RAS 11672

DOCKETED
USNRC

May 23, 2006 (9:19am)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

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) (Technical Specification Proposed Change No. 362)	May 17, 2006 Docket No. 50-271-OLA ASLBP No. 04-832-02-A

NEW ENGLAND COALITION'S STATEMENT OF POSITION

I. INTRODUCTION

The New England Coalition, by and through its *pro se* representative, Raymond Shadis, files this Statement of Position together with supporting prefiled written testimony in the above captioned proceeding.

II. BACKGROUND

On August 30, 2004, New England Coalition filed a Request For Hearing, Demonstration Of Standing, Discussion Of Scope Of Proceeding And Contentions in the Matter of Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. (Vermont Yankee Nuclear Power Station) (Technical Specification Proposed Change No. 362).

New England Coalition proposed seven contentions; six of the proposed contentions supported by expert testimony.

In sum the proposed contentions were:

1. Entergy Vermont Yankee has failed to maintain an independent QA/Qc program as required by 10CFR 50.54.

Template = SECY-037

SECY-02

> 2. Entergy has failed to pursue the root cause Main Steam Line Isolation Valve ("MSIV") Leakage, a negative component performance trend that could ultimately yield failure of the MSIV safety function.
> 3. Large Transient Testing will be a prerequisite to Extended Power Uprate
> 4. Entergy cannot assure seismic and structural integrity of the cooling towers under uprate conditions, in particular the Alternate Cooling System cell. At present the minimum appropriate structural analyses have apparently not been done.
> 5. Failure to maintain documentation and records, as required under 10 CFR 54 and elsewhere, adequate to determine plant condition and design basis conformance as a foundation on which to build uprate analysis.
> 6. Failure to preserve defense-in-depth and violation of single failure criteria by placing dependence on maintaining containment pressure to secure Residual Heat Removal and Core Spray Pump suction under accident conditions.
> 7. Entergy failure to comply with the requirements of 10 CFR 50.71 (E), Maintenance of Records and Making of Reports, without which thorough review of the application is impossible.

An Atomic Safety and Licensing Board (Board) was convened and, on November 22, 2004, ruled that New England Coalition had standing and admitted two of the proffered seven contentions for adjudication; redrafted by the Board as follows:

> NEC Contention 3: The license amendment should not be approved unless Large Transient Testing is a condition of the Extended Power Uprate.
>
> NEC Contention 4: The license amendment should not be approved because Entergy cannot assure seismic and structural integrity of the cooling towers under uprate conditions, in particular the Alternate Cooling System cell. At present the minimum appropriate structural analyses have apparently not been done.

Both of these contentions had been supported by the expert testimony of New England Coalition witness, Arnold Gundersen.

A. Contention 4 - Several months later, ABS Consulting, under contract to Entergy, performed a structural and seismic analysis of the cooling towers and the Alternate Cooling System (ACS), which it claimed addressed the cooling tower upgrades associated with the proposed EPU.

Entergy then filed a motion for summary disposition of New England Coalition Contention 4.

On September 1, 2005, the Board dismissed New England Contention 4 as moot, finding that it was essentially a "contention of omission" cured by the ABS Report.

Even so the Board took note of the qualitative language in Contention 4 and ordered that, "if NEC moves for leave to file new or amended contentions challenging the adequacy of Entergy's seismic and structural analysis within 20 days of the date of this order, then the motion and contentions will be deemed timely for purposes of 10 C.F.R. § 2.309(f)(2)(iii)."

On September 21, 2005, NEC filed its request for leave to file a new contention.

On December 2, 2005, the Board granted the request and found NEC's new contention admissible, redrafting it as follows:

> The Entergy Vermont Yankee [ENVY] license application (including all supplements) for an extended power uprate of 20% over rated capacity is not in conformance with the plant specific original licensing basis and/or 10 CFR Part 50, Appendix S, paragraph I(a), and/or 10 CFR Part 100, Appendix A, because it does not provide analyses that are adequate, accurate, and complete in all material respects to demonstrate that the Vermont Yankee Nuclear Power Station Alternate Cooling System [ACS] in its entirety, in its actual physical condition (or in the actual physical condition ENVY will effectuate prior to commencing operation at EPU), will be able to withstand the effects of an earthquake and other natural phenomena without loss of capability to perform its safety functions in service at the requested increased plant power level.

Subsequently, upon complaint of Entergy, on March 14, 2006, the Board ordered New England Coalition to file briefs on the legal and material scope of Contention 4 on March 17, 2006 and March 20 2006, respectively; and accordingly thereafter, Entergy and NRC Staff were accorded the opportunity to file response and New England Coalition the opportunity to file reply. This onerous load simply overwhelmed New England Coalition's limited pro se resources. As a consequence both brief and reply on material and legal scope were filed late and, as a result, the reply was struck.

On April 24, 2006, the Board ruled that it now rejected the definition of Alternate Cooling System contained in New England Coalition's Request For Leave to File New Contention[1] and, setting aside the definition of the "entire ASC system" in DR. Ross Landsman's expert declaration[2], also ruled that the material scope of Contention 4 was limited to the alternate cooling tower cell and impinging structures. Further, the Board ruled that only those issues itemized by Dr. Landsman in a numbered list regarding deficiencies in the ABS Report could be considered, again redrafting Contention 4:

> **NEC Restated Contention 4**
> The Entergy Vermont Yankee license application (including all supplements) for an extended power uprate of 20% over rated capacity is not in conformance with the plant's current licensing basis because, with respect to the Alternative Cooling System (ACS) cooling tower cells CT2-1 and CT2-2, it does not provide analyses that are adequate, accurate, and complete in the following respects: the ABS Report
> (1) does not include a physical examination of the alternate cooling tower cell;
> (2) lacks adequate documentation of the breaking strength of the tie rods,
> (3) does not use added conservatism in accounting for the effects of aging mechanisms and/or moisture and/or cooling system chemicals;
> (4) in its structural analysis, fails to assign a negative value to the replacement rate for degraded members;
> (5) fails to account for changes after the report was completed;
> (6) relies on incorrect and non-conservative assumptions concerning the condition of the concrete in the cooling tower cells and fails to take into account the unanalyzed effects of recent modifications including steel splices; and

1 The ACS system includes, but is not limited to, towers, fill, structural members and bracing, shear pins and/or tie rods, basins, piping, pumps, valves and controls, fan motors, fan decks and fan gearing, emergency electrical supply, and all components vital to design basis objectives and licensing basis requirements intended to assure operability when the system is called upon in an emergency.

2 Landsman Declaration at 20. Upon review of the foregoing referenced documents it is my professional assessment that Entergy Nuclear Vermont Yankee has not demonstrated seismic resilience of the entire alternate cooling system. By the entire ACS system, I mean to include, but not be limited to, towers, fill material, structural members and bracing of all kinds, shear pins and/or tie rods, basins, piping, pumps, valves and controls, fan motors, fan decks and fan gearing, emergency electrical supply, and all components vital to design basis objectives and licensing basis requirements intended to assure operability when the system is called upon in an emergency. This lack is distressing because extended power uprate operating conditions will require the alternate cooling system, when needed, to remove a greater heat load than that for which it was originally designed. In my professional opinion, this remains a serious issue that is included in New England Coalition's new or revised alternate cooling system contention and that the Atomic Safety and Licensing Board should examine in this case.

> (7) does not provide a reasonable assurance of the seismic qualification of the ACS cooling tower cells CT2-1 and CT2-2.
> Therefore, the license application fails to demonstrate that the ACS cooling tower cells CT2-1 and CT2-2, in their actual physical condition (or in the actual physical condition Entergy will effectuate prior to commencing operation at EPU), will be able to withstand the effects of an earthquake and other natural phenomena without loss of capability to perform their safety functions in service at the requested increased plant power level.

In terms of the legal scope of Contention 4, on April 24, 2006, the Board ruled that,

> ... only the Vermont Yankee current licensing basis shall be used to adjudicate and decide NEC Contention 4. The licensing basis at least includes Draft General Design Criterion 2 and 10 C.F.R. § 100.10(c)(1) (1967). We find that the two other legal standards specified the contention – 10 C.F.R. Part 50, Appendix S, paragraph I(a) and 10 C.F.R. Part 100, Appendix A – were promulgated after the ACS towers and cells were built and licensed, and therefore do not apply unless NEC can cite to some specific part of the licensing basis that incorporated them.

This completes New England Coalition's presentation of the background for Contention 4; establishing the current status of Contention 4 as its wording, material scope, and legal scope has been defined by the Board.

B. Contention 3 - New England Coalition now turns to the adjudicatory background of New England Coalition Contention 3.

On December 2, 2005, Entergy filed a Motion for Summary Disposition of New England Coalition Contention 3, by-and-large on the purported basis that overwhelming evidence mooted New England Coalition's claim that full transient testing, per General Electric's boiling water reactor Constant Pressure Power Uprate Topical License Report and NRC Review S-001, Standard Review Plan P 14.21, and Regulatory Guide.1.68, should be required at Vermont Yankee as a prerequisite to operation at Extended Power Uprate, On December 23,2005, New England Coalition filed response, including a Declaration of Dr. Joram Hopenfeld. On January 31, 2006, the Board denied Entergy's

motion, ruling that clearly a dispute with technical basis existed between intervenor, New England Coalition, and the licensee.

III. DISCUSSION

A. Contention 4 - In its Order of April 24, 2006, the Board has largely constrained New England Coalition Contention 4 to asserting a series of omissions regarding the alternate cooling cells and impinging structures, albeit with some quality language remaining. Thus it is fairly straightforward work for Entergy to show that the cooling tower seismic, structural, and performance considerations listed in Dr. Ross Landsman's Declaration Supporting New England Coalition's Alternate Cooling System Contention, September 19, 2005 (as included in Contention 4, restated by the Board above) and reiterated in the Board's Order of April 24, 2005 are satisfied or have no requirement for satisfaction in regulation or the licensee's licensing and design basis.

New England Coalition now respectfully resubmits and includes by reference Dr. Ross Landsman's September 19, 2005 Declaration ...Supporting New England Coalition's Alternate Cooling System, as Prefiled Written Testimony, in lieu of new testimony, for three reasons:

(1) Following the Conference Call with the Board on April 20 (wherein the Board's expectations for this filing were laid out) and upon New England Coalition Pro Se Representative's return from an international environmental conference in Kiev, Ukraine (April 21-26), New England Coalition, through its pro se representative, was surprised to learn that a member of Dr. Landsman's household had suffered an accidental injury with continuing consequences that required Dr. Landsman to assume the role of full-time

caregiver, thus hampering his ability to review documents and prepare additional testimony. Dr. landsman assured New England Coalition that he would do his best to provide prefiled written testimony by May 17th, but as of this filing, he has apparently been unable to do so. New England Coalition is confident that Dr. Landsman can provide additional testimony in the near term, if needed. However, New England Coalition points to the lightening of the review schedule due to the withdrawal of the Vermont Department of Public Service from the proceeding and begs the Board's indulgence of two weeks (or until May 31, 2006) to sort out Dr. Landsman's availability for refilled testimony and/or find another expert if Dr. Landsman is unable to continue.

(2) Given that Contention 4 (as twice redrafted by the Board) is now largely, if not entirely, a contention of omission, New England Coalition respectfully submits that Dr. Landsman's original expert review and testimony (declaration), coupled with the Board's Order of April 24, 2006, ought to suffice to provide Entergy with adequate and specific notice of what issues it must address, at what quality, to satisfy the omissions listed. Thus Dr. Landsman's new prefiled testimony would best serve to build the record in this proceeding, if it were in reply to whatever information or claims Entergy offers in response to Contention 4. In the interim, New England Coalition and Dr. Landsman rely on and wish to incorporate here by reference, his testimony filed as a declaration on September 19, 2005.

(3). Given that Contention 4 (as twice redrafted by the Board) is now largely, if not entirely, a contention of omission, New England Coalition respectfully submits that the Board has sufficient expertise at its command, with a New England Coalition expert

witness, to ascertain if the omissions listed in Dr. Landsman's Declaration and memorialized in the redrafted contention have been fulfilled.

New England Coalition respectfully suggests that, in consideration of the public interest, the Board and the parties press on in consideration of Contention 4, irrespective of the participation (or not) of an expert witness; failing that, New England Coalition respectfully requests time in which to gather Dr. Landsman's testimony or that of a replacement expert.

B. Contention 3 - Here New England Coalition provides the attached Prefiled Written Testimony of Dr. Joram Hopenfeld. Dr. Hopenfeld testifies in support of New England Coalition Contention 3 as originally redrafted by the Board:

> The license amendment should not be approved unless Large Transient Testing is a condition of the Extended Power Uprate.

In his testimony, fully cognizant of the Board's admonitions to the licensee concerning a discussion of benchmarking and applicability of analytical computer codes (see, Transcript, Pre-Hearing Conference, April 20, 2006), Dr. Hopenfeld grapples with the question of proper application of computer codes that are used by Entergy in partial justification of avoiding the 'risk' of full transient testing. Dr. Hopenfeld offers that if the licensee seeks to be relieved from the requirement to do full-transient testing per the GE CLTR, RS-001, the SRP 14.2.1, and R.G. 1.68, then the licensee must demonstrate, <u>before continued operation in excess of original licensed thermal power</u>, verifiable applicability and appropriate benchmarking for its analytical and predictive codes.

New England Coalition takes the position that the question of full transient testing must be approached with great caution; that no collection of individual component tests may be substituted for an integral test, and that while there is some un-

quantified additional risk inherent in full transient testing; there is greater un-quantified risk in proceeding into the inevitable spontaneous scram event in an inadequately analyzed condition. The NRC's Advisory Committee on Reactor Safeguards discussed these concerns most pointedly early in 2005. Excerpts from their discussions mirror New England Coalition's concerns are presented here to underscore the legitimacy of New England Coalition's concerns and to provide a suggested conceptual framework for continued adjudicatory exploration of the topic before this Board.

> NUCLEAR REGULATORY COMMISSION MEETING
> ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)
> SUBCOMMITTEE ON THERMAL-HYDRAULIC PHENOMENA
> WEDNESDAY, JANUARY 26, 2005 ROCKVILLE, MARYLAND
> Dr. Graham Wallis, Chairman, presiding.
>
> MR. ROSEN: [ACRS Member, *regarding Entergy's position on risk in full-transient testing*]: While I've interrupted your
> Page 103
> talk, let me ask you a related question. Part of the discussion here today will be about the large transient testing and the desire on the part of Entergy to not do the large transient tests at Waterford. Now in the attachment 5 to the supplement testing, the startup-testing supplement rather, there is a statement I want you to help me understand. It's talking about a SCRAM from full power, from the new extended power. It says "A SCRAM or the potential for a SCRAM from a high power level results in an unnecessary and undesirable plant transient cycle on the primary system. And the risk associated with the intentional introduction of a transient initiator while small, should not be incurred unnecessarily." Now, that statement does not quantify what the word "small" means. And I'd ask you to help me with that. What is your view of the risk of a full power SCRAM?
> MR. HOLMAN [Entergy]: We have not quantified that specific transient and the impact of doing that test. I think it was meant to be a more general statement that anyway time you initiate you reactor trip, there is some consequence to that.
> MR. CONSTANCE [Entergy]: Hello. I'm David
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> Constance. And I'm with Entergy, and I'll be presenting testing later on day. Jerry, we did get some of those numbers in for the event specific risks for turbine trip. I don't recall what the numbers were, but they were indeed in our opinion small but should not be discounted.
> MR. ROSEN: What do you mean by small?
> You mean –
> MR. CONSTANCE: Less than ten to the minus 6.
> MR. ROSEN: Less than ten to the minus 6?
> MR. CONSTANCE: Right.
> MR. ROSEN: Okay.

Page 336, MR. ROSEN ...Okay. Well -- lower steam generator trip pressure setpoint, reheat system safety valves will be modified, condenser modifications will be performed staking the condenser. I mean, that's a long list of stuff. And my feeling about all that stuff is it has to work as an integrated whole. And the only way to know that is to do an integrated test, the large transient test at the new EPU. And I wouldn't expect that to be done the day the instant you get there, but at a reasonable time after you get to the EPI conditions and after you've taken steady state data, and at a time convenient to the system and the plant when management and all the control systems, the proper control systems are in place, additional resources as necessary both people and equipment. And it would

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seem to be that that would be an appropriate time to take it rather at some undetermined time in the future decided by the plant, not by the plant management.

MR. MITCHELL [Entergy]: Yes. This is Tim Mitchell. I guess I feel like we are testing each of those components you listed. And we are doing LTC code predictions on their performance. But things like turbine valves, which would be the primary concern I believe with everything along the turbine train, are they capable of moving and closing, you know we will demonstrate that they are capable of moving and closing or opening as part of the power ascension profile, plus the maneuvering from 100 percent power to 90, to 95 also shows our ability to move those valves from the new 100 percent power plateau. So to me we are testing the plant.

MR. ROSEN: Individual, I agree. Individual here, individual there. But your reliance on calculations and analyses to predict the transient response of a plant from full power at the extended power conditions is purely analytical. And I don't think we would have ever accepted that in the past. And I see no reason to do so in the future. You can continue to address this subject and provide more documentation, but I've been through

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all of the stuff that's been provided, I think, both by the staff and the applicant. And I don't think you've carried the burden. My reaction to it is well, if that's the best you can say, why don't you just do the test and get it over with.

CHAIRMAN WALLIS [ACRS]: Steve, I'm not sure that this Subcommittee is going to take the position one way or the other. I don't know how the members feel about this, but we may turn out to be evenly split.

MR. ROSEN: Well, that may very well be. That may very well be. And I was just feeling my burden to let the applicant and the staff know.

...

MR. JONES [NRC Staff]: This is Steve Jones in Plant Systems. I just wanted to bring up one more point.

We have accepted in the past when during initial startup tests when plants have had inadvertent trips at lower power levels then initially plans, we have accepted those as satisfying the startup test requirement.

MR. ROSEN: Up to that power level, not extrapolated beyond that power level?

MR. SIEBER [ACRS]: No, extrapolated.

MR. JONES: I mean, we've accepted those as satisfying the generator load reject tests for 100 percent power if it occurred at 80 percent power.

MR. PRESCOTT [NRC Staff] : And we also accepted for initial startup of plants, we also accepted as logic for not performing certain tests at other plants that were being constructed afterwards with the same
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vintage or the same make, they're not performing a certain test based on a test performed at other plants.
MR. ROSEN: I understand.
MR. PRESCOTT: So NRC has long --
MR. ROSEN: I understand that you've told me that you've accepted it at other plants and at lower power levels in the past.
MR. PRESCOTT: Yes.
MR. ROSEN: We're talking about the future, not the past here I thought. And so I would prefer to talk about the future. And given the fact that either you make a change here with the past or you use the past essentially forever as prologue. In other words, we give every licensee the signal that they may rely on the past precedent of not requiring this. Their burden has been reduced effectively to zero, when in fact their purpose -- the change of the standard was to transfer the burden to the licensee. It was not the staff's job to argue with the agency reviewers that the licensee could waive transient testing, which was part of normal startup programs. It was not the staff's job to do that. It was the applicant's job to do that. To make that case convincingly.
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MR. PRESCOTT: And then the SRP covers that. It gives them the option of supplying us information analytically or performing the test. It doesn't weigh the option for them.
MR. RULAND [NRC Staff]: Let me add about Duane Arnold. As you probably are aware, Duane Arnold when we approved their power uprate, they had a license condition that required them to do large transient testing.
Recently they came in for a license amendment to eliminate that license condition. And the staff basically said to the licensee -- but we haven't issued this license amendment by the way, yet. That they hadn't performed sufficient justification to eliminate large transient testing at this point.
So what I'm arguing is that the staff has shown that we're applying this as the Review Standard has suggested on a case-by-case basis. And in fact, at least at this stage in Duane Arnold they haven't provided us sufficient justification to justify eliminating the large transient testing. So that's just an example.
MR. ROSEN: Well, I appreciate that.
MR. PRESCOTT: And there was a significant RAI associated with this EPU at trying to address
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large transient testing.
CHAIRMAN WALLIS: Can we perhaps move on and revisit this later?
MR. PRESCOTT: Finally, this is just to give a little more background on some of the things that we take a look at, and we also take a look at operator training and familiarization, any changes that were done to the ELPs and the benchmarking of analysis codes and models as extra consideration for whether or not large transient testing.
Next slide, please.
Finally, this is just a conclusion slide to give an overall view of that SRP 14.2.1 has options available to a licensee for ways of justifying large transient testing

and testing in general. And that there have been 12 domestic LWRs or light water reactors that have implemented staff approved EPUs.
CHAIRMAN WALLIS: But at Duane Arnold you are requiring?
MR. PRESCOTT: No, it's a licensed condition right now that's on there to perform the testing. They're doing their power uprate in phase and they haven't reached the phase yet where they're required to do the testing --
CHAIRMAN WALLIS: There have to be LWRs
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where you have required large transient testing.
MR. PRESCOTT: I'm sorry.
CHAIRMAN WALLIS: You said there were 12 were you have not required large transient tests. Are there other ones where you have required large transient tests?
MR. PRESCOTT: No, sir.

AND the trade-offs in predictive analysis versus full transient testing

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS) 519TH MEETING
THURSDAY, FEBRUARY 10, 2005
ROCKVILLE, MARYLAND
Dr. Mario V. Bonaca, Chairman, Presiding.

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MR. CONSTANCE [Entergy]: Right. There's also initial condition effects of time and life also, but a bigger aspect is, what about other transients? What about loss of feed pump? What about loss of both feed
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pumps?
MEMBER ROSEN [ACRS]: You're arguing for more large transient testing, I think. (Laughter.) We might go easy -- go along with that.
MR. CONSTANCE Well, what I think I'm arguing for is that we need to establish the performance and operability in the confidence level in these systems in some other manner other than challenging them in their design basis transient. If you think there's a flaw, that seems to be the poorest time to try to demonstrate that flaw. Rather, we need -- what we're trying to demonstrate here is that we perform --
MEMBER ROSEN: No. We think the converse. We think there's not a flaw, but we need you to demonstrate that. That's a view that some of the members of the committee hold. And it goes back to some of the comments my esteemed colleague Dr. Apostolakis has made in another context about model uncertainty. And that is, you don't know what you don't know. So how can one conduct a test to find out those things. It's obviously not possible.
MR. CONSTANCE: That's right.
MEMBER ROSEN: So one needs to think about
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not being so certain that you know everything you know -- that you need to know about the plant, because there is always model uncertainty in both the calculations or by analogy here in the plant
condition.
MR. MITCHELL [Entergy]: This is Tim Mitchell, and I guess I'd like to phrase it a little different. The act of going through low power on a power plant tests

things like feedwater control and steam dumps, and those type control systems in an integrated fashion, that is more challenging, in my opinion, than the active trip in the turbine. So between the testing that we're doing and the power ascension program itself, I would argue that we are subjecting the systems to much more
stringent testing than would be exhibited by a turbine trip.
MEMBER SIEBER [ACRS]: I think one could also reach a conclusion that a trip from any higher power level, from a control system standpoint, causes the controls to act the same as they would from the highest license power level. In other words, if you trip the plant from 80 percent, most things will close except heater levels which modulate, and, you know, all your heater
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drain system valves close, your -- to limit the amount of stored energy that goes through the turbine. And so to demonstrate that, you really don't need to do it at 100 percent power. What you do learn from a trip at 100 percent power is -- will a water hammer occur? Will pipe movements occur that will strain or damage pipe hangers? Things of that nature? And, of course, after a trip I'm sure your plant, like most I've been in, does a walkdown of all of these systems to make sure everything is taken care of.
So if you're looking at control systems, to me, I don't think that a trip from 100 percent power really tells you too much. On the other hand, it does tell you about the overall mechanical response of the plant, where the pipes move, where the hangers -- whether they -- the hangers and snubbers get bent, or something like that. And so there is some value in doing that.
But I would think that if you wanted to argue to say the licensee ought to do it; that should be the basis.
MR. CONSTANCE: If I can continue on --
MEMBER WALLIS [ACRS]: This is likely to occur anyway within the next few years, whether you test --whether you plan it or not, isn't it?
MR. CONSTANCE: That's right. It is likely to occur. We expect it to occur sometime in the life of the plant. When we go through a refueling outage, any refueling outage, but especially during a power uprate refueling outage, and we put the plant online, we then go into a -- we then go in -- well, we then go into a -- we then enter into our routine surveillance and monitoring programs. These programs have an opportunity to detect any degradations that might exist in the plant, before we reach a point where we might actually need them. So that trip may not occur for six months, it may not occur for five years, and in that period the operators and the engineers and the technicians have an opportunity through our routine monitoring and surveillance program to detect this degradation and correct it.
MR. MITCHELL: Plus, our post power ascension or our power ascension testing program will look for -- is piping and hangers -- are all thermal growths as predicted, and is it consistent with what we would expect? And we have looked at it from an analysis standpoint, what the effects would be.
MR. CONSTANCE: So if you are asking if I
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would rather take a turbine trip now than later, I'd have to say later. All right.
MEMBER SIEBER: Spoken like a true operator.
(Laughter.)
MEMBER ROSEN: Especially on somebody else's shift.
(Laughter.)

New England Coalition's concern, echoed in the ACRS dialogue excerpted above, is that component testing, piecemeal ascension testing, and inappropriately applied predictive computer codes will not reveal what an integrated full transient test, planned or inadvertent, may reveal. We must soberly consider the words of ACRS Member Sieber:

> What you do learn from a trip at 100 percent power is -- will a water hammer occur? Will pipe movements occur that will strain or damage pipe hangers? Things of that nature? And, of course, after a trip I'm sure your plant, like most I've been in, does a walkdown of all of these systems to make sure everything is taken care of.
> So if you're looking at control systems, to me, I don't think that a trip from 100 percent power really tells you too much. On the other hand, it does tell you about the overall mechanical response of the plant, where the pipes move, where the hangers -- whether they -- the hangers and snubbers get bent, or something like that. And so there is some value in doing that.

Mr. Sieber's comment on "hangers and snubbers" strikes home, in as much as while Entergy Nuclear's Vermont Yankee is running at 120 % of original licensed thermal power without benefit of full transient testing (either Main Steam Isolation Valve close or Turbine/Generator load shed), Entergy has applied for an amendment to technical specifications regarding snubber inspection requirements and is planning no inspection or maintenance until the 2007 refueling outage.

(see, Vermont Yankee, Technical Specifications Proposed Change No. 272, Relocation of LCO 3.6.1 and SR 4.6.1 and Addition of LCO 3.0.8 Regarding Snubbers, April 22, 2006, ML061170419)

Snubbers, mentioned by Mr. Sieber, are shock absorbers for the plants piping, including main steam lines. The importance of their performance in protecting the integrity of piping during a full transient cannot be overstressed.

IV. CONCLUSION

New England Coalition eagerly awaits oral argument on its Contentions. With respect to Contention 3, Dr. Hopenfeld is fully prepared to engage in a professional discussion of

the limits, requirements, and potential predictive and analytic computer codes used in analysis of transients.

New England Coalition is fully confident in the Board's ability to weigh these issues. New England Coalition believe that this is the first sub-part L proceeding in which a party represented pro se has come this far in the process. New England Coalition wants this Board to know that the Coalition is doing its level best to adhere to the rules and to fulfill the expectations of the Board. If the Board finds this pleading is lacking, New England Coalition respectfully requests that the Board allow the Coalition an opportunity to cure its defects.

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, LLC and Entergy Nuclear Operations, Inc. (Vermont Yankee Nuclear Power Station) (Technical Specification Proposed Change No. 362)	May 17, 2006 Docket No. 50-271-OLA ASLBP No. 04-832-02-OLA

PREFILED WRITTEN TESTIMONY OF

DR. JORAM HOPENFELD

REGARDING CONTENTION 3

On behalf of New England Coalition, Dr. Joram Hopenfeld hereby submits the following testimony regarding New England Coalition's Contention 3.

Q.1. Please state your name and address.

A.1. My name is Dr. Joram Hopenfeld and my business address is 1724 Yale Place, Rockville, MD, 20850.

Q.2. What is your educational and professional background?

A.2. I have received the following degrees in engineering from the University of California at Los Angeles: BS 1960, MS 1962, and PhD 1967.

My major fields were in Fluids Flow, Heat Transfer and Electrochemistry.

I am an expert in the development of thermal hydraulic computer codes and models as they relate to the assessment of nuclear safety issues.

My resume' has been provided to the Board and to the parties as an attachment to a Declaration Of Dr. Joram Hopenfeld Supporting New England Coalition's Response To Envy's Motion For Summary Disposition, December 21, 2005.

During a professional career spanning over 44 years I have:

- conceived, designed and conducted tests as well as managed national and international research programs in the areas relating to thermal hydraulics, materials/coolant compatibility and reactor safety,
- managed a major international program on steam generator performance during accidents, and
- funded research and development work at the Engineering Department of the University of Virginia, which resulted in the development of a computer code in support of measurements of pipe wall thinning from erosion/corrosion.

Q.3. Can you cite specific examples of recognition by the scientific community?

A.3.

- As described in Attachment One, PUBLICATION IN PEER REVIEWED JOURNALS ONLY, I have published 14 papers in peer-reviewed technical journals in the above areas.
- I hold eight U.S. patents and I am listed in the Engineers of Distinction published by the Engineers Joint Council and in American Men and Women in Science.
- I was a reviewer for the "A.I.A.A. Journal of Energy."
- I was the U.S. representative to the 1976 International Conference on Cavitation in Fast Breeder Reactors. I am a recipient of the ASME Blackall Machine Tool Gage Award

Q.4. Please discuss your experience as it relates to transient testing?

A.4. While working for the NRC I was responsible for a major international transient test program, MB-2, which was designed to benchmark thermal hydraulic codes for PWR

steam generators. This program required intimate knowledge of scaling laws and the understanding of instrumentation and data acquisition systems. The results were published in NUREG /CR 4751 and are being used (9, 11) to validate computer codes.

Q.5. The above studies appear to be related to Pressure Water Reactor (PWR) issues, why is this experience applicable to thermal hydraulic issues in a Boiling Water Reactor (BWR)?

A.5. The thermal hydraulic issues are common to many components both in PWRs and BWRs. For example both PWRs and BWRs use dryers to separate moisture from steam. Differences in geometry and the operating conditions would require different modeling; nevertheless the concepts of the governing equations are similar. My broad experience in various areas of thermal hydraulics qualifies me as an expert in evaluating thermal hydraulic issues in BWRs.

Q.6 Could you please list the areas where you had hands-on experience with modeling?

A.6 I have hands-on experience with modeling in these areas:

- Transient Boiling,
- Fire propagation,
- Stratified flow,
- Natural Circulation,
- Jet mixing,
- Plenum Mixing,
- Fuel mixing in fuel bundles,
- Cavitation,

- Water – Molten Metal Interaction,
- Boundary Layer/Shock Interaction,
- Reentry Heat Transfer,
- Two Phase pressure drop in undeveloped pipe flows and
- N0x Emissions from coal fired plants.

Q.7. What materials have you reviewed in preparation for your testimony?

A.7 I have reviewed Entergy and NRC documents, published papers, and certain chapters in two classic textbooks. A list of these references is provided in the Attachment Two, LIST of REFERENCES..

Q.8. What is the purpose of your testimony

A.8 My purpose is to discuss why Entergy rationale for seeking exemptions from transient testing is technically unsound. This rationale is essentially based on the following unsubstantiated three propositions:

a) "None of the plant modifications that have been or will be made for the EPU will introduce new thermal-hydraulic phenomena, nor will there be any new system interaction during or as the result of analyzed transients introduced."

b) "There is every reason to anticipate that the transient analysis will accurately predict the plant response to large transient events without need to perform actual tests"

c) "The transient analysis for VY are performed using the NRC approved code ODYN"

With regard to item (a) above, Entergy provides no substantiation of this assertion. For example the steam dryer has been modified; its structural integrity could be affected by

the EPU. The 20% increase in flow velocity at EPU conditions increases turbulence and vortex shedding frequencies and loads on the dryer.

With regard to item (b), this statement is too general to deserve comment. Entergy must provide a discussion showing why their analysis can be used as a substitute for transient testing; a mere assertion to that effect is simply not acceptable. The public must be provided with the proper documentation to evaluate the risk from forgoing transient testing.

With regard to item (c) Entergy does not state that the ODYN code was benchmarked for pressurized transients nor does it discuss how the ODYN code was benchmarked for steady state operations.

In summary Entergy must provide the public an analysis of the key assumptions, which underlie their assertions that transient tests are not needed.

Q.9. Please explain why it is important to show benchmarking of ODYN.

A.9. Thermal-Hydraulics (T-H) computer codes attempt to represent complex physical processes during various reactor operations.

An example of such a process is two-phase flow that occurs in the reactor core where water is converted to steam. The theoretical basis for describing two-phase flow phenomena is not complete; T-H codes must therefore rely heavily on experimental data to reduce uncertainties. As shown in Reference 9, unless the T-H codes are validated with data from well-instrumented prototype components, the predictions of the codes may result in significant errors in calculating heat transfer parameters. For certain components, knowledge of this uncertainty is critical because otherwise some components may fail, especially under transient conditions.

The need to reduce code uncertainties during transient conditions is well recognized, for example, Peach-Bottom-2 transient experimental data has recently been used to validate best estimate T-H codes (16).

The coolant flow rate under EPU conditions is higher than the flow rate under 100% power. Since the core void fraction, the power generation rate and the coolant flow rate are interdependent, accurate predictions of void fractions are essential. This ability depends on the two-phase model that a particular code has adopted. Different computer codes use different models (homogeneous, drift flux) having different accuracies. If the ODYN computer code employs inaccurate models, the predicted behavior of the VY reactor during transients will include large uncertainties. For example, closure of the MSIVs, due to operator error or LOCA redirects the flow of steam into the containment suppression pool. The uncertainties in predicting loads under these conditions must be quantified at EPU flow rates.

Q.10 Do you have concerns with regards to a specific component in particular?

A. 10 Yes, the steam dryer. Because of the increase in flow velocity at EPU conditions, steady state temperature and pressure fluctuations will increase the fatigue usage factor of the steam dryer. This increase in fatigue together with the increase in fatigue during transients must be taken into account to show that the cumulative fatigue factor at EPU conditions will remain below A.S.M.E. allowable limits.

A computer code of unknown accuracy, such as the ODYN, can not be used reliably for the above purpose.

Q.11. Please discuss what Entergy should do to demonstrate that the fatigue usage factor of critical components will remain below the relevant A.S.M.E. code limits.

A.11. In my opinion Entergy should proceed as follows.

1. Walk around the plant and identify those components that are most susceptible to failure by flow-induced vibrations.
2. Identify the parameters (pressure, neutronic response) that can be used to compare plant behavior during MSIVs closure and load rejections to ODYN predictions under VY- EPU conditions.
3. Compare ODYN predictions with Peach Bottom data

4. If a good agreement is not obtained in 3 above, show that transient tests are not required in spite of the differences between Peach Bottom and VY.

Q.12 Have you previously filed testimony in support of New England Coalition Contention 3?

A.12 Yes, On December 21, 2005, I provided testimony in the form of my a declaration supporting New England Coalition Contention 3 and responding to an Entergy Motion for Summary Disposition.

Q.13 Do you now wish to incorporate that testimony in this, your prefiled written testimony?

A. 13 Yes.

Q.14. Please summarize your conclusions?

A.14. I have concluded that Entergy's assertion that there is no need for transient testing is severely wanting.

A lack of demonstrated ability to predict loads on structural components during transients can have a major impact on public health and safety. Entergy's description of the ODYN code is blatantly general; it is impossible to scrutinize generalities. Acceptance of the Entergy unsubstantiated statements that the transient test is not needed would in essence shut the door to the public for evaluating Entergy analysis.

Q.15. Please state what would you believe the Board should do?

A.115. I believe that the Board should direct the NRC to discontinue Entergy operation above 100% power until the issues discussed in A.11 are satisfactory resolved.

Q.16. Does that conclude your testimony?

A. 17. Yes.

Attachment One: PUBLICATION IN PEER REVIEWED JOURNALS ONLY

1. Distributed Fiber Optic Sensors for Leak Detection In Landfills, Proceeding of SPIE Vol 3541 (1998)
2. Continuous Automatic Detection of Pipe Wall Thinning, ASME Proceedings of the 9th, International Conference on Offshore Mechanics and Arctic Engineering. Feb. 1990
3 Iodine Speciation and Partitioning in PWR Steam Generators, Nuclear Technology, March 1990
4. Comments on "Assessment of Steam Explosion Induced Containment Failures" Letter to the Editor, Nuclear Science and Engineering, Vol. 103, Sept. 1989
5. Experience and Modeling of Radioactivity Transport Following Steam Generator Tube Rupture, Nuclear Safety, 26,286, 1985
6. Simplified Correlations for the Predictions of Nox Emissions from Power Plants. AIAA Journal of Energy, Nov.-Dec., 1979
7. Grain Boundary Grooving of Type 304 Stainless Steel in Armco Iron Due to Liquid Sodium Corrosion, Corrosion, 27, No.11, 428, 1971
8. Corrosion of Type 316 Stainless Steel with Surface Heat Flux in 1200 Flowing Sodium, Nuclear Engineering and Design, 12; 167-169, 1970
9 Prediction of the One Dimensional Cutting Gap in Electrochemical Machining, ASME Transaction, J. of Engineering for Industry, p100 (1969)
10. Electrochemical Machining- Prediction and Correlation of Process Variables, ASME Transactions, J. of Engineering for Industry, 88:455-461, (1966)
11. Laminar Two-Phase Boundary Layers in Subcooled Liquids, J. of Applied Mathematics and Physics (ZAMP), 15, 388-399 (1964)
12. Onset of Stable Film Boiling and the Foam Limit, International j. of Heat Transfer and Mass Transfer, 6; 987-989 (1963)) (co-author)
13 Operating Conditions of Bubble Chamber Liquids, The Review of Scientific Instruments, 34, 308-309. (1963); co-author

14. Similar Solutions of the Turbulent Free Convention Boundary Layer for an Electrically Conducting Fluid in the Presence of a Magnetic Field, AIAA J. 1:718-719 (1965)

Attachment Two: LIST OF REFERENCES

1. Entergy's Motion for Summary Disposition of New England Coalition Contention 3. ASLB-No.04-832-02-OLA
2. Nureg-0800, SRP 14.2.1
3. VYNP Technical Specification Proposal Change No. 263 Supplement No 3 "Justification for Exception to Large Transient Testing"
4. Same Title Docket 50-271, BVY 03-80
5. Petlon to Anderson, Regarding Draft Press Release Regarding VY Dryer Cracking. ML052790448 2004-04-16
6. Transcript of 512th ACRS Meeting, May 7, 2004 Rockville, MD ML041470049 2004-05-07
7. 2005/03/31 Vermont Yankee TSP Change No-263, Supplement No. 26 "Extended Power Uprate Steam Dryer Analysis and Monitoring ML050960047 – 2005-03-31
8. 2004/01/31 VYNP TSP Change No 263. Supplement 5, EPU RAI . ML04048640 2004-01-31
9. Yassin A.Hassan et.al. " U-Tube Steam Generator Predictions: New Tube Bundle Convective Heat Transfer Correlations NUCLEAR TECHNOLOGY, Vol. 94, June 1991
10. Prototypical Steam Generator (MB-2) Transient Testing Program, NUREG/CR-3661
11. A Sawyer et. al "RELAP5-3D Validation Study Using MB-2 Prototypical Steam Generator Steady State Data" NUCLEAR TECHNOLOGY Vol. 151 Sep. 2005
12. Yoshiro Asahi et. al. Analysis of BWR Turbine Trip Experiment by Entire Plant Simulation with Spatial Kinetics. NUCLEAR SCIENCE AND ENGINEERING, 152 219-235 (2006)
13. E. Uspuras et. al. 'RELAP5-3D Code Validation in the Neutron-Dynamic Analysis of Transient Processes Taking Place in RBMK-1500 Reactors. Nuclear Engineering and Design 224 (2003) 293-300

14. Hasna J. Khan. et. al " Mitigation of Anticipated Transient Without Scram Event in A Simplified Boling Water Reactor By the Insertion of Fine-Motion Control Rods" NUCLEAR TECHNOLOGY, Vol 112 Nov.1995
15. EE. Lee and EIN-CHUN WU " Term Analysi MAAP 3.0B Analysis of A Severe Anticipate Transient Without Scram" NUCLEAT TECHNOLOGY, VOL. 100 OCT. 1992
16. Lainsu Kao et.al. "Peach Bottom Turbine Trio Simulations with RETRAN Using INER/TPC BWR Transient Analysis Method" NUCLEAT TECHNOLOGY Vol. 149, Mar. 2005
17. Vermont Yankee Safety Evaluation for Amendment 229 regarding Extended Power
Uprate ML060050028

18. H. Schlichting. **Boundary Layer Theory,** Fourth Edition, McGraw-Hill Book Co ,
Inc New York , June 1962. (PP.216-228 and 457-472)

19. H.W. Liepmann, A. Roshko, **Elements of Gasdynamics** , John Wiley & Sons, Inc, Fifth
Printing, 1963. (Chapter 3)

UNITED STATES
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)	May 12, 2006 Docket No. 50-271 ASLBP No. 04-832-02-OLA

AFFIDAVIT OF DR. JORAM HOPENFELD
REGARDING HIS PREFILED TESTIMONY
IN SUPPORT OF
NEW ENGLAND COALITION'S CONTENTION 3

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 declare under penalty of perjury that the testimony that I have offered in the above captioned proceeding as PREFILED WRITTEN TESTIMONY OF DR. JORAM HOPENFELD IN SUPPORT OF NEW ENGLAND COALITION CONTENTION 3, is true and correct.

Executed this day, April 17, 2006 at Rockville, Maryland.

Joram Hopenfeld, PhD

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-OLA
	)	ASLBP No. 04-832-02-OLA
	)	
(Vermont Yankee Nuclear Power Station)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of New England Coalition's Statement of Position and Prefiled Written Testimony of Dr. Joram Hopenfeld in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class this 17th day of May 2006 and by e-mail as indicated by a double asterisk (**), this 17th day of May, 2006[1].

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	John M. Fulton, Esq. Assistant General Counsel Entergy Nuclear Operations, Inc. 440 Hamilton Avenue White Plains, NY 10601

[1] Through an inadvertent omission in New England Coalition's outgoing mail list, conforming hardcopy this Motion was not deposited in the US Mail on February 6th, as represented in New England Coalition's electronic filing of February 6, 2006. Conforming hardcopy is provided today, February 14, 2006. New England Coalition deeply regrets an inconvenience, concern, or confusion that may have resulted.

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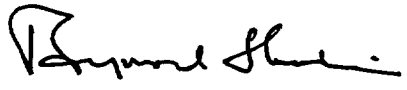
Jonathan M. Rund, Esq.** Law Clerk Atomic Safety and Licensing Board Panel Mail Stop: T-3F23 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 (E-mail: jmr3@nrc.gov)	Sherwin E. Turk, Esq.** Jason C. Zorn, Esq.** Office of the General Counsel Mail Stop O-15 D21 U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 set@nrc.gov, jcz@nrc.gov



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UNITED STATES
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of	May 17, 2006
ENTERGY NUCLEAR VERMONT YANKEE, LLC and ENTERGY NUCLEAR OPERATIONS, INC. (Vermont Yankee Nuclear Power Station)	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 STATEMENT OF POSITION and PREFILED DIRECT WRITTEN TESTIMONY OF DR. JORAM HOPENFELD

Thank you for your kind assistance in making this filing,

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