixed Oxide Fuel Fabrication Facility), LBP-07-14, 66 NRC 169, 210 n. 95 (2007) (*citing AmerGen Energy Co.* (Oyster Creek Nuclear Generating Station), LBP-06-11, 63 NRC 391, 395-96 & n.3 (2006); and *Entergy Nuclear Vermont Yankee, LLC* (Vermont Yankee Nuclear Power Station), LBP-05-32, 62 NRC 813, 821 & n.21 (2005)). When the information is not new, the stricter standards of 10 C.F.R. § 2.309(c)(1)(i)-(viii) apply. *See id*; *infra* section III.

NEC's proposed new contention is based on the Partial Initial Decision ("PID"), which authorized NEC to file new or amended contentions on the final CUFen analyses for the CS and RO nozzles submitted by Entergy. PID at 67. However, the Commission has previously stated that the NRC does not look with favor on new contentions filed after the initial filing. *Dominion Nuclear Connecticut, Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-04-36, 60 NRC

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[6] For purposes of clarification, the Staff notes that Entergy's May 18, 2009 Answer in Opposition to NEC's Motion to File a Timely New Contention at page 24 asserts that NEC incorrectly applied the exponent "n" outside of the parenthetical term (GrPr) to establish that the heat transfer coefficient for natural convection varies with the vertical distance at a rate of $1/x^{.25}$. The Staff notes that the Grashof number ("Gr") within the parenthetical term contains the term x^3. Eckert and Drake at 314. Thus, the heat transfer coefficient for natural convection may well vary with the vertical distance at a rate of $1/x^{.25}$. But, for the reasons stated above, the Staff finds NEC's assertion immaterial.

631, 636 (2004). Thus, a petitioner may file late contentions "only 'upon a showing that -- (i) [t]he information upon which the amended or new contention is based was not previously available; (ii) [t]he information upon which the amended or new contention is based is materially different than information previously available; and (iii) [t]he amended or new contention has been submitted in a timely fashion based on the availability of the subsequent information.' " *Id.* (quoting 10 C.F.R. § 2.309(f)(2)(i)-(iii) (alterations in original); *see also* 10 C.F.R. § 2.309(c)(1)).

In promulgating 10 C.F.R. Part 2, the Commission stated,

> For [non-NRC-environmental-document-based] new or amended contentions the rule makes clear that the criteria in § 2.309(f)(2)(i) through (iii) must be satisfied for admission. Include[d] in these standards is the requirement that it be shown that the new or amended contention has been submitted in a timely fashion based on the timing of availability of the subsequent information. *See* § 2.309(f)(2)(iii). This requires that the new or amended contention be filed promptly after the new information purportedly forming the basis for the new or amended contention becomes available.

Statements of Consideration, Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. 2182, 2221 (Jan. 14, 2004).

B. NEC's Proposed New Contention Fails to Meet the Standards in 10 C.F.R. § 2.309(f)(2)

NEC's proposed new contention is not based on new information, as required by 10 C.F.R. § 2.309(f)(2)(i). As discussed above, NEC states that the final CUFen analyses for the CS and RO nozzles are flawed because the heat transfer coefficient calculations assume a fully developed flow during forced convection, the heat transfer coefficients do not vary in the vertical direction within the nozzles during natural convection, the DO concentrations are uniform, and they do not account for possible cracks in the RO nozzle. However, NEC's complaints related to heat transfer coefficients and DO concentrations arise from assumptions Entergy made in the August 2, 2007 refined CUFen analyses for the CS and RO nozzles and the February 15, 2008

confirmatory CUFen analyses for the FW nozzle. Entergy provided those analyses to NEC long before NEC filed this motion. Indeed, these documents formed the bases of NEC contentions 2A and 2B. Thus, these complaints are not based on new information. Likewise, NEC's claim that Entergy should have considered cracks in the RO nozzle is not based on new information that is materially different from previously available information.[7]

1. Entergy Made the Same Assumptions Regarding Heat Transfer Coefficients and DO Concentrations in the Refined CUFen Analyses that it Did in the Final CUFen Analysis for the CS and RO Nozzles

NEC claims that Entergy's final CUFen analyses for the CS and RO nozzles are flawed because they assume a fully developed flow during forced convection, a constant heat transfer coefficient for natural convection, and a uniform DO concentration. However, in calculating the refined CUFen analyses for the CS and RO nozzles using the simplified Green's function methodology, Entergy made the same assumptions that NEC now seeks to challenge in the final CUFen analyses for the CS and RO nozzles. With respect to the refined CUFen analyses for the CS and RO nozzles, Entergy assumed a fully developed flow during forced convection. *See* PID at 46. Moreover, Entergy made the same assumption in calculating the heat transfer coefficient during natural convection in the refined CUFen analyses for the CS and RO nozzles that NEC now challenges with respect to the final CUFen analyses for the CS and RO nozzles. *Id.* at 48; NEC Exh. NEC-JH_03 at 12, 14; Fitzpatrick/Stevens Decl. Post. Tr. 763, at 30. Specifically, in both instances, Entergy used a constant diameter for a given section of pipe in performing the fatigue analyses. NEC Exh. NEC-JH_03 at 12, 14; Hopenfeld Declaration at 8-9;

[7] As, as stated above and addressed at the evidentiary hearing, cracks are not considered when performing ASME Code Section III analysis. *See, e.g.,* Tr. 1051 (Fitzpatrick); Tr. 1059 (Stevens).

Tr. at 1108-09 (Hopenfeld); Tr. at 1111-13 (Stevens). Finally, Entergy relied on industry guidance to determine the DO concentration in the non-feedwater lines in the refined CUFen analyses. PID at 37. Entergy relies on the same documents in the final CUFen analyses.[8] Therefore, the assumptions NEC seeks to challenge with its proposed new contention were previously available and are not new information as defined by 10 C.F.R. § 2.309(f)(2)(i). If NEC wished to challenge these assumptions, it should have done so within a reasonable amount of time (that is, by September 4, 2007) after Entergy filed its initial CUFen reanalyses for the CS and RO nozzles on August 2, 2007.[9]

Even if the assumptions NEC challenges in the final CUFen analyses were not previously available, NEC has failed to show how they are materially different from the assumptions Entergy relied on in the refined CUFen analyses for the CS and RO nozzles. The primary difference between Entergy's refined and final confirmatory CUFen analyses is the use of the simplified Green's function methodology. NEC has made no attempt to demonstrate that Entergy's removal of the simplified Green's function methodology from the final CUFen analyses for the CS and RO nozzles had any effect whatsoever on the assumptions Entergy made regarding forced and natural convection flow or DO concentrations. Consequently, NEC has

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[8] *Compare* March 10, 2009 Letter from Entergy, Fatigue Analysis of Reactor Recirculation Outlet Nozzle, file number 0801038.306 ("Calculation 306") at 7-8 and Fatigue Analysis of Reactor Core Spray Nozzle, file number 0801038.303 ("Calculation 303") at 7-8 *with* Letter from Mathias F. Travieso-Diaz, Counsel for Entergy to Mary C. Baty, Counsel for NRC, Sarah Hofmann, Counsel for DPS, and Karen L. Tyler, Counsel for NEC, Structural Integrity Associates Final Fatigue Analyses Reports (August 2, 2007), Fatigue Analysis of Recirculation Outlet Nozzle, file number VY-16Q-306R0 at 14-15 and Fatigue Analysis of Core Spray Nozzle, file number VY-16Q-310R0 at 12-13.

[9] Many boards have concluded that thirty days after discovery of new information is a reasonable period of time to file new or amended contentions based on that information. *See Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station), LBP-06-14, 63 NRC 568, 574 (May 25, 2006).

not addressed, much less shown, that Entergy's assumptions upon which the final CUFen analyses rests are materially different from those assumptions that supported the refined CUFen analyses.[10]

Instead, NEC contends that the differences in geometry and materials between the FW nozzle and the CS and RO nozzles render Entergy's assumptions regarding uniform DO concentrations as well as the heat transfer coefficient during forced and natural convection flow invalid. NEC Motion at 6-7. However, the geometries and materials of the CS and RO nozzles have been available throughout these proceedings. Thus, they can hardly be information that is materially different within the meaning of 10 C.F.R. § 2.309(f)(2). As demonstrated above, Entergy's assumptions regarding forced and natural convection flow and DO concentrations have not changed. Indeed, Entergy relied on the same assumptions in the refined CUFen analyses for the CS and RO nozzles in 2007. The physical characteristics of the CS and RO nozzles have not changed. NEC has failed to demonstrate how the interaction between the two has changed either through the use of the simplified Green's function methodology or otherwise. Thus, NEC has not met the requirements of 10 C.F.R. § 2.309(f)(2)(ii).

Consequently, NEC's proposed new contention is based on information that has been available to NEC since Entergy disclosed its refined CUFen analyses for the CS and RO nozzles in August of 2007. The refined CUFen analyses contained the same assumptions regarding the heat transfer coefficient during natural and forced convection flow and DO concentration that the final CUFen analyses contain. NEC should have challenged those

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[10]Rather than challenge new information, as contemplated by the PID, NEC seeks to relitigate issues upon which the Board has already ruled. *See* PID at 67 & n.95; *infra* Section IV.

assumptions within a reasonable time after Entergy submitted the refined CUFen analyses for the CS and RO nozzles on August 2, 2007.[11]

2. Information Regarding Cracks in Other Plant's RO Nozzles has Long Been Available

NEC states that in calculating the final CUFen analyses for the RO nozzle, Entergy erroneously excluded the possibility of cracks in the nozzle. NEC cites the discovery of such cracks in similar reactors in the past year to question this assumption. On November 20, 2008, Entergy submitted to the NRC a letter that indicated Entergy had discovered an inner diameter axial flaw indication in the reactor recirculation inlet nozzle at Fitzpatrick. Additionally, on January 21, 2009, Exelon sent to the NRC an analysis of an indication in the reactor pressure vessel outlet nozzle-to-safe end weld at Oyster Creek. Hopenfeld Declaration at 12.

However, information regarding the possibility of such cracks has been available for years. In 1984, Pilgrim Nuclear Power Station discovered cracks in the recirculation inlet and outlet nozzle to safe end welds. Letter from Electric Power Research Institute to NRC, Project No. 704 - Interim Guidance for an Accelerated Inspection Program for BWRVIP-75-A Category C Dissimilar Metal Welds Containing Alloy 182, attachment 2 at 1 (October 28, 2008) (ADAMS Accession No. ML083050515). In addition, Duane Arnold Energy Center experienced a similar problem shortly before Entergy filed the refined CUFen analyses for the RO nozzle. *Id*. Thus, information related to potential cracking in the reactor pressure vessel outlet nozzle-to-safe end weld at other plants has been available for over two decades. NEC has not attempted to show how the cracks at Oyster Creek and Fitzpatrick are any different than the RO nozzle cracks that

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[11] As explained in Section IV, *infra,* NEC has already raised, and the Board has already resolved these issues.

have long been public knowledge. As a result, NEC should have brought this challenge when Entergy initially submitted the refined CUFen analyses in 2007.

III. NEC's Motion Fails to Meet the Standards for Filing a Non-Timely Contention

Even if a proposed new contention is not, in fact, based on new information, the Board might still consider the petition under the stricter standards of 10 C.F.R. § 2.309(c)(1)(i)-(viii). *See MOX Services*, LBP-07-14, 66 NRC at 210 n. 95. To consider a late petition, the Board must balance the following factors: (i) good cause for failure to file on time; (ii) the petitioner's right to be made a party to the proceeding; (iii) the nature and extent of petitioner's interest in the proceeding; (iv) the possible effect of any order that may be entered in the proceeding on that interest; (v) the availability of other means to protect the interest; (vi) the extent to which the interests will be represented by existing parties; (vii) the extent to which the petitioner's participation will broaden the issues or delay the proceeding; and (viii) the extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record. 10 C.F.R. § 2.309(c)(1)(i)-(viii). Therefore, even though NEC has not met the standard for filing a new contention under 10 C.F.R. § 2.309(f)(2), the Board may still consider the proposed new contention after balancing the factors in 10 C.F.R. 2.309(c).

The Commission has held that the most important of these factors is the first, the requirement for the petitioner to demonstrate good cause for the failure to file on time. *Dominion Nuclear Connecticut, Inc.* (Millstone Power Station, Unit 3), CLI-09-05, 68 NRC __, (Mar. 5, 2009)(slip op. at 14). "Good cause has long been interpreted to mean that the information on which the proposed new contention is based was not previously available." *Id*. As discussed above, NEC has failed to demonstrate that the information upon which it bases its proposed new contention was not previously available. Therefore, NEC cannot satisfy the most important factor of the balancing test.

Moreover, to be considered under the late contention standard, petitioners must address the eight factors in 10 C.F.R. §2.309(c)(1). 10 C.F.R. § 2.309(c)(2). The failure to comply with the Commission's pleading requirements for late filings constitutes sufficient grounds for rejecting the pleading.[12] NEC has failed to address these factors altogether. Therefore, the Board should not admit NEC's proposed new contention under 10 C.F.R. § 2.309(c).

IV. NEC's Proposed New Contention Impermissibly Seeks to Relitigate Arguments NEC has Already Raised and on Which the Board has Already Ruled

A. The Board Has Already Ruled on NEC's Challenges Regarding Heat Transfer Coefficients and DO Assumptions.

NEC has already challenged Entergy's assumptions regarding a fully developed uniform flow during forced convection flow, the heat transfer coefficient during natural convection, and use of a constant DO concentration in calculating the refined CUFen analyses for the CS and RO nozzles. The Board already rejected these challenges in the PID. PID at 38-39, 48. As mentioned above, the Board warned NEC not to file proposed new contentions "to rehash or renew" challenges the Board already resolved. *Id*. at 67 n. 95. Therefore, to the extent the Board has already found that Entergy's refined CUFen analyses for the CS and RO nozzles reasonably assumed a fully developed uniform flow during forced convection flow, calculated the heat transfer coefficient during natural convection, and assumed a uniform DO concentration, the Board should not allow NEC to relitigate the same issues in obvious contradiction to its order in the PID.

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[12] *Florida Power & Light Company, FPL Energy Seabrook, LLC, FPL Energy Duane Arnold, LLC, Constellation Energy Group, Inc.* (Calvert Cliffs Nuclear Power Plant, Units 1 and 2; Calvert Cliffs Independent Spent Fuel Storage Installation; Nine Mile Point Nuclear Station, Units 1 and 2; R.E. Ginna Nuclear Power Plant; Turkey Point Nuclear Generating Plant, Units 3 and 4; St. Lucie Nuclear Power Plant, Units 1 and 2; Seabrook Station; Duane Arnold Energy Center), CLI-06-21, 64 NRC 30, 33-34 (2006).

B. Heat Transfer Coefficient in the CS Nozzle During Forced Convection Flow

The Board has already rejected a similar argument to NEC's claim that Entergy improperly calculated the heat transfer coefficient for the CS nozzle for forced convection flow. Specifically, NEC contends that in the final CUFen analyis for the CS nozzle, Entergy improperly calculated the heat transfer by assuming fully developed flow in the nozzle. Hopenfeld Declaration at 5. NEC argues that the CS nozzle will only experience fully developed flow when a length of piping 25 to 40 times the diameter of the nozzle precedes the nozzle upstream. Because the CS nozzle is downstream of piping elbows, NEC states that the flow will enter the CS nozzles at different velocities resulting in a non-uniform or not fully developed flow in the CS nozzle. *Id*.

NEC previously argued that Entergy's heat transfer coefficient for the FW nozzle confirmatory analysis was flawed because it assumed fully developed flow in the FW nozzle when the length of straight upstream piping did not justify this assumption. PID at 46. To support this argument, Entergy relied on a table from Eckert and Drake ("Figure 8-9"). Figure 8-9 is also Attachment 2 to the Hopenfeld Declaration. Entergy responded that NEC's arguments only applied when the point of concern is downstream from a "sharp tube entrance," not a pipe elbow. *Id*. at 47. Moreover, Entergy noted that Figure 8-9 indicated that as the velocity of the flow increased, the flow needed a shorter distance of straight upstream piping to become fully developed. *Id*. In the case of the FW nozzle, Entergy noted that the velocity of the flow far exceeded the values in Figure 8-9. *Id* Thus, Entergy concluded that an assumption of fully developed flow was both reasonable and conservative. *Id*. at 47.

Based upon the testimony and exhibits presented during the evidentiary hearing, the Board rejected NEC's arguments. The Board concluded "Entergy has shown that is has appropriately applied heat transfer equations in its calculations of the effects of the VYNPS

environment on metal fatigue CUFens." PID at 48. The Board also determined that Dr. Hopenfeld's concern about the appropriateness of assuming fully developed flow at the feedwater nozzles had not been substantiated. *Id.*

Like the FW nozzle, the CS nozzle is downstream of a pipe elbow, not a sharp tube entrance. NEC Motion at 5. Moreover, the flow velocity in the CS nozzle is high enough to expect a fully developed flow. *See* E-mail from Matias F. Travieso-Diaz, Counsel for Entergy to Atomic Safety and Licensing Board (Jan. 8, 2009) (ADAMS Accession No. ML090330335), Design Inputs and Methodology for ASME Code Fatigue Usage Analysis of Reactor Core Spray Nozzle, file number 0801038.301 ("Calculation 301") at 27-41. As a result, based on the reasoning previously endorsed by the Board, Entergy reasonably assumed a fully developed flow in the CS nozzle for purposes of calculating the heat transfer coefficient in the final CUFen analysis for the CS nozzle. Therefore, NEC's argument that based on the geometry of the CS nozzle, Entergy improperly calculated the heat transfer coefficient for forced convection flow is a rehash of NEC's previous argument that the Board rejected.

C. Heat Transfer Coefficient for the RO Nozzle During Forced Convection Flow

NEC also argues that flow in the RO nozzle cannot be fully developed because the length of upstream piping is non-existent. Hopenfeld Declaration at 5-8. However, as discussed above, the Board rejected such an argument with respect to the FW nozzle. PID at 46-48. In this case, the velocity of flow in the RO nozzle, like the velocity of the flow in the CS and FW nozzles, far exceeds the values depicted in Figure 8-9. Calculation 304 at 6-7. As a result, Entergy's assumption of a fully developed flow in the RO nozzle is justified. The Board has already ruled on this issue in a similar context. PID at 48. Thus, the Board should not permit NEC to relitigate this argument with respect to the RO nozzle.

D. Heat Transfer Coefficient During Natural Convection Flow

Next, NEC argues that Entergy inaccurately calculated the heat transfer coefficient for the CS and RO nozzles during natural convection. Hopenfeld Declaration at 8-9. As NEC notes, Entergy uses the following equation to calculate the heat transfer coefficient (h): $h=C(GrPr)^n k/x$.[13] *Id*. To compute the heat transfer coefficient, Entergy held x equal to the diameter of the pipe in the above equation. NEC states that x should not be a constant, but rather x should vary with the vertical distance to account for the local variations in the heat transfer coefficient. *Id*.

In the PID, the Board rejected a similar argument. The Board noted that NEC raised concerns about Entergy's equation to compute the heat transfer coefficient during natural convection. PID at 47-48. To determine the heat transfer coefficient for natural convection in the FW nozzle, Entergy used the equation $h= 0.55(GrPr)^{.25} k/L$. In this equation, Entergy set L equal to the diameter. NEC contended that this equation ignored the inherently local variations in the heat transfer coefficient. NEC Exh. NEC-JH_03 at 12, 14. In response, Entergy stated that in using this equation, it set L equal to the bounding nozzle diameter in each region, thereby producing a conservative result. Fitzpatrick/Stevens Decl. Post. Tr. 763, at 30; *see also* Tr. at 1108-09 (Hopenfeld); Tr. at 1111-13 (Stevens). The Board found this to be an appropriate response that rebutted NEC's concerns. PID at 48.

In the final CUFen analyses for the CS and RO nozzles, NEC alleges that Entergy improperly assumes a constant diameter in calculating the heat transfer coefficients for the CS and RO nozzles. However, as stated above, Entergy has already defended such an

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[13] In this equation, Entergy set n=.25.

assumption to the Board's satisfaction. *Id*. Thus, this argument seeks to rehash a technical argument which the Board has rejected in a similar context.

E. Dissolved Oxygen

Next, NEC argues that CUFen analyses for the CS and RO nozzles are flawed because Entergy assumed the same concentrations of DO for both carbon and low-alloy steels as well as austenitic stainless steels without providing measurements from the plant to justify those assumptions. Hopenfeld Declaration at 10-11. As the Board explained in its PID, "DO has a different effect on different types of steel – increased DO in the reactor feedwater increases the metal fatigue on carbon and low-alloy steels but decreases it on stainless steels." PID at 36. Thus, NEC notes that NUREG/CR 6909 suggests that "[a] value of 0.4 ppm for carbon and low-alloy steels and 0.05 ppm for austenitic stainless steels can be used for the DO content to perform a conservative evaluation." NUREG/CR 6906 at A.5. NEC concludes that the RO and CS nozzle CUFen calculations are flawed because Entergy used a non-conservative value for DO without providing measurements to justify that value. Hopenfeld Declaration at 11.

The Board rejected this argument in the PID. *See* PID at 35-39. NEC argued that Entergy's calculations failed to account for fluctuating values of DO and should have instead relied on the guidance in NUREG/CR 6906. PID at 36. Entergy responded that, with respect to the feedwater line, Entergy used a DO value based on thirteen years of measurements. For the remaining locations, Entergy based the DO values on the EPRI guidance document MRP-47. Finally, Entergy noted that VYNPS uses "hydrogen water chemistry" to control reactor water chemistry and reduce DO concentration. PID at 37. The Board found that Entergy rebutted NEC's arguments and specifically decided "[t]he use of actual DO data from the feedwater system, as well as the use of industry guidance DO values in other systems, was reasonable and appropriate." PID at 38. Entergy relied on the same documents to calculate the DO

concentration for the refined CUFen analyses that it did for the final CUFen analyses.[14] Therefore, the Board has already ruled on this method, and this portion of NEC's challenge renews previously raised arguments.

F. Cracks in the RO Nozzle

NEC argues that Entergy incorrectly excluded the possibility of pre-existing cracks in the RO and CS nozzles in completing the CUFen analyses. Hopenfeld Declaration at 12. According to NEC, prior discoveries of large cracks in the RO nozzles at James A. Fitzpatrick Nuclear Station and Oyster Creek Nuclear Generating Station suggest that these calculations are not conservative. *Id*.

NEC made a similar argument with respect to the FW nozzle, which the Board rejected. NEC maintained that Entergy should have assumed that the base metal on the FW nozzle was cracked. NEC noted that, in the 1970's, the FW nozzles in some comparable plants developed cracks in the base metal due to thermal differences between the cladding and base metals. Nonetheless, NEC acknowledged that no evidence suggested cracks had actually formed in the FW nozzle base metal at VYNPS. PID at 39.

In response to NEC arguments, Entergy explained that it currently monitored cracks in the FW nozzles through ultrasonic testing ("UT"). UT is the industry standard and can detect cracks as small as 3/16 of an inch deep. The Board noted that Entergy conducted such tests on all four FW nozzles at VYNPS every four refueling cycles and that the most recent tests showed no cracks. The Board concluded that, based on the UT inspection, Entergy had adequately considered cracking in the FW nozzle. PID at 39-40.

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[14] *See supra* note 8.

With regard to the RO nozzles, Entergy conducts UT tests at regular intervals. ASME, Boiler and Pressure Vessel Code, Section XI , IWB-2000, "Examination and Inspection" Examination Category B-D, Full Penetration Welded Nozzles in Vessels, Items B3.90 and B3.100. The most recent such test uncovered no findings of significance. January 28, 2009 Integrated Inspection Report. Vermont Yankee Nuclear Power Station – NRC Integrated Inspection Report, Attachment at 6-7 (January 28, 2009) (ADAMS Accession No. ML090280422). Therefore, NEC's argument that Entergy did not adequately consider the possibility of cracking in the RO nozzles is essentially a rehash of its argument concerning the FW nozzle. The Board found inspections similar to Entergy's UT examinations for the RO nozzle sufficient to justify Exelon's assumption that no cracks existed in the FW nozzle for purposes of calculating the confirmatory CUFen. As a result, the Board has already rejected a similar argument.

Conclusion

For the foregoing reasons the Board should deny NEC's motion for leave to file a timely new contention. The proposed contention is not based on new information, attempts to relitigate issues the Board has already decided, and does not provide adequate support for its claims.

Respectfully submitted,

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Dated at Rockville, Maryland
this 19th day of May, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR VERMONT YANKEE, LLC, and ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket No. 50-271-LR
	)	ASLBP No. 06-849-03-LR
	)	
(Vermont Yankee Nuclear Power Station)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the "NRC STAFF'S ANSWER IN OPPOSITION TO NEC'S MOTION FOR LEAVE TO FILE A NEW CONTENTION" in the above-captioned proceeding have been served on the following by electronic mail with copies by deposit in the NRC's internal mail system or, as indicated by an asterisk, by electronic mail, with copies by U.S. mail, first class, this 19th day of May, 2009.

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