

May 1, 2006

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)	)	

NRC STAFF'S ANSWER TO NEW ENGLAND COALITION'S  
REQUEST FOR LEAVE TO FILE NEW CONTENTIONS

**ATTACHMENT 2**

**NUCLEAR REGULATORY COMMISSION**

Title: Advisory Committee on Reactor Safeguards  
Subcommittee on Power Uprates

Docket Number: (not applicable)

Location: Rockville, Maryland

Date: Wednesday, November 30, 2005

Work Order No.: NRC-751

Pages 1-320

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS (ACRS)

SUBCOMMITTEE ON POWER UPRATES

+ + + + +

WEDNESDAY,

NOVEMBER 30, 2005

+ + + + +

The meeting was convened in Room T-2B3 of  
Two White Flint North, 11545 Rockville Pike,  
Rockville, Maryland, at 8:30 a.m.

MEMBERS PRESENT:

RICHARD S. DENNING, Chairman

THOMAS S. KRESS

VICTOR H. RANSOM

JOHN D. SIEBER

GRAHAM B. WALLIS

ACRS STAFF PRESENT:

RALPH CARUSO, ACRS Staff

ACRS CONSULTANTS PRESENT:

GRAHAM M. LEITCH

SANJOY BANERJEE

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1 CHAIRMAN DENNING: Please make sure you  
2 speak into the mic and identify yourself.

3 MR. HOPENFELD: My name is Joe Hopenfeld.  
4 I'm a consultant to New England Coalition.

5 I'll be very, very brief because I spoke  
6 for half an hour a couple of weeks ago. Let me repeat  
7 my concern.

8 First, very simple. What happens to a  
9 damaged dryer that is exposed to DBA loads? I'd like  
10 to remind you, and I think it was mentioned here by  
11 Entergy, that these plants were designed to withstand  
12 DBA. So it's true the computer codes that were used  
13 40 years ago are a little bit different than the  
14 computer model that we're using today.

15 And based on my experience with PWRs,  
16 you'll find new things, new loads under DBA condition  
17 that you didn't see before. Obviously they have not  
18 at that time considered it a dryer that contains  
19 certain distribution of cracks of unknown size and  
20 unknown location.

21 That issue should be addressed, and I  
22 haven't heard it discussed, only very briefly.

23 The second issue, and I can go through  
24 this very, very quickly, has to do with the iodine  
25 spike or iodine releases. We heard this presentation

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1 in the afternoon, and I haven't heard anything said  
2 about the iodine uncertainty.

3 There is a generic issue that is  
4 unresolved. When you operate with EPU, under EPU  
5 conditions, the flow rates are higher. So the  
6 concentration of iodine is lower, and if you remember  
7 or you can go back to the database and you'll see when  
8 the concentration is lower, there's a potential for a  
9 much higher iodine spike, and I'm not talking factor  
10 of two or three. I'm talking an order of magnitude.

11 So are we asking ourselves are we meeting  
12 the 10 CFR 100 or the 10, what is it, 50.69? That  
13 issue hasn't been even touched on, and I think we have  
14 to assure ourselves that under the EPU conditions you  
15 meet the requirement, the legal requirements.

16 And what I would like to remind you, that  
17 the database on which the iodine spike is based on,  
18 it's purely empirical, and it is not -- you cannot  
19 extrapolate the directive to the way I understand it  
20 was done. It wasn't described in the presentation  
21 today, but from reading the SER, I believe that  
22 they're just plain extrapolated directly, and I think  
23 that issue should be addressed because you cannot  
24 assure yourselves that we meet the criteria.

25 Now, I don't know how far are we for the

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1 5 REM or whatever it is in the control room. The  
2 numbers were not presented. They were not in the SER.  
3 So I don't know how far we are, but I've looked at  
4 some numbers in other plants, and there was no order  
5 of magnitude cushion in there. They were very, very  
6 much closed.

7 So you really have to look at it. It's  
8 not an academic issue if you really want to meet the  
9 legal requirements. It's not a safety issue, but it's  
10 an issue that should be addressed.

11 The last one has to do with the delta P  
12 across the screen, and one thing that bothered me a  
13 little bit, we have some experiments at Los Alamos.  
14 We have some experiments at VY. We have some  
15 experiments at EPRI, and for a person that, you know,  
16 is kind of removed from that, it's very difficult to  
17 see how all of that matches together.

18 In addition to this, I keep hearing the  
19 word "conservatism." However, the conservatism that  
20 you're talking about is based on data which was  
21 obtained in '96 by weighing the sludge in the pool.  
22 But now what happens to all the sludge that you have  
23 during blow-down? What happened to all of the crud  
24 and the rust that you get in the drywall that's coming  
25 down there?

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1 But more important than that, the SER  
2 states that the conductivity of the coolant is  
3 different, and obviously the particle size, particle  
4 distribution is going to be affected by the pH.

5 So it's not really a conservative kind of  
6 approach. That's ridiculous, but conservative  
7 approach would be to take a one-eighth of an inch  
8 fiberglass and put it on the screen and take a spray  
9 gun and shoot it with particles. That would be  
10 conservative, and then work yourself back.

11 There's no modeling at all. There's  
12 absolutely no understanding how these pieces come  
13 together. They just -- they're somewhere there, but  
14 you know, there's some insight.

15 Well, I have absolute zero insight as to  
16 how these things go together. So I know you have a  
17 lot of flow area, and that's good, but that clearly is  
18 not sufficient.

19 Now, with regard to another comment I made  
20 last time, it had to do with flow acceleration and  
21 corrosion. I think answers were clear. The gentleman  
22 that was sitting here asked the question, and the  
23 question was answered with regard to velocity and the  
24 fact that you're going to increase the scope of your  
25 inspection probably will take care of it, but it is a

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1 potential problem because you're running 100 feet or  
2 200 feet per second with some particles in there. So  
3 basically, these are the four issues that I am sort of  
4 repeating myself.

5 CHAIRMAN DENNING: Do we have any  
6 questions?

7 Let me ask one question, and that is with  
8 regard to your first concern, which is in additional  
9 accident loads, it looked to me like as far as local  
10 loads that they really aren't changed very much, and  
11 I was wondering whether, you know, it was EPU or  
12 whether it's -- that even though the power is up, the  
13 blow-down looks awfully similar, and I was just  
14 wondering was there a particular accident scenario  
15 that was of concern to you that would --

16 MR. HOPENFELD: Well, I think I just went  
17 on a gut feeling that we are talking about increasing  
18 power. I know you're going to be choked on one side,  
19 but as it was pointed out, you're going to run in for  
20 a long period of time.

21 Really the question is: are you going to  
22 excite some new vibrations in that dryer during that  
23 different conditions? And you've got to address that.  
24 Because if you do, there was a case. I forgot where  
25 it was in Florida. I just don't remember the case,

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1 where we did have, I think, a valve on the main steam  
2 line lifted and excited very, very strong vibrations.

3 So you've got to look at it. You just  
4 can't say it's not there. How different it is, I  
5 mean, the flow is choked, and I don't know what the  
6 peer does to it, but I think you have to realize  
7 really again going back to what the calculations tell  
8 you.

9 The calculations we had 40 years ago are  
10 not that good, again, based on the PWR. If you go  
11 into more detailed modeling, you may find out.

12 I don't know how the temperature is  
13 affecting it. Temperatures may not be different, but  
14 the natural frequency of the dryer may change, too.  
15 So how to hold that thing together, somebody has got  
16 to look, and I haven't even heard it mentioned to you  
17 running into PRA and CDF, but you've got to address  
18 the physics first.

19 CHAIRMAN DENNING: Thank you very much.

20 PARTICIPANT: Are there anymore comments?

21 MR. ATHERTON: My name is Peter James  
22 Atherton. I'm here primarily representing the  
23 interests of the public.

24 And I have a few comments I'd like to  
25 make, and I'll start out with an overview that has me

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1 outstanding issues in a matter that's coming to the  
2 full committee for hearing and whether maybe that full  
3 committee meeting maybe wouldn't be proper to postpone  
4 that until these issues were properly addressed.

5 And I thank you for permitting me to make  
6 these comments.

7 CHAIRMAN DENNING: Thank you very much.

8 MR. ATHERTON: Are there any questions?

9 CHAIRMAN DENNING: Any comments,  
10 questions?

11 (No response.)

12 CHAIRMAN DENNING: Thank you.

13 Are there any other members of the public  
14 that want to make a presentation? Yes, please.

15 MR. SHADIS: Good afternoon. My name is  
16 Raymond Shadis. I'm representing New England  
17 Coalition.

18 Thank you for the opportunity to comment.  
19 I'll try to make this quite brief. As I remarked to  
20 one member of the committee earlier today, there's too  
21 much to say. So I'll be brief. We will try to  
22 provide some additional written comments, and I'll try  
23 to do that in outline form so that they're accessible  
24 and usable for your purposes.

25 I would like to comment, and I hope that

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1 the committee in its review will comment on the  
2 process. There are all of the technical specifics,  
3 and there are a number of things that jumped out  
4 today, but largely the great concern here is with the  
5 process.

6 From October, beginning of October  
7 forward, it really seemed as if the technical review  
8 was being driven by a calendar that was set for  
9 reasons other than technical review. We suddenly had  
10 proposed dates for ACRS to review this project, and a  
11 last minute rush of RAIs and SER and, you know, we're  
12 really not done with that process yet.

13 And it does seem to be backwards, that all  
14 things considered, if safety were the first concern,  
15 that that first concern for safety would have it that  
16 as the technical issues were resolved, the calendar  
17 would then be set in accordance with anticipating the  
18 end of resolving those issues, not the other way  
19 around.

20 So there's that comment. Also, one thing  
21 that popped out today, earlier today, was the  
22 segmented licensing actions that have gone forward in  
23 support of EPU. In June of -- yeah, I think it was in  
24 June, late spring of 2003, we have copies of NRC staff  
25 correspondence wondering if it is valid for this

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1 licensee to separately submit their ARTS MELLA  
2 (phonetic) application, their AST application, and the  
3 extended power uprate application, and whether or not  
4 for legitimate consideration they should not all have  
5 been submitted together.

6 When we had a presenter from NRC today  
7 talking about the alternate source term credit for dry  
8 well spray capture of Iodine 131, one of the committee  
9 members put their finger right on it because, hey,  
10 wait a minute. We're taking credit for using this  
11 spray system. On the other hand, we have some  
12 constraints about not using it. You know, this is  
13 among one of those many little issues that's got to be  
14 floating around in the mind of an operator.

15 Comes the time when you are under accident  
16 constraints, and had AST and the EPU been handled  
17 together in one application, people might have meshed  
18 those two concerns and properly addressed them, and I  
19 guess our concern is how many other technical issues  
20 are floating out there where there is conflict and  
21 contradicting information that is bouncing around  
22 among these three different applications.

23 And I just very quickly want to comment on  
24 one other item that you have all been asked to  
25 consider by the State of Vermont initially, and that

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1 is the State of Vermont in requesting an independent  
2 engineering assessment of Vermont Yankee as  
3 prerequisite to upgrade stated that in their letter of  
4 request, their belief that the ACRS would consider any  
5 such examination in the course of its review of the  
6 uprate.

7 And I know that you've gone there, given  
8 that you scheduled that into the two meetings that you  
9 held in Brattleboro.

10 I just want to give a little background on  
11 the origin of that engineering team inspection that  
12 NRC offered as a substitute for the independent  
13 engineering assessment that was requested by the  
14 Vermont Public Service Board. This is SECY Letter  
15 040071, dated April 29th, 2004, and this letter  
16 spells out the proposed program for the engineering  
17 team inspection. It is entitled "Proposed Program to  
18 Improve the Effectiveness of Nuclear Regulatory  
19 Commission Inspections of Design Issues."

20 And this is from William Travers,  
21 Executive Director of Operations. And Mr. Travers  
22 reports that in order to better understand the degree  
23 to which NRC inspections and licensee self-assessment  
24 efforts have been effective in identifying design  
25 issues, the staff reviewed the last three years of

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1 data from the reactor oversight process, and here's  
2 what he says. And I think it's interesting; it's  
3 instructive.

4 "Of the 17 greater than green design  
5 engineering issues that fell within the scope of this  
6 review, 11 were NRC identified, two were licensee  
7 identified, and four were self-revealing." Love it.

8 "Of the 11 NRC identified issues, seven  
9 involved issues that had previously been recognized by  
10 the licensee, but whose significance the licensee had  
11 not recognized. Three of the NRC identified issues  
12 were associated with fire protection, an area not  
13 typically covered in NRC design inspections. Only one  
14 of the NRC identified issues was identified as a  
15 result of an NRC design inspection."

16 And it takes me back to parochial school  
17 when we had to do all of the taking away and putting  
18 back of numbers in any sequence. If we had the  
19 blackboard up here, we could come down and understand  
20 that of 17 greater than green design engineering  
21 issues, only one was identified as a result of an NRC  
22 design engineering inspection.

23 So does the program need improvement is  
24 the question they were trying to answer, the question  
25 they were struggling with.

1                   Now, the scale of the independent  
2                   engineering assessment requested by the State of  
3                   Vermont was for four people, four weeks, or about 640  
4                   hours of inspection time, and in this letter with  
5                   respect to the proposed engineering team inspection,  
6                   Mr. Travers reports, "Overall, the prototype  
7                   inspection module is more resource intensive and would  
8                   require about 700 hours of direct inspection versus  
9                   the current allocation of approximately 500 hours for  
10                  the safety system design inspection."

11                  And it doesn't take very long in thinking  
12                  about it before one realizes that the inspection that  
13                  was done wrapped in the routine periodic design basis  
14                  inspection, the one that yielded one finding in 17,  
15                  that same inspection.

16                  So where Vermont was asking for inspection  
17                  on the scale of 640 hours, here we have NRC proposing  
18                  to give them 200 hours of specialized inspection added  
19                  to the normal 500 hours that they do. The 500 hours  
20                  is taken off the board, and what is put back on is  
21                  700. So basically a net gain of 200 hours.

22                  On July 1st, 2005, SECY Paper 050118 was  
23                  issued by Luis Reyes, Executive Director, and again,  
24                  it is instructive, and it goes eventually right to  
25                  this EPU review, my humble opinion.

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1           The results, and he's speaking now about  
2       four pilot inspections that were done, and Vermont  
3       Yankee was one of those pilot inspections. "The  
4       results of the pilot inspections appear to indicate  
5       that latent design and engineering issues mostly of  
6       very low safety significance persist at operating  
7       reactors. The pilot inspections resulted in 29  
8       inspection findings."

9           And to Vermont Yankee, the next page, "the  
10       staff has reviewed the results of the Vermont Yankee  
11       inspection and has concluded that the current power  
12       uprate inspection procedure should be enhanced. In  
13       addition, a process should be developed to better  
14       integrate the inspection and NRR technical review  
15       process for power uprates and other important license  
16       amendment requests. These conclusions are based  
17       primarily on the identification of several issues  
18       during the Vermont Yankee inspection. These issues  
19       included the acceptability of the licensee's power  
20       uprate submittals with respect to station blackout  
21       rule, motor operated valve testing, certain operator  
22       response times, and certain assumptions in accident  
23       analyses. The staff believes it unlikely that these  
24       inspection identified issues would have been  
25       identified by subsequent NRR technical reviews

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1 because" -- and this echoes the last two days because  
2 I heard this, and this is parenthetical and I'm  
3 interjecting this.

4 Over the last two days, I heard NRC staff  
5 say again and again "the licensee says," "the licensee  
6 reports," "the licensee tells us," "the licensee has  
7 it in their application."

8 "The staff believes it unlikely that these  
9 inspection identified issues would have been  
10 identified by subsequent NRR technical reviews because  
11 the NRR technical reviews rely primarily on licensee  
12 submitted documentation."

13 And this I could have written myself.  
14 "The staff, therefore, believes that a detailed  
15 inspection is a good complement to the NRR technical  
16 review in this area."

17 Finally, there is a table included in  
18 Attachment 2 of that letter, and it yields that  
19 Vermont Yankee was accorded a total of 910 hours of  
20 direct inspection. This is an addition of 410 hours  
21 not to the nominal 500 that's part of the vanilla  
22 periodic inspection.

23 So what the State of Vermont asks for was  
24 a very special inspection to confirm the conditions of  
25 the plant, to provide some indication of future plant

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1 reliability, to confirm, I think -- maybe I'm putting  
2 a little interpretation on this -- to confirm NRC's  
3 assumption that their normal inspection regimen  
4 provides sufficient assurance that the plant is in  
5 conformance with its design basis.

6 And what they got instead was a warmed  
7 over portion of their normal inspection regimen with  
8 a topping, if you will, and definitely not what they  
9 requested.

10 I will be submitting written comments  
11 because there is additional material with respect to  
12 the contrast between the scale and the scope and the  
13 purposes of the requested independent engineering  
14 assessment and what NRC finally gave us, which was the  
15 engineering team inspection, and I will persist in  
16 that until I convince you gentlemen to reject the  
17 notion that these two are somehow equal.

18 Finally, just a couple of quick points.  
19 A number of the presentations that were given, there  
20 was an admission or it could be easily derived that  
21 safety margins, while they may not have been or may  
22 not be eroded beyond what regulation provides for, are  
23 nonetheless eroded, diminished, and where this is a  
24 matter of public concern, it is truly disconcerting to  
25 see all of those diminutions at almost every turn and

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1 facet stack up.

2 In terms of a trend, you would have to  
3 say, as far as a safety trend, it is a negative trend  
4 that has been incorporated in this application.

5 Earlier today one of the NRC presenters  
6 referenced the off-site dose calculation manual and  
7 referred to the numbers for fenceline dose as a result  
8 of the shortened time of passage for N-16 through the  
9 loop and resulting shine in fenceline dose.

10 And I don't remember the exact numbers he  
11 used, but it looked to me like he was saying the base  
12 fenceline dose from which Vermont Yankee was moving  
13 was about 15 MR per year, and that after uprate, they  
14 were looking at about 18.6. I think those were the  
15 numbers he used.

16 And this is an issue that we reviewed  
17 because the State of Vermont has an agreement with  
18 Vermont Yankee in which Vermont Yankee agrees to  
19 comply with state regulation of 20 MR at fenceline, 20  
20 MR per year, and when we first looked at the proposed  
21 uprate, the numbers we got went beyond the 20 MR.

22 but then what happened very quickly was  
23 that at Vermont Yankee they reached back into some NRC  
24 guidance which permitted them to adjust the calculated  
25 dose at fenceline, and what it is is a quality factor

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1 which they now applied on the difference between skin  
2 dose and air dose or between -- turn that around --  
3 between air dose and skin dose, between rads and rems.

4 And whereas this has been traditionally  
5 treated as a one-one equivalency, there's now in place  
6 a .71 quality factor. So I'm not arguing with the  
7 numbers they gave you, but if it's 18.6, they arrived  
8 at that by applying for and taking credit for and  
9 using this .71 quality factor.

10 To the citizen walking by, what that looks  
11 like is a 29 percent discount in order to facilitate  
12 uprate. What wasn't mentioned is that we're now  
13 looking at the deployment of dry cask storage, and  
14 whatever little incremental dose can be expected from  
15 that will, of course, be added. That is now a matter  
16 of some contention.

17 The same thing is true, of course, in  
18 terms of the alternate source term and control room  
19 habitability issues. NRC offered its licensees the  
20 option of applying certain source term credits many  
21 years ago and Vermont Yankee never saw the need until  
22 they got ready to apply for extended power uprate, and  
23 then suddenly that long list of credits that was hung  
24 on the screen here when NRC staff did their  
25 presentation popped up.

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1 And so it essentially is a 40 percent  
2 discount of what would have been dose at the control  
3 room under accident conditions, and in order to  
4 facilitate uprate.

5 These are but two examples out of many  
6 that are available, and we'll write you until you  
7 really won't want to open the envelopes, but these are  
8 two examples out of the many that are available of the  
9 way that the safety margins have been eliminated.

10 And you know, we spoke in Brattleboro at  
11 least to some small degree about the removal of the  
12 old things that we used to rely on for redundancy, of  
13 defense in depth, of the individual integrity of  
14 individual safety systems. So, you know, we'll be  
15 bringing those to you, and I do thank you.

16 I have a couple of quotes for you. I love  
17 these little quotes. EPA Chairman Ruckleshouse once  
18 said about risk assessment, and it could be as well  
19 applied to the PRAs, that it was like capturing an  
20 enemy combattant, and if you tortured him long enough,  
21 you'd get him to say anything.

22 You know, we see that over and over. At  
23 my hotel room this morning, I lingered over a Christa  
24 McAuliff tribute, and that was the 1986 Challenger  
25 disaster. You know, PRA just didn't hack it there,

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1 and PRA I don't think would have predicted that since  
2 we began extended power uprate modifications at  
3 Vermont Yankee, we have had two generator trips and  
4 two scrams, and we have had reverberations throughout  
5 the system, recirc pump trips, various trips during  
6 one of those.

7 So bringing you those concerns. Any  
8 questions, gentlemen?

9 CHAIRMAN DENNING: Thank you very much.

10 MR. SHADIS: Thank you.

11 CHAIRMAN DENNING: We appreciate your  
12 input.

13 Okay. I would like to thank all of the  
14 contributors. I think that this has been an excellent  
15 meeting. I'd like to particularly thank Entergy for  
16 excellent presentations, their willingness to make  
17 modifications in their presentations, the staff also  
18 for excellent presentations. I thank the public for  
19 their comments.

20 And with that, I think we will adjourn.

21 (Whereupon, at 4:59 p.m., the meeting was  
22 concluded.)

23

24

25

**ACRS Subcommittee on Thermal-Hydraulics**

November 16, 2005

**Comments on the Vermont Yankee  
Proposal for the Extended Power Uprate**

**Dr. Joe Hopenfeld**

**On Behalf of**

**New England Coalition**

## **PRINCIPAL AREAS OF CONCERN**

- Steam Dryer Failure
- Lack of Adequate NPSH Margins
- Flow Accelerated Corrosion
- Iodine Release



# Steam Dryer Vibrations

## Theoretical Predictions

- Predictions of fatigue failure of the dryer are based on two computer models: the **Computational Fluid Dynamics model (CFD)**, and the **Acoustic Circuit Model, (ACM)**
- Neither the **CFD** nor the **ACM** were benchmarked against full scale tests.
- The flow field in the dryer is complicated by its complex geometry. And the thermal expansion of the dryer during transients may affect the natural frequency of the dryer. These are only two examples of why a validation of the models under steady state and transient conditions is required.
- The ascension to power tests do not validate the **CFD** nor the **ACM**. The ascension to power test do not represent the loads that the dryer would experience during transients such as Main Steam Line Break (MSLB), for example.
- In conclusion, the uncertainties in the **CFD** and the **ACM** reduce the reliability of converting plant data into dryer loads.

# **Steam Dryer Vibrations**

## **Dryer Failure**

- Recently discovered cracks in the VY dryer indicate that stresses in the dryer may be exceeding design levels.
- The growth of such cracks from flow induced vibrations during steady state operations or from dynamic loads during coolant depressurization will cause an accelerated crack growth and possible steam dryer fragmentation.
- Based on the experience at Quad Cities, dryer fragments may migrate to the steam line and fragments may be shed down on to the fuel.

# **STEAM DRYER VIBRATIONS**

## **Safety Consequences**

- The Quad Cities dryer failures should be viewed as precursors of similar incidents at VY under the EPU.
- The Quad Cities incidents should also be viewed as a “near misses” of fuel channel blockage or MSIV blockage during LOCA events.
- VY should be required to analyze the above worst case scenarios in a manner that provide adequate assurance that the EPU will not increase the core damage frequency beyond the present level.
- Assumptions per 10CFR50.92 criteria should be presented and defended.

# Steam Dryer Vibrations

## Lessons Learned

- After the Steam Dryer failures at Quad Cities, the Industry attributed the event to:  
***“ the lack of industry knowledge of flow-induced vibrations dryer failures”***
- This assessment, it appears, still applies to the VY methodology.

# **Steam Dryer Vibrations**

## **Conclusions**

It has yet to be demonstrated, per 10CFR50.92, that the proposed EPU will not –

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.
2. Create the possibility of a new and different kind of accident from any accident previously evaluated.
3. Involve a significant reduction in a margin of safety.

# **Lack of Adequate NPSH Margins**

- Pressure drop across inlet pump screen is a major uncertainty
- Increase in coolant sludge concentration and other debris increases the potential for screen blockage.
- In one part of their analysis VY indicated that the EPU will increase sludge content. In another part of the analysis VY indicated that the EPU has no effect on the debris source term.
- The VY analysis with respect to NPSH margins is not conservative.

## **Flow Accelerated Corrosion, FAC**

- VY analysis of wall thinning is based on a computer model, CHEKWORKS
- CHEKWORKS can only be used to rank components with respect to their susceptibility to FAC but not as a predictive tool of actual material loss.
- Many failures have occurred from FAC since CHEKWORKS was developed in 1986 (La- Salle, Sequoyah, ANO-2, San-Onofre, Mihama)
- VY's account of the effects of EPU on the wall thinning of critical components is not conservative. Material loss is assumed by VY to be proportional to the velocity. It is more likely to be proportional to velocity squared.

# Iodine Release

- Because of higher feed water flow rates at EPU conditions the initial iodine concentration of the coolant will decrease.
- Empirical data indicates that the iodine spike increases with the decrease in iodine concentration.
- VY did not evaluate the pre accident iodine spike in terms of the actual iodine concentration in the coolant at EPU conditions.
- The empirical concentration of the 4uCi/g used by VY may not be applicable to the EPU.
- VY did not discuss why the effect of the concurrent iodine spike during the MSLB accident was not included in the calculations.
- The ACRS, in NUREG 1750, and at the 02/03/04-04/04/04 meetings, concluded that the NRC is not addressing the iodine spike adequately. They could not conclude that the allowable dose limits (10CFR 50, 10CFR100 10CFR50.67 and GDC 19) would be met during the MSLB accident.
- The NRC has recently initiated work on a new generic issue (GSI 197) to resolve the iodine spiking issue. NRC must bound the uncertainties in GSI 197 before one can be assured that VY will meet federal laws with the proposed EPU.