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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.)
)
(Vermont Yankee Nuclear Power Station))

Docket No. 50-271-OLA
ASLBP No. 04-832-02-OLA

NEW ENGLAND COALITION'S REQUEST FOR LEAVE TO FILE A SUPPLEMENT
TO
NEW ENGLAND COALITION'S REQUEST FOR LEAVE TO FILE A NEW CONTENTION

New England Coalition herein requests leave to file a Supplement to its April 20, 2006 Request for Leave to File a New Contention. New England Coalition's proposed supplement is based upon the emergence of new information, the sworn testimony of William Sherman, Vermont State Nuclear Engineer submitted to the Vermont Public Service Board, a quasi-judicial body, on June 20, 2006. Incorporating Mr. Sherman's testimony, New England Coalition respectfully submits Dr. Joram Hopenfeld's expert evaluation of Mr. Sherman's observations regarding steam dryer testing and analysis at Vermont Yankee Nuclear Power Station as supporting and supplementing the material basis for New England Coalition's proposed new contention.

UNITED STATES
NUCLEAR REGULATORY COMMISSION

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In the matter of

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and ENTERGY NUCLEAR OPERATIONS, INC.
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I. INTRODUCTION

On April 20, 2006, New England Coalition filed a Request for Leave to File A New Contention" ("Request").

On May 25, 2006, the NRC Staff and Entergy Nuclear Vermont Yankee, LLC And Entergy Nuclear Operations, Inc ("Entergy") filed responses to which New England Coalition replied on June 1, 2006. Pursuant to 10 C.F.R. § 2.309(h)(1), New England Coalition hereby replies to, filed on to filed by New England Coalition.

On June 22, 2006, New England Coalition became aware of new information, information not previously available, that it believes supports its proposed new contention and that it believes would, if considered, serve to inform the record and the Board's deliberation regarding admissibility of the proposed new contention.

Accordingly, New England Coalition herein petitions the presiding officer and the Atomic Safety and Licensing Board Panel convened in this proceeding for leave to supplement the New England Coalition Request of April 20, 2006.

II. DISCUSSION

New England Coalition seeks herein to place before the Board the Prefiled Written Testimony of William Sherman, Vermont State Nuclear Engineer, regarding Vermont Yankee Nuclear Power Station's ("Vermont Yankee") Steam Dryer Reliability.^[1]

This testimony was filed before the Vermont Public Service Board on behalf of the Vermont Department of Public Service on June 21, 2006.

Mr. Sherman's testimony was submitted to the Vermont Public Service Board in support of a Department of Public Service Petition to Open an Investigation in connection with postulated financial impact on Vermont ratepayers from potential steam dryer failure of due to implementation of extended power uprate at Vermont Yankee.

In sum, Mr. Sherman testifies that, in his expert, professional opinion, the ascension power tests performed at Vermont Yankee fail to provide adequate assurance that steam dryer structural failures, such as cracks, will not continue to increase under extended power uprate loadings.

New England Coalition has secured and attached a confirming review of Mr. Sherman's testimony in the form of a sworn declaration from New England Coalition's expert, Dr. Joram Hopenfeld.

1 The specificity and basis requirements for contentions under 10 CFR § 2.309(f) may be met when the contention is based upon allegations in a sworn complaint that has been filed in a judicial action and the passages that apply are identified. This applies notwithstanding the fact that the allegations may be contested. Consumers Power Co. (Midland Plant, Units 1 and 2), LBP-84-20, 19 NRC 1285,1292-94 (1984).

New England Coalition does not believe that filing of this Request or this Supplemental information constitutes an amended to its proposed contention because it does not seek to alter the substance of the contention or the inherent dispute with the licensee. However, if the Board determines that the action proposed in this filing does constitute an amendment, New England Coalition respectfully proposes that it meets the factors for late filing (new Contentions) set forth in 10 C.F.R (f) (2) (i)-(iii). Principally, Mr. Sherman's testimony only became available two days prior to this filing; indeed New England Coalition has yet to be able to secure the exhibits attached to Mr. Sherman's filing. Thus this information is both new and promptly filed². As reconciled in the attached declaration by Dr. Hopenfeld with his declaration in support of the Request, Mr. Sherman's testimony does not expand on the scope of the proceeding nor does it serve to expand on the scope of the contention. NRC staff's determination regarding the inapplicability of the Quad Cities Nuclear Power Station experience, an unpredicted and undetected steam dryer fracture, to Vermont Yankee has effectively closed other avenues of redress, as amply shown by New England Coalition in its Request.

In Response to New England Coalition's Request both the NRC Staff and Entergy argued in the main that New England Coalition's new contention is not supported by a sufficient basis as required by 10 C.F.R. § 2.309(f). New England Coalition, while it believes that documentation and expert opinion offered in its Request and in its Reply provides ample basis, respectfully requests that Mr. Sherman's testimony be incorporated for purposes of supplementing the basis of New England Coalition's proposed new contention.

² Usually a straightforward inquiry into when the information at issue was available to the petitioner will resolve the question of a "good cause" finding concerning on "new information." Yankee Atomic Electric Co. (Yankee Nuclear Power Station), LBP-96-15,44 NRC 8, 26 (1996).

Information and documents not available when contentions initially were filed satisfy the "good cause for delay" criteria for late-filed contentions if the proposed contention is filed promptly as information becomes available. Yankee Atomic Electric Co. (Yankee Nuclear Power Station), CLI-96-7, 43 NRC 235, 255 (1996).

III. CONCLUSION

For all of the good reasons stated above, New England Coalition now respectfully petitions the presiding officer and the Atomic Safety and Licensing Board Panel convened in this proceeding for leave to supplement the New England Coalition Request of April 20, 2006, with the attached testimony of Mr. William Sherman (Exhibit One) and the supporting declaration of Dr. Joram Hopenfeld.

Respectfully submitted,



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Dated at Edgecomb, Maine
this 23rd day of June, 2006

STATE OF VERMONT

PUBLIC SERVICE BOARD

Investigation into the reliability of the)
steam dryer and resulting performance of)
the Vermont Yankee Nuclear Power Station)
under uprate conditions)

Docket No. _____

Direct Testimony on Steam Dryer Reliability of

William Sherman

on behalf of the

Vermont Department of Public Service

June 21, 2006

Summary: Mr. Sherman provides testimony regarding steam dryer performance and reliability concerns associated with operation at power uprate conditions based on new information.

Direct Testimony on Steam Dryer Reliability
of
William Sherman

Q. Please state your name and occupation.

A. My name is William Sherman, and I am an engineer with the Department of Public Service ("The Department"). My responsibilities include oversight for the state of the activities of the Vermont Yankee Nuclear Power Station and the nuclear power industry in general.

Q. Please describe your educational background and experience.

A. I have a B.S. Degree in Mechanical Engineering from The University of Michigan. I have been with the Department for over seventeen years in the position of state nuclear engineer. Prior to coming to the Department I had 18 years of licensing, engineering, and design experience in the nuclear industry. I am a registered professional engineer in three states.

Q. What is the purpose of your testimony?

A. On February 14, 2006, the Department entered into a memorandum of understanding ("the steam dryer MOU") with Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc. (together, "Entergy VY") pertaining to an appurtenance of the Vermont Yankee nuclear reactor, the steam dryer (Exhibit DPS-WKS-1). The steam dryer MOU identified that

the Department had concerns regarding the performance of the steam dryer at uprated power levels and the potential for steam dryer performance to adversely affect Station reliability . It was acknowledged that power ascension tests for power uprate, required by the Nuclear Regulatory Commission, would provide additional information regarding the performance of the steam dryer at uprated power levels. Considering the information from the power ascension tests, the Department still has concerns regarding steam dryer performance under uprated power conditions. Based on the performance of similar steam dryers under uprated conditions and the information from the tests, the potential exists that structural failures of the steam dryer could adversely effect Vermont ratepayers. This testimony identifies concerns regarding the reliable performance of the Vermont Yankee steam dryer during power uprate conditions.

Q. What are your conclusions regarding the reliability of the steam dryer during power uprate operation?

A. Based on reliability problems caused by the steam dryers at Quad Cities Units 1 and 2 and Dresden Units 2 and 3, and the lack of resolution of these concerns in either the NRC staff review or the power ascension tests, additional means should be provided in order for Entergy's certificate of public good to be considered and determined to remain in the public good.

17. Please describe the testimony regarding the steam dryer which was provided in Docket No. 6812.

A. At the time of the close of the evidentiary record in Docket No. 6812, the steam dryer at Quad Cities Unit 2 had failed twice, in June 2002 and May 2003, as a result of operating at higher, uprated power levels. Despite this repeat failure at Quad Cities Unit 2, the expectation at the close of the evidentiary record was that, once identified, the steam dryers would be modified and repaired to prevent further failure. Power uprate related failure of the steam dryer at Quad Cities Unit 1 in October 2003 was an emerging issue at the close of the evidentiary record. The following are findings in this area from the Board's Order of March 15, 2004:

56. Plants which have implemented 20 percent power uprates have experienced forced outages and power reductions as a result of the modifications made for power uprate. Sherman pf. 5/9/03 at 14.

58. Eight nuclear plants have undergone extended power uprates of 17 percent or greater. Two of these, the Quad Cities Units 1 and 2, have experienced extended outages as well as periods of derates. Exh. EN-JKT-7; Sherman pf. 11/5/03 at 8; tr. 6/19/03 at 191.

59. Quad Cities 2 has experienced 42 days of uprate-related outages, along with additional lost generation through a period of derating. Sherman pf. 8/19/03 at 22.

60. The cost risk for Vermonters occurs from having to purchase replacement power at prices potentially higher than those set out in the Power Purchase Agreement. The cost of this replacement power would most likely be defined by market prices since uprate-related outages would most likely be unplanned. *Id.*

61. Market prices are expected to exceed the prices in the Power Purchase Agreement for the remaining operating life of Vermont Yankee. Exh. DPS-DFL-4.

62. The major reliability effects associated with uprate or major plant changes, inputting major equipment, are likely to occur within the first eighteen months. Two operating cycles, or 3 years, is a good surrogate for when the highest percentage of run-in problems occur. Tr. 1/15/04 at 222 (Sherman).

Q. Please describe the performance of steam dryers at power uprate plants subsequent to the close of the evidentiary record in Docket No. 6812.

A. Subsequent to the close of the evidentiary record, it became evident that extensive, power uprate related cracking in the Dresden Unit 2 and Unit 3 steam dryers had been discovered in October and November 2003. Dresden Unit 3 was derated to its original full power level for a period of three weeks until its steam dryer was modified. In Fall 2003, the Dresden Units implemented the same steam dryer modification that Vermont Yankee implemented. However, during the November 2005 refueling outage, it was discovered that the modified parts had again cracked as a result of power uprate loads.

In addition, the Quad Cities Unit 2 steam dryer that was twice repaired previously (in June 2002 and May 2003), was found in February 2004 to have cracking in areas of the steam dryer that were previously modified. As a result of the cracking discovered in October 2003 in the Unit 1 steam dryer, and the ongoing cracking in the Unit 2 steam dryer, the Quad Cities Units were limited to operating at their former full power level before power uprate. Quad Cities Units 1 and 2 were derated to their former full power levels for periods of 78 weeks (18 months) and 58 weeks (13-1/2 months), respectively. At that time, Quad Cities owner, Exelon, elected to

replace the steam dryers at both units. The replacements were installed in May 2005 in special outages for Quad Cities Unit 2 and Unit 1 of 10 days and 6 days respectively.

Also, inspections were made of the Vermont Yankee steam dryers during the Fall 2004 and Spring 2005 outages. In 2004, twenty steam dryer cracks were discovered. Sixteen of these cracks were characterized as "hairline" cracks. Two 14-inch cracks were found in the skirt of the dryer were left "as-is." Two additional 3-inch cracks were repaired. In 2005, a total of 62 steam dryer cracks were discovered. Entergy stated that the additional discoveries were a result of higher resolution inspection devices.

Q. Why do you only mention the Quad Cities and Dresden units when there have been other boiling water reactors that have had power uprates?

A. There are several different steam dryer designs in boiling water reactors. One design - the square-hood design - has proven susceptible to failure under power uprate conditions. There are only five square-hood steam dryers in U.S. reactors - the two at Quad Cities, the two at

Dresden and Vermont Yankee's steam dryer. The Quad Cities and Dresden experience is applicable to Vermont Yankee¹.

17. Please describe the NRC headquarters staff review of the steam dryers for power uprate.

¹ Even though Quad Cities and Dresden units are larger units than Vermont Yankee (approximately 770 MW vs. 510 MW - before uprate), their steam dryer experience is applicable to Vermont Yankee. It is even possible that Vermont Yankee's smaller size could exacerbate the problem.

1. The NRC headquarters staff review of the steam dryer is summarized on Exhibit DPS-WKS-2 (“Steam Dryer Slides”)². This Exhibit consists of slides by Mr. Thomas G. Scarbrough, entitled Component Evaluation for Vermont Yankee Proposed EPU Amendment, presented to the ACRS Power Upgrades Subcommittee on November 29, 2005. NRC assembled a team of eight highly qualified specialists (Steam Dryer Slides, p. 4-8,9) that requested and reviewed a great amount of steam dryer information (Steam Dryer Slides, p. 4-12).

Q. Please summarize the results of the NRC staff review of the steam dryer.

A. As shown in the Steam Dryer Slides, after numerous rounds of requests for additional information and responses, NRC staff could not confirm and did not agree with Entergy’s evaluation of the steam dryer.

17. Please describe the results of the NRC staff review in more detail

1. Regarding Entergy’s steam dryer analysis, the NRC determined that excitation sources were not adequately identified, a technically justifiable load definition was not provided, the analysis methodology was not justified as realistic, potential non-conservative assumptions were

² Certain of the Steam Dryer Slides have been labeled, “Slides Might Contain Proprietary Material.” Entergy has certified that the slides do not contain proprietary material.

used and extrapolation of pressure peaks were not validated (Steam Dryer Slides, p. 4-11).

Available margin to stress limits are not verifiable because of analysis uncertainties (Steam Dryer Slides, p. 4-20).

Entergy's steam dryer evaluation consisted of 1) a computational fluid dynamics (CFD) analysis, 2) an acoustical circuit model (ACM) review by scale model testing, and 3) an ACM review from the Quad Cities Unit 2 instrumented steam dryer.

The NRC staff found significant uncertainties associated with the CFD predictions. Sensitivity studies were not performed and comparison to other plant data was not sufficient. CFD uncertainty was underestimated. Steam Dryer Slides, p. 4-15.

For the ACM validation by scale model testing, NRC staff found significant uncertainties with the scale model because of the relative low flow used in the scale model test. The scale model measured results had substantial deviations from predicted results by calculations. Steam Dryer Slides, p. 4-16.

For ACM validation from the Quad Cities Unit 2 instrumented steam dryer, NRC staff concluded an assumption of even 100% uncertainty was an underprediction. Steam Dryer Slide, p. 4-17.

Because none of these analytical techniques were successful, the only basis for NRC acceptance of the steam dryers in power uprate conditions was the added instrumentation and the power ascension tests³.

Q. Please identify how the ACRS characterized Entergy's steam dryer evaluation.

A. In its letter of January 4, 2006 (Exhibit DPS-WKS-3), at 5, the ACRS stated:

[T]he state of validation of these [steam dryer analysis] methods is poor.

Q. Since the NRC could not confirm and did not agree with Entergy's evaluation of the steam dryer, what did the NRC staff require in order to provide reasonable assurance of public health and safety

³ Each of Steam Dryer Slides, p. 4-15, 17, 18, 19, and 20, end with the statement, "License condition addresses this finding."

A. As a result, NRC staff required special instrumentation for steam dryer performance and a series of closely monitored power ascension tests. In other words, because Entergy could not confirm steam dryer adequacy by analysis and model testing, Entergy's power ascension tests were a carefully monitored test to determine, at least in part, Entergy's methods of analysis. The initial power ascension test plan is provided as Exhibit DPS-WKS-4⁴.

Q. The power ascension plan describes various instrumentation and measurements. Please describe the steam line acoustical instrumentation and measurements.

A. Entergy provided acoustical monitoring instrumentation at eight locations on its four steam lines. The instrumentation measured strain⁵ at the locations along the steam line per frequency. A finite element model of the steam dryer was created of calculated stress levels on the dryer. The maximum code allowable stress at the highest stressed element on the steam dryer was used to determine, through complex calculations, the maximum allowable strains per

⁴ Exhibit DPS-WKS-4 consists of the main body of the steam dryer monitoring plan and Appendix D to that plan which includes layouts of the steam lines and instrumentation. The other omitted Appendices can be provided if desired.

⁵ The instruments provide a representative measurement of strain, and by complex correlation, stress. The actual measurement is strain squared divided by frequency.

frequency for the acoustical monitors on the steam lines. These maximum allowable strains per frequency were represented by a set of eight limit curves for the eight steam line instrument locations. As stated in the power ascension plan (Exhibit DPS-WKS-4), if the measured strain exceeded the limit curve value, action was required.

17. Please summarize the results of the power ascension tests with regard to the steam line acoustical monitoring.
18. In the power ascension tests, strain measurements reached or exceeded the limit curves at 105% power, 112.5% power, 117.5% power and 120% power⁶. As a result, Entergy recalculated and adjusted its limit curves three times in order to accommodate measured strains. Overall, the power ascension tests were successful and NRC was satisfied that catastrophic failure of the steam dryer would not occur. Operation at 120% power is considered acceptable because any failure of the steam dryer is expected to be detected by measuring moisture carryover, and power would be reduced if necessary to a known, safe operating range. Thus, NRC is confident that there is reasonable assurance that nuclear safety will not be compromised.

⁶ Each steam line location had two sets of limit curves. Level 1 curves are based on the ASME allowable stress. Level 2 curves were set at 80% of ASME allowable stress. During the power ascension tests, Entergy reached or exceeded Level 2 curves which required evaluation while remaining at the given power level.

17. Please describe your involvement in the power ascension tests.

1. I reviewed data that Entergy provided to the NRC and participated in Entergy/NRC technical conference calls at each step level. I also visited the site during a number of power increases.

17. Please describe in more detail the strain measurements that exceeded limit curves and the recalculations that were done.

1. Exhibit DPS-WKS-5 consists of nine pages of results from the strain measurements. These curves, as described below, represent the cases where the measured results reached or exceeded the limit curves. The color presentation on the curves has the following meaning:

- Bright red - top curve-labeled LC1_Ave_[location]

This curve is the Level 1 limit curve for the given location.

- Dark red - second curve from top-labeled LC2_Ave_[location]

This curve is the Level 2 limit curve - it is this curve which is exceeded on the pages provided.

- Medium red - third curve from top-labeled Ave_MSL_[location]_with_Excita

This curve presents the measured results from the strain gages at the given location for that particular power level.

- Blue - bottom curve-labeled AVE_MSL_[location]_No_Excita

This curve represents the natural frequencies or "electrical noise" that is present at the location that are not related to the acoustical forces that cause stress on the steam dryer. Along these blue curves are peaks which represent known electrical noise frequencies,

along with their resonant frequencies. For example, the most prominent peak is at 60 hz, representing that our AC power is 60 cycle/sec power.

- The curves also have a barely visible pink line which represents the strain gage readings at the previous step level.

There are two presentations included in Exhibit DPS-WKS-5. Pages 1 through 5 are a wide range presentation of frequencies from 0 to 250 hz. Pages 6 through 9 are a narrow range presentation of frequencies from 130 to 150 hz, the frequencies at which the limit curves were reached or exceeded. The wide range presentations have peaks in which the blue curve and the medium red curve exceed the limit curves together. These are not considered real strain signals, but rather noise, and therefore are not considered of concern. Signals of concern are those where the medium red curve reaches or exceeds the limit curve while the blue curves are at low levels at the bottom of the presentation. The following describes the curves provided:

Page 1 - 105% power (1671 MWt), main steam line A - lower location,

The measured results reached the limit curve at a frequency of 137 hz. As a result, the tests were put on hold while Entergy recalculated its limit curves by creating a more detailed model of the steam dryer (a finer finite element model) and by reducing uncertainties. Overall, the new limit curves were higher, and the allowed peak was higher at the 137 hz level to accommodate peak measured at 105% power and its expected further increase throughout the remaining step increases.

Page 2 - 112.5% power (1792 MWt), main steam line A - lower location

This curve shows the overall raised limit curves and the increased allowable peak at 137 hz that was recalculated at 105% the power level. However, at 112.5% power, the strain results had changed with a minor peak at 137 hz, and a higher peak at 142-3 hz that exceeded the limit curve. This resulted in another hold while Entergy again recalculated its curves to accommodate these new peaks. The new curves for this recalculation were generally lower than the 105% power curves, with higher peaks where measured peaks had developed.

Page 3 - 112.5% power (1792 MWt), main steam line D - lower location

In addition to the main steam line A - lower location item above, the limit curve was reached, or nearly so, at the main steam line D - lower location at 137 hz.

Page 4 - 117.5% power (1872 MWt), main steam line A - lower location

Even though the limit curves had been recalculated twice before, the results at 117.5% power saw the limit curve again reached at 142-3 hz. The curve was also reached at the main steam line A - upper location as described below. Once again, the tests were placed on hold and recalculations were done for a third time.

Page 5 - 117.5% power (1872 MWt), main steam line A - upper location

At this power level, for the first time, the upper location of main steam line A had a frequency (142-3 hz) that exceeded its limit curve.

Page 6 - 120% power (1912 MWt), Set 1, main steam line B - lower location

The limit curve was exceeded on main steam line B for the first time at full (120%) uprate power at 142-3 hz. This is set 1 of 5 sets of data taken. The Department was only provided sets 1, 2 and 5. The results for main steam line B - lower exceeded the limit curve at 143 hz in sets 1 and 2 but not in set 5.

Page 7 - 120% power (1912 MWt), Set 2, main steam line A - upper location

Although recalculated at 117.5% power to account for this peak (see page 5 above), the limit was exceeded for 143-4 hz. The results for sets 1 and 5 did not exceed the limit curves at this location.

Page 8 - 120% power (1912 MWt), Set 2, main steam line B - upper location

At this location, the limit curve was exceeded at 143-4 hz. The results for sets 1 and 5 did not exceed the limit curves at this location.

Page 9 - 120% power (1912 MWt), Set 2, main steam line B - lower location

Just as in set 1, the limit curve was exceeded at this location at 143 hz. Since the locations exceeded at 120 % power did not exceed the Level 1 limit (top curve), no further recalculations were necessary.

Q. What conclusions do you draw from the acoustical strain measurement results of the power ascension tests?

A. The original limit curves presented in the initial power ascension test plan (Exhibit DPS-WKS-4) carried the expectation that steam line/steam dryer phenomena were sufficiently understood analytically and that the limit curves were conservative. The fact that limit curves had to be recalculated three separate times demonstrates to me that steam line/steam dryer interactions are not well understood analytically. Based on not being able to predict the uncertainties related to how steam line frequencies would perform, there exists sufficient doubt in the steam line strain/steam dryer stress correlation to merit additional protection for ratepayers.. The complete translation of frequency data into actual loads on the steam dryer is theoretical. While I agree that catastrophic failure of the steam dryer is unlikely, Entergy has not conclusively demonstrated that steam dryer cracks resulting in power derates will not occur.

Q. Besides the acoustical strain measurements, was there another aspect of the power ascension test in which limits were exceeded?

A. Yes. As stated on Table 2 of the power ascension plan (Exhibit DPS-WKS-4), moisture carryover⁷ was monitored and had a Level 2 limit of 0.1%. This limit was exceeded starting at the 117.5% (1872 MWt) power level of the power ascension.

Q. What is conclusion regarding the moisture carryover exceeding limits?

A. The fact that moisture carryover exceeded its Level 2 limit is further demonstration to me that Entergy does not fully understand the uncertainties regarding steam dryer performance at uprate conditions. There was an expectation that the 0.1% carryover limit would be conservative.

⁷ Moisture carryover is the percentage of moisture remaining in the steam delivered to the steam line. The purpose of the steam dryer is to remove moisture from the steam developed in the reactor. Moisture carryover is the percentage of the weight (or mass) of water to the overall weight (or mass) of the saturated steam and water mix for of a given volume. For example, 100% moisture carryover would be all water. Zero percent moisture carryover would be all saturated steam with no water portions.

Q. Do you believe the instances of exceeding test limits, and the resulting multiple recalculation of acoustical strain measurement limit curves represents a condition adversely affecting the reliability of the steam dryer?

A. Yes. This terminology is used in stipulation 2 of the Steam Dryer MOU. As I have stated, the multiple exceeding of limits demonstrates that steam dryer analytical uncertainties are not well understood. These multiple exceeding of limits constitutes a condition adversely affecting the reliability of the steam dryers.

Q. Has the NRC staff concluded from its review that derates will not occur?

A. No. NRC is concerned with safety, and does not try to guarantee reliable operation at full 120% uprate power. Part of the NRC's conclusion of reasonable assurance that steam dryer will meet safety requirements is that cracking can be detected by increases in moisture carryover, and the plant power can be reduced to a known, safe power level⁸ until the steam dryer can be evaluated and repaired. NRC relies on the possibility of a derate in its safety determination.

17. Please explain how Vermont ratepayers would be affected if power were required to be reduced because of steam dryer problems.

⁸ The most likely known, safe power level is the former 100% power level.

1. Article 8 of the power purchase agreement (PPA) between Entergy Nuclear Vermont Yankee, LLC, and Vermont Yankee Nuclear Power Corporation (Exhibit DPS-WKS-6) provides that a Capability Audit will be performed after uprate power level is achieved. Based on the Capability Audit, the Company Entitlement fraction will be changed.

The current Company Entitlement is 100% (510 MW) - Vermont Yankee Nuclear Power Corporation currently takes 100% of Vermont Yankee power at fixed prices established by the PPA. Assuming that power is uprated by 20% (102 MW), the new Company Entitlement fraction would be 100% divided by 120%, or 83%. Vermont Yankee Nuclear Power Corporation would get 83% of 612 MW, or 510 MW, while Entergy would be able to sell 17% of 612 MW, or 102 MW - the uprate power.

However, if the plant were required to reduce power, or derate, because of steam dryer problems, Vermont Yankee Nuclear Power Corporation would get less than its former entitlement. For example, if the plant were required to derate to the old 100% power level of 510 MW, Vermont Yankee Nuclear Power Corporation would get 83% of 510 MW, or 425 MW. Entergy would get 17% of 510 MW, or 85 MW. In this condition, Vermont Yankee Nuclear Power Corporation would lose 17% of its former power⁹.

⁹ While there is the provision in Article 8 to modify the company entitlement fraction based on the claimed capability audit following power uprate, there is no provision to adjust the fraction if Vermont Yankee is later derated. Following the modification of the company

Vermont Utilities receive 55% of the power taken by Vermont Yankee Nuclear Power Corporation. In the above example, Vermont Utilities would lose 17% of the power currently received from Vermont Yankee at favorable PPA prices, and would have to make up this power at market prices. Using current power price forecasts, the costs to Vermont Utilities of derating back to the current 100% power level is estimated to be approximately (see Exhibit DPS-WKS-7):

\$54,000 per day

\$376,000 per week

\$19,573,000 per year

17. Would these amounts be covered by the current rate payer protection plans?

entitlement fraction, Vermont Yankee Nuclear Power Corporation will receive only approximately 83% of the output, even if Vermont Yankee is permanently returned to the old 100% power level.

1. The rate payer protection plans implemented in this docket are capped at a maximum value of \$4.5 million. Considering previous uses of these funds, approximately \$2 million remains in the rate payer protection plan. This amount would accommodate less than 6 weeks of derate back to the current full power level¹⁰.

- Q. Please describe the provision in the Steam Dryer MOU related to changing the Company Entitlement Fraction.

- A. If the Board opens a docket within 30 days following the completion of the power ascension tests (May 9, 2006), Entergy has agreed not to modify the Company Entitlement Fraction until 120 days following the completion of the power ascension tests.

17. Do you have a suggestion for the protection required for Vermont ratepayers?
 1. Yes. Vermont Utilities should be protected for a period ending two months after the startup from the first refueling outage for a cycle in which no derate has occurred. The Vermont Utilities should be protected for economic losses that result from decreases of power delivery associated with the steam dryer, with consideration of the risk that Entergy has undertaken to develop uprate power and continue electric generation service to Vermont Utilities.

¹⁰ By comparison, the Quad Cities Units 1 and 2 were derated back to old 100% power for a period of 78 weeks and 58 weeks, respectively.

17. Why do you choose the period ending two months after the startup from the first refueling outage for a cycle in which no derate has occurred?

1. If Entergy operates through its current cycle, inspects the steam dryer during its 2007 refueling outage, and is not derated within the two months following, I believe this would serve as a demonstration that steam dryer performance under uprate conditions was satisfactory. If derate occurred during the period, I would expect dryer repairs to be made, and an additional cycle without derate would be necessary to demonstrate performance.

17. Do you have opinions on how Entergy could provide the necessary protection for Vermont Utilities for economic losses from steam dryer problems?

1. I have no specific opinion at this time. There are likely a number of different ways this could be accomplished. For example, Entergy is a power supplier in the Northeast region. Entergy might be able to agree to supply power lost to Vermont Utilities as a result of steam dryer problems from other sources at the PPA prices. It is possible Entergy could procure or assist with payments for a type of reliability insurance policy.

Another manner that Entergy might provide protection to Vermont Utilities could be to conduct an additional Capability Audit of the type discussed in Article 8 of the PPA if the plant is

derated because of steam dryer problems, and to readjust for the Vermont Utilities the Company Entitlement fraction in the manner discussed in Article 8.

Q. Does this conclude your testimony?

A. Yes, it does.

**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of
ENERGY NUCLEAR VERMONT YANKEE, LLC
and ENERGY NUCLEAR OPERATIONS, INC.
(Vermont Yankee Nuclear Power Station)

June 23, 2006

Docket No. 50-271

ASLBP No. 04-832-02-OLA

**DECLARATION OF DR. JORAM HOPENFELD
REGARDING NEW ENGLAND COALITION'S
SUPPLEMENT TO A PETITION FOR LEAVE TO FILE A NEW CONTENTION**

I, Dr. Joram Hopenfeld, declare as follows:

1. My name is Dr. Joram Hopenfeld. I reside at 1724 Yale Place, Rockville, Maryland.
2. The New England Coalition has retained me as an expert witness in the above captioned matter.
3. I have previously provided testimony in this proceeding and with it provided my credentials and resume' to the parties and to the Atomic Safety and Licensing Board Panel convened in the above captioned matter.
4. I have reviewed the Prefiled Testimony of William K. Sherman, Vermont State Nuclear Engineer, regarding Vermont Yankee Nuclear Power Station's ("Vermont Yankee") Steam Dryer Reliability as filed before the Vermont Public Service Board on behalf of the Vermont Department of Public Service, June 21, 2006.
5. The subject testimony was submitted to the Vermont Public Service Board in support of a Department of Public Service Petition to Open an Investigation in connection with

postulated financial impact on Vermont ratepayers from potential steam dryer failure of due to implementation of extended power uprate at Vermont Yankee.

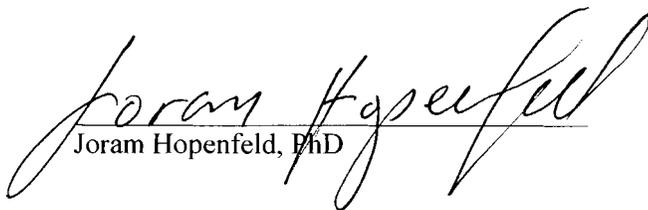
6. I find Mr. Sherman's testimony to be professional and technically credible. I am in general agreement with Mr. Sherman's observations regarding the large uncertainties in the Entergy's methodology of predicting the loads on the dryer from flow induced vibrations.

7. The fact that all (four) reactors sharing the same geometry as the Vermont Yankee steam dryer have experienced FIV-induced structural failures, the fact that the ACM/CDF codes have not been verified on a properly scaled test model, the fact that other plants also relied on the ACM/CDF methodology, and the fact that the predicted limiting curves have been continuously exceeded during the accession tests at Vermont Yankee, all as pointed out or affirmed in the testimony of Mr. Sherman, comprehensively demonstrate a high risk of dryer failure at the 120% power level.

8. I take an exception to a single point in Mr. Sherman's testimony, that is, his unsupported conclusive statement that the steam dryer is not likely to fail catastrophically. Neither Mr. Sherman nor Entergy has provided any documentation to ensure NRC or the public that the dryer will not fail catastrophically especially during design basis LOCA events.

I declare under penalty of perjury that my foregoing statements are true and correct.

Executed this day, June 23, 2006 at Rockville, Maryland.


Joram Hopenfeld, PhD

June 23, 2006

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of
ENERGY NUCLEAR VERMONT YANKEE,
LLC and ENERGENCY NUCLEAR
OPERATIONS, INC.
(Vermont Yankee Nuclear Power Station)

Docket No. 50-271-OLA
ASLBP No. 04-832-02-OLA

ERRATA

TO NEW ENGLAND COALITION'S REQUEST FOR LEAVE TO FILE A SUPPLEMENT
TO NEW ENGLAND COALITION'S REQUEST FOR LEAVE TO FILE A NEW CONTENTION

On June 23, 2006, New England Coalition electronically filed a petition with the presiding officer and the Atomic Safety and Licensing Board Panel convened in this proceeding for leave to supplement the New England Coalition Request of April 20, 2006. In preparation for service by mail it was discovered that a footnote was inadvertently omitted in the electronic filing.

That footnote is included in this paper filing on page 2 under, **II. DISCUSSION**, following the sentence: New England Coalition seeks herein to place before the Board the Prefiled Written Testimony of William Sherman, Vermont State Nuclear Engineer, regarding Vermont Yankee Nuclear Power Station's ("Vermont Yankee") Steam Dryer Reliability. It has been marked in **bold** and [bracketed] in order to distinguish it in comparison to the electronic copy and the footnote reads as follows,

The specificity and basis requirements for a proposed contention under 10 CFR § 2.309(f) (formerly 2.714(b)) can be satisfied where the contention is based upon allegations in a sworn complaint filed in a judicial action and the applicable passages therein are specifically identified. This holds notwithstanding the fact that the allegations are contested. Consumers Power Co. (Midland Plant, Units 1 and 2), LBP-84-20, 19 NRC 1285,1292-94 (1984).

New England Coalition regrets any confusion or inconvenience this error may have caused.

Respectfully submitted,



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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
ENTERGY NUCLEAR VERMONT YANKEE) Docket No. 50-271-OLA
LLC and ENTERGY NUCLEAR)
OPERATIONS, INC.) ASLBP No. 04-832-02-OLA
)
(Vermont Yankee Nuclear Power Station))

CERTIFICATE OF SERVICE

I hereby certify that copies of "NEW ENGLAND COALITION'S REQUEST FOR LEAVE TO FILE A SUPPLEMENT TO NEW ENGLAND COALITION'S REQUEST FOR LEAVE TO FILE A NEW CONTENTION," in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class; or as indicated by an asterisk (*), by deposit in the Nuclear Regulatory Commission's internal mail system; and by e-mail as indicated by a double asterisk (**), this 23rd day of June, 2006.

Alex S. Karlin, Chair** Administrative Judge Atomic Safety and Licensing Board Panel Mail Stop T-3F23 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 E-mail: ask2@nrc.gov	Dr. Anthony J. Baratta** Administrative Judge Atomic Safety and Licensing Board Panel Mail Stop T-3F23 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 E-mail: ajb5@nrc.gov
Lester S. Rubenstein** Administrative Judge Atomic Safety and Licensing Board Panel 4760 East Country Villa Drive Tucson, AZ 85718 E-mail: lesrrr@comcast.net	Office of the Secretary** ATTN: Rulemaking and Adjudications Staff Mail Stop: O-16C1 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 E-mail: HEARINGDOCKET@nrc.gov
Office of Commission Appellate Adjudication* Mail Stop: O-16C1 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001	Jonathan M. Rund, Esq.** Law Clerk Atomic Safety and Licensing Board Panel Mail Stop: T-3F23 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 E-mail: jmr3@nrc.gov

<p>Marcia Carpentier, Esq.** Law Clerk Atomic Safety and Licensing Board Panel Mail Stop: T-3F23 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 E-mail:</p>	<p>Jay E. Silberg, Esq.** Matias Travieso-Diaz, Esq.** Pillsbury Winthrop Shaw Pittman, LLP 2300 N St., NW Washington, DC 20037-1128 E-mail:</p>
<p>John M. Fulton, Esq. Assistant General Counsel Entergy Nuclear Operations, Inc. 440 Hamilton Avenue White Plains, NY 10601</p> <p>Terence A. Burke Associate General Counsel Entergy Services, Inc. 1340 Echelon parkway Jackson, MS 39213 E-mail:</p>	<p>Sherwin E. Turk, Esq.** Richard Ennis, NRC, NRR Office of the General Counsel Mail Stop O-15 D21 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 E-mail:</p>



Raymond Shadis
Pro Se representative
New England Coalition

UNITED STATES
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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Docket No. 50-271

ASLBP No. 04-832-02-OLA

Office of the Secretary
ATTN: Rulemaking and Adjudications Staff
Mail Stop: O-16C1
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Rulemaking and Adjudications Staff,

Please find for filing in the above captioned matter one original and two copies of
**NEW ENGLAND COALITION'S REQUEST FOR LEAVE TO FILE A
SUPPLEMENT TO NEW ENGLAND COALITIONS REQUEST FOR LEAVE TO
FILE A NEW CONTENTION**

Thank you for your kind assistance in making this filing,



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