

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

DOCKETED 09/11/07

SERVED 09/12/07

Before Administrative Judges:

Alex S. Karlin, Chairman
Dr. Richard E. Wardwell
Dr. Thomas S. Elleman

In the Matter of

ENERGY NUCLEAR VERMONT YANKEE,
L.L.C.,
and
ENERGY NUCLEAR OPERATIONS, INC.

(Vermont Yankee Nuclear Power Station)

Docket No. 50-271-LR

ASLBP No. 06-849-03-LR

September 11, 2007

MEMORANDUM AND ORDER

(Ruling on Motion for Summary Disposition of NEC Contention 3)

Before this Atomic Safety and Licensing Board (Board) is a motion by Entergy Nuclear Vermont Yankee, L.L.C., and Entergy Nuclear Operations, Inc. (collectively, Entergy) for summary disposition of one of the admitted contentions relating to its request to renew the operating license for the Vermont Yankee Nuclear Power Station (VYNPS) in Windham County, Vermont (Operating License No. DPR-28).¹ On January 25, 2006, Entergy filed an application seeking to extend this license for an additional twenty years beyond the current expiration date

¹ Entergy's Motion for Summary Disposition of [NEC's] Contention 3 (Steam Dryer) (Apr. 19, 2007) [Entergy Motion]. See also Entergy Nuclear Vermont Yankee, L.L.C., and Entergy Nuclear Operations, Inc. (Vermont Yankee Nuclear Power Station), LBP-06-20, 64 NRC 131, 187-191 (2006) (admitting NEC Contention 3).

of March 21, 2012.² On March 27, 2006, the Commission published a notice of acceptance for docketing of Entergy's renewal application and a notice of opportunity to request a hearing on the application. 71 Fed. Reg. 15,220 (Mar. 27, 2006). Requests for hearings and petitions to intervene were filed on or before May 26, 2006, by four entities: the Vermont Department of Public Service (DPS), the Attorney General of the Commonwealth of Massachusetts, the Town of Marlboro, Vermont, and the New England Coalition (NEC).

On June 14, 2006, this Board was established to conduct this adjudication. 71 Fed. Reg. 34,397 (June 14, 2006). On September 22, 2006, the Board granted the hearing requests of DPS and NEC, admitting one DPS contention and four NEC contentions. LBP-06-20, 64 NRC at 140. One of the admitted contentions, denominated "NEC Contention 3," reads as follows:

NEC Contention 3: Entergy's License Renewal Application does not include an adequate plan to monitor and manage aging of the steam dryer during the period of extended operation.

Id. at 187. Specifically, NEC alleges that Entergy's program for aging management of the steam dryer is not adequate to detect crack initiation and growth because it is not based on actual measurements, but instead relies on theoretical calculations of two computer models – the Computation Fluid Dynamic Model (CFD) and the Acoustic Circuit Model (ACM) – that are subject to large uncertainties.³ NEC goes on to allege that Entergy's aging management program for the steam dryer is inadequate due to the apparent lack of a sound evaluation process and corrective implementation procedures to assure the component's integrity during

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 [NEC] Petition for Leave to Intervene, Request for Hearing, and Contentions (May 26, 2006) at 17. See also id., Exh. 7, Declaration of Dr. Joram Hopenfeld (May 12, 2006) ¶¶ 18-19 [First Hopenfeld Decl.].

the license renewal period.⁴ In particular, NEC contends that the status of the dryer cracks must be continuously monitored and assessed by a competent engineer, First Hopenfeld Decl. ¶ 18, and questions the adequacy of an aging monitoring plan that does not involve any means of estimating and predicting stress loads on the steam dryer for comparison with established fatigue limits.⁵

On April 19, 2007, Entergy filed the instant motion for summary disposition of NEC Contention 3 on the grounds that no genuine issue as to any material fact exists and it is entitled to a decision as a matter of law.

The Board hereby grants in part, and denies in part, Entergy's motion for summary disposition of NEC Contention 3. Specifically, the Board grants the motion (1) as it relates to the specific use and benchmarking of the CFD and ACM computer models in monitoring potential steam dryer cracking, and (2) as it relates to NEC's inferences that the steam dryer is not continuously monitored as part of the aging management program for the license renewal period. As discussed herein, Entergy has flatly represented to the Board that the CFD and ACM models will not be used or relied upon for this purpose, and that the steam dryer will be continuously monitored – thereby demonstrating that there is no genuine issue of material fact relating to these factual issues and that Entergy is entitled to this decision as a matter of law. The Board denies the motion as it relates to remaining aspects of NEC Contention 3 that deal with the other inadequacies of the aging management program, *i.e.*, the alleged need for continuous assessment by a competent engineer and the alleged need for updated estimates

⁴ [NEC] Reply to Entergy and Staff Answers to Petition for Leave to Intervene, Request for Hearing, and Contentions (June 29, 2006) at 22.

⁵ See *id.* ¶ 19. See also [NEC] Opposition to Entergy's Motion for Summary Disposition of NEC's Contention 3 (Steam Dryer) (May 9, 2007) [NEC Answer]; *Id.*, Exh. 1, Third Declaration of Dr. Joram Hopenfeld in Support of NEC's Opposition to [Entergy Motion] (May 8, 2007) ¶¶ 5-6 [Third Hopenfeld Decl.].

and a method of predicting stress loads on, and cracking of, the steam dryer. For these issues, Entergy has failed to show that there is no genuine issue of material fact – the prerequisite for summary disposition. Instead, this contention presents us with a “classic battle of the experts” that requires the Board to weigh opposing expert testimony and thus requires denial on this portion of the motion.

I. BACKGROUND

A. Procedural Posture

Entergy’s motion for summary disposition was filed on April 19, 2007. See Entergy Motion. The NRC Staff filed an answer in support of the motion on May 9, 2007.⁶ On this same date, NEC filed its answer opposing the motion. See NEC Answer.

The arguments presented in Entergy’s motion occasionally make reference to an extended power uprate (EPU) at VYNPS, certain elements of which were the subject of a prior adjudication before a different licensing board.⁷ The EPU amendment to the plant’s license authorized a 20-percent increase in the maximum power level, increasing output from 1,593 megawatts thermal (MWt) to 1,912 MWt, as well as certain associated changes to its technical specifications. See id. at 155. Arguments presented by the parties here address the extent to which the EPU-related changes may affect steam dryer cracking during the full license renewal period.

Entergy asserts that summary disposition is appropriate for this contention because “no genuine issue as to any material fact exists and Entergy is entitled to a decision as a matter of

⁶ NRC Staff Answer in Support of [Entergy Motion] (May 9, 2007) [Staff Answer].

⁷ See Entergy Nuclear Vermont Yankee, L.L.C., and Entergy Nuclear Operations, Inc., (Vermont Yankee Nuclear Power Station), LBP-07-02, 65 NRC 153 (2007) (Initial Decision in Vermont Yankee EPU case).

law” under 10 C.F.R. § 2.710(d)(2). Entergy Motion at 1. In support of its motion Entergy submits, inter alia, the sworn declaration of its expert, John R. Hoffman, who states that cracking due to flow-induced vibration in the steam dryer is managed by the VYNPS BWR Vessel Internals Program, which incorporates the industry guidance of GE-SIL-644, Revision 1.⁸ Mr. Hoffman represents that this industry guidance includes detailed recommendations for monitoring of plant operational parameters that are indicative of potential steam dryer cracking and for steam dryer inspections during refueling outages. Id. ¶¶ 17, 20-22. In addition, he states that Entergy is committed to continuing this same monitoring and inspection program during the license renewal period. Id. ¶ 23. He also confirms that the CFD and ACM models were used in connection with the EPU application to develop inputs to a finite element method (FEM) analysis that estimated the stresses on the steam dryer for comparison with the American Society of Mechanical Engineers (ASME) fatigue endurance limits, and that Entergy installed strain gages in the main steam line and monitored them frequently during the power ascension of the EPU to verify that the structural limits for the steam dryer were not reached. Id. ¶¶ 11-12. While these design and operational activities took place in the past, during the power uprate, Mr. Hoffman states clearly that, as a prospective matter, Entergy’s aging management program for the steam dryer during the renewal period does not depend upon, use, or rely on the CFD or ACM models or any other models or analyses conducted using those codes.⁹ He adds that the strain gages will not be used as part of the aging management program during the license renewal period. Id. ¶¶ 8, 12, 14. Further, he states that Entergy’s aging management program provides continuous monitoring and assessment by a competent

⁸ Declaration of John R. Hoffman in Support of [Entergy Motion] (Apr. 18, 2007) ¶¶ 16-17 [Hoffman Decl.].

⁹ Id. ¶ 24 (“The aging management plan for the license renewal period, consisting of the monitoring and inspection activities described above, does not depend on, or use, the CFD and ACM computer codes or the FEM conducted using those codes.”).

engineer. Id. ¶ 11. In this regard, however, he references only the continuous monitoring of plant parameters indicative of potential dryer cracking that are specified in its management program, and is silent on the assessment program and the qualifications of the individual(s) responsible for review of the data.

The NRC Staff agrees with Entergy, confirming that Entergy is committed to monitoring plant parameters indicative of steam dryer cracking and crack propagation, and performing steam dryer inspections throughout the renewal period. Staff Answer at 6. The NRC Staff also repeats Entergy's statement that the aging management program for the Vermont Yankee renewal does not depend upon or use the CFD or ACM models or codes. Id. at 6-7. In response to NEC's assertion that "existing dryer cracks must be continuously monitored and assessed by a competent engineer," NRC Staff reiterates, in the affidavit attached to its answer, that the Applicant is committed to conducting regular, recurring monitoring of the facility during the renewal period to detect potential dryer cracking and crack propagation.¹⁰ While the Staff Answer supports Entergy's position that continuous monitoring is provided, see Staff Answer at 7, it does not shed any light on the adequacy of data assessment in the proposed program.

NEC opposes Entergy's motion, contending that the facts concerning Entergy's use of the ACM and CFD models and the validity of these models are still in genuine dispute. NEC Answer at 3. If these models (or some others) are not used, NEC asserts that an aging management program consisting solely of visual inspection and parameter monitoring would not be sufficient to ensure the dryer's structural integrity. Id. at 5. Therefore, NEC maintains that it is necessary for the Board to determine the extent to which Entergy's program relies on the ACM and CFD models and, in turn, the validity of the stress loads resulting from these analyses. Id. at 1. If these stresses are not being updated, NEC's expert opines that a valid steam dryer

¹⁰ Affidavit of Jonathan G. Rowley, Kaihwa R. Hsu, and Thomas G. Scarborough Concerning NEC Contention 3 (May 9, 2007) ¶11.

aging management program must include “both (1) visual inspections of the steam dryer; and some (2) means of estimating and predicting stress loads on the steam dryer, establishing dryer flow induced vibration load fatigue margins, and demonstrating that the stresses on the dryer at selected locations will fall below ASME fatigue limits.” Third Hopenfeld Decl. ¶ 5.

On June 19, 2007, NEC filed a motion requesting that Board withhold its decision on Entergy’s motion to allow its expert witnesses to review Entergy’s May 2007 steam dryer inspection report and, if necessary, to file a supplement to its answer opposing Entergy’s motion.¹¹ The Board granted this motion on July 13, 2007,¹² and NEC filed its supplement to its opposition to Entergy’s motion on July 19, 2007.¹³ NEC’s supplement included a declaration from another NEC expert witness, Ulrich Witte.¹⁴ Both Entergy and the NRC Staff responded to NEC’s supplement on July 26, 2007.¹⁵

In its supplement, NEC continues to allege that Entergy’s proposed steam dryer aging management plan relies on stress load analyses using the ACM and CFD models. NEC Supplement at 1. The remainder of NEC’s supplement deals with Mr. Witte’s interpretation of Entergy’s May 2007 steam dryer inspection report. Second Witte Decl. ¶¶ 3-19. Although Mr. Witte focuses on results from the May 2007 inspection indicating that there were at least 20 new cracks or incidences of crack growth or change in the steam dryer, id. ¶ 18, he does not conclude that the cracks were induced by fatigue or that the aging management program was

¹¹ NEC Motion to Withhold Decision of [Entergy Motion] (June 19, 2007).

¹² Licensing Board Order (Granting Motion to Defer and Setting Schedule) (July 13, 2007) (unpublished).

¹³ NEC’s Supplement to Opposition to [Entergy Motion] (July 19, 2007) [NEC Supplement].

¹⁴ Second Declaration of Ulrich Witte (July 19, 2007) [Second Witte Decl.].

¹⁵ Entergy’s Response to [NEC Supplement] (July 26, 2007) [Entergy Suppl. Response]; NRC Staff’s Answer to [NEC Supplement] (July 26, 2007) [Staff Suppl. Response].

inadequate. Instead, his conclusions are stated in the negative, specifically that he is “unable to conclude whether the cracks were or were not fatigue induced.” Id. ¶ 18. Likewise, Mr. Witte is “unable to conclude that Entergy is adequately managing fatigue failure of the steam dryer,” and “cannot conclude that Entergy fully understands or can predict stress loads on the VYNPS steam dryer.” Id. ¶ 3. Mr. Witte does not provide support for these allegations or indicate the relationship between these statements and the May 2007 inspection report.

In response, Entergy points out that nothing in the NEC Supplement supports NEC’s premise that Entergy is using the ACM or CFD models in managing the aging of the steam dryer. Entergy Suppl. Response at 4. To the contrary, Entergy contends that NEC’s supplement demonstrates that Entergy is managing aging by visual inspections. Id. The NRC Staff’s response alleges that: (1) NEC’s supplement raises issues outside of the scope of this proceeding in its critique of activities performed during Entergy’s current operations, Staff Suppl. Response at 4, (2) NEC and its expert proffer no evidence supporting its speculation that Entergy’s steam dryer aging management program relies on stress load analyses that uses the ACM and CFD models, id. at 5-6, and (3) NEC’s supplement is not supported by Mr. Witte’s declaration because his affidavit does not support NEC’s assertions that fatigue cracking is occurring and that Entergy’s steam dryer aging management program relies on stress load analyses. Id. at 6.

Before closing on the procedural background of this proceeding, we dispense with two collateral procedural issues that have arisen. The first issue relates to NEC’s May 18, 2007, response to the Staff’s answer filed in support of Entergy’s motion for summary disposition.¹⁶ On May 29, 2007, the NRC Staff moved to strike NEC’s response, arguing that such responses

¹⁶ [NEC] Response to NRC Staff’s Answer in Support of [Entergy Motion] (May 18, 2007) [NEC Response to Staff Answer].

are not authorized under 10 C.F.R. Part 2, Subpart L.¹⁷ In its response to this motion, NEC argues that its response was appropriate under 10 C.F.R. § 2.710(a).¹⁸ Entergy agrees with the NRC Staff, asserting that even if 10 C.F.R. § 2.710(a) applied, the NEC's response does not "respond to new facts and arguments" presented in the Staff Answer.¹⁹

On this point, the Board agrees that the NRC Staff's answer did not raise any new factual or legal arguments, and only repeated and corroborated similar information or arguments initially provided by Entergy. Likewise, the NEC response to the Staff's answer was uninformative and unhelpful, and the Board did not use or rely on it in today's decision. Accordingly, we find it unnecessary to address the legal question of whether responses to answers to motions for summary disposition are authorized in a Subpart L proceeding.

The second collateral procedural point is whether we should grant NEC's July 25, 2007, motion to file supplemental authority alerting us to a recent decision in another Atomic Safety and Licensing Board proceeding.²⁰ In that case, the Board addressed the availability of responses to answers to motions for summary disposition in Subpart L proceedings.²¹ For reasons unclear to this Board, the Staff objected to the filing of this supplemental authority.²² The Board has no trouble in granting NEC's request to file the foregoing supplemental authority.

¹⁷ NRC Staff's Motion to Strike [NEC Response to Staff Answer] (May 29, 2007) at 2.

¹⁸ [NEC] Opposition to NRC Staff Motion to Strike [NEC Response to Staff Answer] (June 8, 2007) at 1.

¹⁹ Entergy's Response in Support of NRC Staff's Motion to Strike [NEC Response to Staff Answer] (June 8, 2007) at 3-4.

²⁰ [NEC] Motion to File Supplemental Authority in Support of NEC Opposition to NEC Staff Motion to Strike [NEC Response to Staff Answer] (July 25, 2007).

²¹ AmerGen Energy Company, L.L.C. (License Renewal for Oyster Creek Nuclear Generating Station), Docket No. 50-0219-LR, ASLBP No. 06-844-01-LR, Licensing Board Memorandum and Order (Denying AmerGen's Motion for Summary Disposition) (June 19, 2007) at 13 n.14 (unpublished).

²² NRC Staff Answer to NEC Motion to File Supplemental Authority (Aug. 6, 2007).

We do note, however, that it would have been more accurate if NEC had given us the full quote from the Oyster Creek ruling, thereby making clear that the Board in that case declined to decide the issue.

B. Legal Standard for Summary Disposition

The legal standard for summary disposition is set out in our August 10, 2007, Memorandum and Order in this case²³ and need not be repeated here.

II. RULING

The Board grants the portion of Entergy's motion for summary disposition of NEC Contention 3 relating to NEC's allegations that Entergy's proposed aging monitoring program for the steam dryer is inadequate (1) because of alleged inadequacies in the CFD and ACM computer models, and (2) because Entergy will not be conducting continuous monitoring of the steam dryer during the license renewal period. The alleged inadequacies of the CFD and ACM models appear irrelevant, because Entergy has flatly stated that its proposed program for monitoring and managing the aging of the steam dryer during the license renewal period does not use or rely upon either of these models. Entergy Motion at 10-11. Likewise, Entergy states that the steam dryer aging program for the renewal period does include continuous monitoring – consisting of well-defined monitoring and inspection activities that include continuous monitoring of certain plant parameters indicative of steam dryer integrity (including main steam flow, reactor vessel water level, and steam dome pressure), weekly monitoring of moisture carry-over, and visual inspections of the steam dryer every two refueling outages. Hoffman Decl. ¶¶ 21. Entergy's expert confirms that this program does not require the use of CFD and ACM computer codes or the finite element modeling conducted during the EPU. Id. ¶¶ 23-24.

²³ Licensing Board Memorandum and Order (Ruling on Motion for Summary Disposition of NEC Contention 4) (Aug. 10, 2007) at 4-6 (unpublished).

While NEC continues to argue that a hearing before the Board is necessary to determine to what extent Entergy's steam drying aging management plan relies on the ACM and CFD models, it is clear to the Board, based on Entergy's definitive representations, that these models will not be used as part of the aging monitoring program for the steam dryer. The Board also finds that NEC's inferences that there is not continuous monitoring of the steam dryer are unfounded. Therefore, we grant the motion for summary disposition for these portions of NEC Contention 3, recognizing that Entergy is committed to implementing an aging management program that includes continuous monitoring of plant parameters indicative of steam dryer cracking and visual inspections of the steam dryer during refueling outages.

Having granted the motion for summary disposition in part, we must also deny the remainder of the motion, because Entergy has failed to show that there are no aspects of NEC Contention 3 that raise genuine issues as to material facts. Viewing the evidence in the light most favorable to NEC – as we are required to do in the context of considering its opposition motion²⁴ – we find that NEC also raises other allegations as to how and why Entergy's aging management program is inadequate, in particular that there is insufficient evidence that Entergy has established sound evaluation and implementation procedures to assure that the integrity of the steam dryer is not jeopardized. Specifically, NEC contends that the status of the dryer cracks must be continuously monitored and assessed by a competent engineer. While Entergy has established that it will continuously monitor plant parameters indicative of steam dryer cracking, it has not provided information on its assessment program for the monitoring data or the qualifications of the personnel evaluating this information. NEC also disputes the validity of a steam dryer aging management program that does not provide a means to estimate and

²⁴ Advanced Medical Systems, Inc. (One Factory Row, Geneva, Ohio 44041), CLI-93-22, 38 NRC 98, 102 (1993).

predict stress loads on the dryer during operation for comparison to established fatigue limits.

Third Hopenfeld Decl. ¶ 5.

Entergy has not demonstrated the absence of a genuine issue as to material expert opinions for these issues – the essential prerequisite for granting a summary disposition. To the contrary, NEC's experts have presented a direct challenge to Entergy's experts regarding these alleged inadequacies in Entergy's aging management program for the steam dryer, and we do not see that Entergy has met its burden of demonstrating that no factual disputes exist. Based on the clear dispute between the parties, as presented in Entergy's motion and NEC's answer, the Board denies Entergy's motion for summary disposition as it relates to these aspects of Contention 3, *i.e.*, that the plan should provide for continual assessment of the monitoring data by a competent engineer, and should include stress analysis for comparison to fatigue limits as a component of the plan.

The Board notes that the NEC Supplement filed on July 19, 2007, *see supra* pp. 7-8, provided us no additional insight. In the declaration submitted with NEC's supplement, NEC's expert – Mr. Witte – discussed and analyzed the significance of the additional cracks found during the May 2007 inspection. Second Witte Decl. ¶¶ 5-10. But Mr. Witte was unable to postulate whether the observed cracks are fatigue induced or not. Further, Mr. Witte has not provided a nexus between this report and the adequacy of Entergy's aging management plan. As we understand it, the identification of additional cracks does not necessarily mean that the aging management plan is inadequate, but could equally mean that the plan is working, *i.e.*, that additional cracking is being identified, managed, and corrected as necessary. Indeed, the cracks observed at the May 2007 inspection seem to demonstrate that the steam dryer inspections, which are included in the aging management program being contested, are a useful tool in monitoring cracks and a vital component for aging management of the steam

dryer.²⁵

On another matter, in their responses to NEC's Supplement, both Entergy and the Staff questioned the qualifications of Mr. Witte, NEC's expert, to interpret and evaluate the May 2007 inspection report. While Mr. Witte does not appear to have extensive training or experience in analyzing and interpreting inspection results, the Board finds that his background in the areas of configuration management, engineering design change controls, and licensing basis reconstitution provides him with the management-level capability to review results and assess whether there are apparent issues with the data that may raise concerns warranting further investigation and resolution. The Board finds that, based on his training and experience, Mr. Witte can reasonably assist the Board in deciding this case. However, as stated, we did not find the information contained in NEC's supplement, including Mr. Witte's declaration, to be particularly pertinent or necessary in reaching our decision on Entergy's motion.

In summary, the Board grants Entergy's motion for summary disposition on the issue relating to NEC's allegations that Entergy's proposed aging monitoring program is inadequate because (1) it is based on theoretical calculations of stress loads derived from the CFD and ACM computer models, and (2) it does not provide for continuous monitoring of the steam dryer. The Board denies the remainder of Entergy's motion, particularly as it relates to the adequacy of Entergy's assessment of the monitoring data collected from the aging program for the steam

²⁵ We also note that NEC continues to speculate that Entergy's steam dryer aging management program relies on stress load analyses that use the ACM and CFD models, NEC Supplement at 1, but does not provide any support for this assertion.

dryer (including required qualifications of the individuals performing these assessments), and the need to involve some form of stress load analysis as part of this program to help assure protection of public safety during the license renewal period.

It is so ORDERED.

FOR THE ATOMIC SAFETY
AND LICENSING BOARD²⁶

/RA/

Alex S. Karlin, Chairman
ADMINISTRATIVE JUDGE

/RA/

Dr. Richard E. Wardwell
ADMINISTRATIVE JUDGE

/RA/

Dr. Thomas S. Elleman
ADMINISTRATIVE JUDGE

Rockville, Maryland
September 11, 2007

²⁶ Copies of this order were sent this date by internet e-mail transmission to counsel for (1) licensees Entergy Nuclear Vermont Yankee, L.L.C., and Entergy Nuclear Operations, Inc.; (2) intervenors Vermont Department of Public Service and New England Coalition of Brattleboro, Vermont; (3) the NRC Staff; and (4) the State of New Hampshire.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB MEMORANDUM AND ORDER (RULING ON MOTION FOR SUMMARY DISPOSITION OF NEC CONTENTION 3) have been served upon the following persons by U.S. mail, first class, or through NRC internal distribution.

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Docket No. 50-271-LR
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Office of the Secretary of the Commission

Dated at Rockville, Maryland,
this 12th day of September 2007