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MAY 0 1 1981

Docket Nos.: See Attached List of PWR's

SUMMARY OF MEETING HELD ON APRIL 29, 1981, WITH THE PWR OWNERS GROUPS TO DISCUSS THERMAL SHOCK TO REACTOR PRESSURE VESSELS

On April 29, 1981 the NRC staff met with the PWR Owners Groups and their vendor representatives (a) to discuss the status of the reports due to the Commission on May 15, 1981, addressing this concern, (b) to permit the owners groups the opportunity to provide a generic basis for continued operation of PWRs for the short term and (c) to address the concerns addressed in the D. Basdekas' letter to Congressman Udall dated April 10, 1981. The list of Attendees is attached as Enclosure 1.

Each of the Owners Groups was asked to respond to the three items above. The following summarizes that discussion.

B&W Owners Group

The Owners Group noted that the analyses performed on B&W reactors in response to requirement II.K.2.13 of NUREG-0737 identified the worst thermal tansient occuring during the small break loss of coolant accident (LOCA). This analysis is contained in the B&W generic thermal shock report BAW-1648. BAW-1648 addresses small break LOCA and overcooling assuming 40 F ECCS water temperature without overpressurization. This analysis showed unacceptable results for this case but acceptable results for the case of 90 F ECCS water. In the discussions, it was recalled that the overcooling was calculated to occur within 60 seconds. The Owners Group stated that this overcooling rate and other assumptions used in the 40 F case is too conservative. The staff requested a reanalysis of the overcooling transient with repressurization, with suitable conservative assumptions to get an appropriate bounding analysis. The Owners Group report to be submitted on May 15th will include discussions on the design basis LOCA, the small break LOCA, other overcooling transients, and a discussion of possible relaxation of certain conservative assumptions, for example, thermal mixing of ECCS water with primary coolant.

The fluence for B&W vessels is calculated using a method described in a B&W report (BAW-1151-P) submitted to the staff in March 1981. Generic curves in BAW-1151-P and the effective full power years (EFPY) operation of the specific plant can be used to determine the fluence on the vessel. The EFPY for each reactor vessel is to be provided for the B&W reactors in the May 15, 1981 submittal.

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On the question of continued operation, the B&W Owners Group stated that operating B&W reactors have been shown to be adequately safe for the next year or two. The May 15th report will show that the fracture toughness of each operating reactor vessel is no less than the most limiting case used in the bounding thermal transient analysis. The report will not rely on a reduced probability of occurrance of an overcooling event but rather, will rely on material toughness as predicted by calculation of vessel fluence as the basis for continued operation.

The May 15th report will cover the near term situation and not the requirement for the 40 year life of the vessel.

With regard to the uncertainty of calculating vessel fluence, the B&W Owners Group pointed out that they have not seen more than a 15% difference between the actual and predicted fluence from surveillance capsule measurements. They do not consider the difference at Maine Yankee, as was reported by the licensee, to apply to B&W operating reactors. With regard to overcooling transients resulting from control system failures a representative of Duke Power Company reported on a planned meeting between the staff and Duke Power to review control system failure and their effects analyses of the Integrated Control System (ICS). This review should provide additional insight into system failures and a better understanding of possible transients initiated as a consequence of control systems failures and their overcooling effects compared to the worst case small break LOCA. The B&W plant Owners Group indicated that operator actions to prevent pressurized thermal shock problems are being addressed in the on-going emergency procedure guideline development in response to the TMI action plan.

In conclusion, B&W owners group stated that based on BAW-1648 that operating reactors were adequately safe for the next year or two.

<u>Westinghouse Owners Group</u>

The Westinghouse (W) Owners Groups began with a statement that the analysis of the thermal shock resulting from steam line break and LOCAs was acceptable for the W reactors for the next few years. The Owners Group will provide a schedule and program for resolution of this issue in the May 15th report. The W Owners Group was directed to consider the comments made to the B&W Owners Group and address them in the May 15th report.

W stated that values of fluence calculated today differ from values provided in Final Safety Analysis Reports. The comparison of measured fluence and calculated fluences today agrees within about 15% to 20% for both the inside wall fluence and the thru wall fluence. W presented a viewgraph, Enclosure 2, which compared a calculated fluence (line) with measured fluence (points) as a function of time. This graph represents data and analysis for 2-loop W plants. W also presented a viewgraph showing the agreement between the azmuthal fluence obtained from calculations and from measurements (Enclosure 3). W was requested to provide a report discussing this comparison. For any W reactor, the highest known vessel copper content was stated to be 0.36%.

Although the Rancho Seco overcooling event which occurred in 1978 would not be expected to occur in a W reactor, the thermal and hydraulic conditions resulting from it were used to evaluate the effects on a reactor vessel in a W plant. This analysis indicated that the thermal shock would be similar to that occurring from a small steam line break in a W reactor. Westinghouse pointed out that the thermal shock effects would be bounded by the worst large steam line break analysis. They further noted that the large steam generator water volume and associated thermal inertia in a W plant makes it less responsive to excess feedwater transients and subsequent thermal shock considerations.

In summary, W indicated that their analysis of vessel thermal shock included consideration of specific material properties, evaluation of measured versus calculated fluences and review of operational events (including Rancho Seco event) to confirm the bounding design-basis event. W concluded that all plants are acceptable though at least the end of 1982 and most operating plants, if not all operating plants, could be demonstrated to have acceptable lifetimes significantly in excess of the end of 1982 (Enclosure 4).

CE Owners Group

The CE Owners Group prefaced their remarks by a statement that not all CE plant owners were represented by the Owners Group. The Owners Groups were advised that the staff Generic Letter 81-19 dated April 20, 1981 requests a commitment from each utility to participate in owner group discussions and provide a docketed response identifying the specific actions they would take for their facility.

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DATE							

The CE plant Owners Group further stated that no technical basis exists to discontinue reactor operation at this time based on thermal shock with repressurization. The CE representative noted that as of now, the longest operation of any CE plant is 5 EFPY. Assuming a factor of 2 error in calculating vessel fluence, CE stated that these plants could operate for an additional 5 years based on a conservative analysis of the most severe overcooling transient (large steam line break). CE stated that their steam line break was very conservative since it took no credit for operator action and assumed worst case initial conditions (i.e., zero reactor power and low levels in the steam generator). In conclusion, CE stated that lower EFPY on CE reactor vessels plus large thermal inertia to reduce the severity of overcooling transients permitted them to conclude that a basis exists for continued operation for the next several years.

The CE Owners Group was also directed to consider the comments made in the previous discussion with B&W and W and address them in the May 15th report.

Staff Summary

The staff made the following summary comments:

The Owners Group reports should present a generic basis for continued safe operation of the PWRs in the short term.

Owners Groups should meet the May 15th date.

Owner Groups should list the areas of conservatisms in their analyses in the May 15th report.

Solutions of the problem should be in place in the next couple of years; the schedule should be in the May 15th reports.

All parties to the meeting agree that thermal shock with subsequent repressurization is a safety concern that needs prompt evaluation.

ORIGINAL SIGNED

David Wigginton, Project Manager
Operating Reactors Branch #1
Division of Licensing

Enclosures:
As stated

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SURNAME	DWigginton	TNovak	DEisenhut				
DATE	5/ /81 :ds	5/ /81	5/ /81				

Docket

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAY 0 1 1981

NOTE TO: Tad Marsh
B. D. Liaw
John Austin
Bill Dorie

FROM : Thomas M. Novak, Assistant Director for Operating Reactors, DL

Attached for your information is the meeting minutes from the staff's April 24, 1981 meeting with the PWR Owners Group on thermal shock to reactor vessels. Because of your interest in this subject as indicated by your attendance, I am providing you with copies of the minutes. We will keep you informed as this issue progresses.

Thomas M. Novak, Assistant Director for
Operating Reactors, DL

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

May 1, 1981

Docket Nos.: See Attached List of PWR's

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Dave Wigginton

David Wigginton, Project Manager
Operating Reactors Branch #1
Division of Licensing

Enclosures:
As stated

PRESSURIZED WATER REACTOR LICENSEES

Docket No. 50-348
Farley Unit 1

Docket No. 50-313
Arkansas Unit 1

Docket No. 50-368
Arkansas Unit 2

Docket No. 50-317
Calvert Cliffs Unit 1

Docket No. 50-318
Calvert Cliffs Unit 2

Docket No. 50-261
H. B. Robinson Unit 2

Docket No. 50-295
Zion Unit 1

Docket No. 50-304
Zion Unit 2

Docket No. 50-213
Connecticut Yankee (Haddam Neck)

Docket No. 50-3
Indian Point Unit 1

Docket No. 50-247
Indian Point Unit 2

Docket No. 50-296
Indian Point Unit 3

Docket No. 50-255
Palisades

Docket No. 50-269
Oconee Unit 1

Docket No. 50-270
Oconee Unit 2

Docket No. 50-287
Oconee Unit 3

Docket No. 50-334
Beaver Valley Unit 1

Docket No. 50-302
Crystal River 3

Docket No. 50-335
St. Lucie 1

Docket No. 50-250
Turkey Point Unit 3

Docket No. 50-251
Turkey Point Unit 4

Docket No. 50-315
D. C. Cook Unit 1

Docket No. 50-316
D. C. Cook Unit 2

Docket No. 50-309
Maine Yankee

Docket No. 50-289
Three Mile Island Unit 1

Docket No. 50-320
Three Mile Island Unit 2

Docket No. 50-336
Millstone Unit 2

Docket No. 50-282
Prairie Island Unit 1

Docket No. 50-306
Prairie Island Unit 2

Docket No. 50-285
Ft. Calhoun

Docket No. 50-344
Trojan

Docket No. 50-272
Salem Unit 1

Docket No. 50-244
R. E. Ginna 1

Docket No. 50-312
Rancho Seco

Docket No. 50-206
San Onofre Unit 1

Docket No. 50-346
Davis-Besse 1

Docket No. 50-338
North Anna 1

Docket No. 50-280
Surry Unit 1

Docket No. 50-281
Surry Unit 2

Docket No. 50-266
Point Beach Unit 1

Docket No. 50-301
Point Beach Unit 2

Docket No. 50-305
Kewaunee

Docket No. 50-29
Yankee-Rowe

Docket No. 50-339
North Anna 2

Docket No. 50-311
Salem 2

Docket No. 50-327
Sequoyah 1

Docket No. 50-369
McGuire 1

Docket No. 50-364
Farley 2

ENCLOSURE 1

THERMAL SHOCK MEETING

MEETING PARTICIPANTS

April 29, 1981

Name	Organization
Dave Wigginton	NRR-ORB-1
William Bock	ACRS
Vince Panciera	NRC/OCM
R. Lobel	NRC/DST
Earl J. Brown	NRC/AEOD
J. F. Walters	Babcock & Wilcox
R. J. Baker	B&W
R. E. Wascher	B&W
Robert Dieterich	SMUD
R. W. Klecker	NRR/MTEB
S. S. Pawlicki	NRR/MTEB
W. S. Hazelton	NRR/MTEB
John H. Austin	NRC/OCM
B. D. Liaw	NRC/OCM
Robert Gill	Duke Power
B. J. Short	B&W
T. A. Meyer	Westinghouse
W. J. Johnson	Westinghouse
B. S. Monty	Westinghouse
J. N. Chirlgos	Westinghouse
B. K. Singh	NRR/RSB
Bruce King	Westinghouse
R. A. Vincent	Consumers Power
R. M. Douglas	TSE&E
R. C. L. Olson	Baltimore Gas & Electric Co.
Larry D. Young	Arkansas Power & Light
William R. Klien	Florida P!wer Corporation
Dan Howard	Arkansas Power & Light

Name	Organization
Ted J. Meyers	Toledo Edison
P. K. Niyogi	NRC/RES/DRA
Howard Levin	NRC/DE
Richard P. Snaider	NRC/DL/ORB-5
Richard E. Johnson	NRC/DST/GIB
E. Murphy	DOE
Guy A. Arlotto	NRC
C. Z. Serpan, Jr.	NRC/RES
William J. Collins	NRC/IE/REB
Paulette Tremblay	NUS
David G. Maire	Westinghouse
T. B. Natan	CE
W. E. Burchill	CE
D. J. Ayres	CE
J. M. Westhoven	CE
C. B. Brinkman	CE (Bethesda)
P. S. Chech	NRC/DSI
A. Thadani	NRC/DST
J. W. Roe	NRC/DOL
R. B. Borsum	B&W (Bethesda)
S. Varga	NRC/DL
Ed Wenzinger	NRC/I&C/DFO
Joyce M. Nelson	QUADREX
David W. Lippard	VEPCO
Dennis Ziemann	NRC
Jim Clifford	NRC
J. K. Gasper	OPPD-CEOG
Ken Morris	CEOG/OPPD
Rik W. Wells	W Owners Group/Northeast Utilities
John J. Mattimoe	B&W SMUD
John Olshinski	NRC
D. Eisenhut	NRC
Tom Murley	NRC/DST
D. L. Basdekas	NRC/RES

Name	Organization
Larry Shao	NRC
E. G. Igne	ACRS
Gary Holahan	NRC/DL
Don Croneberger	GPU
Daniel M. Speyer	Con Edison
R. M. Bernero	NRC

ENCLOSURE 2

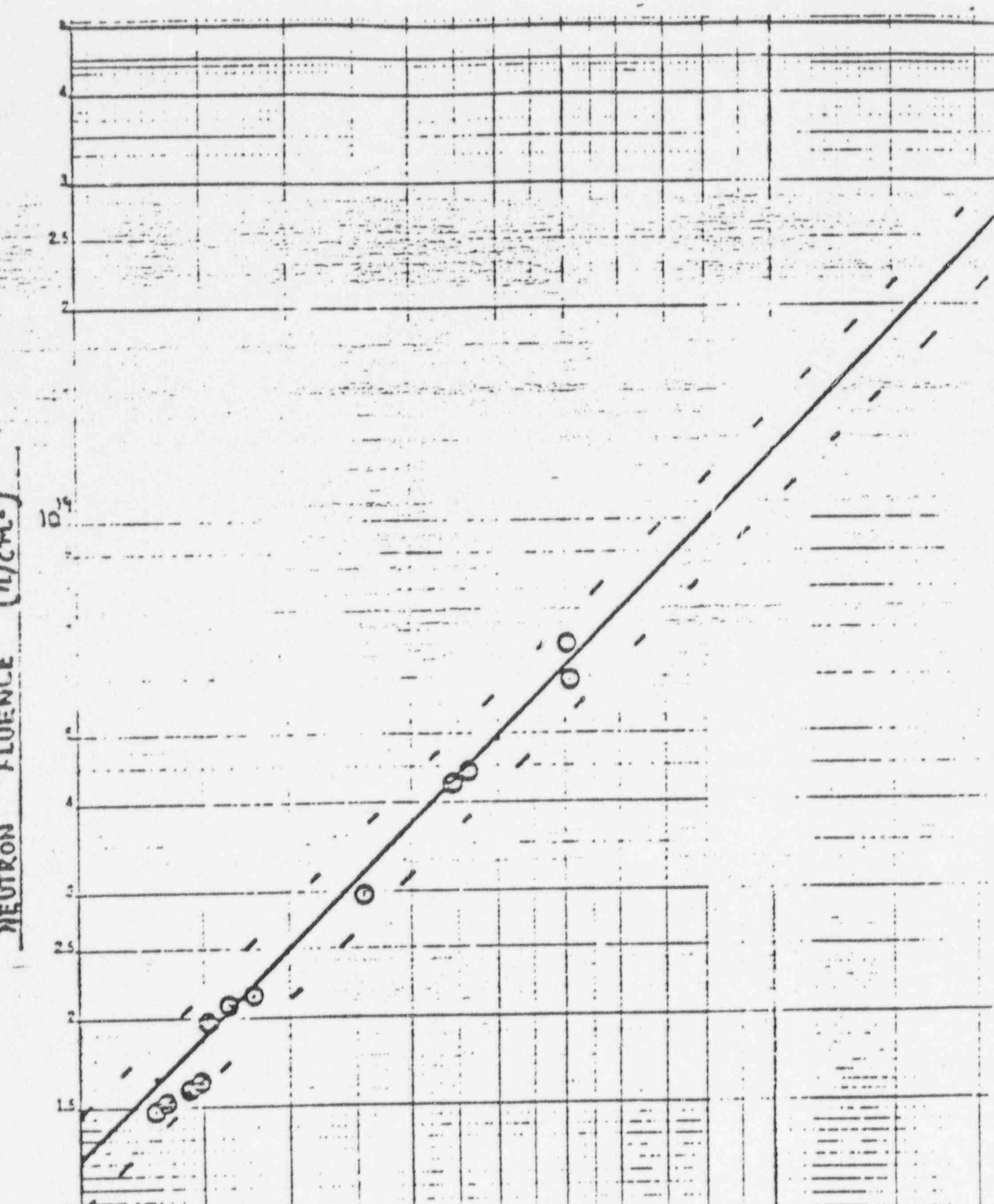

FIGURE 9

CALCULATED AND MEASURED AZIMUTHAL VARIATION OF $Fe^{54}(n,P)Mn^{54}$

RESPONSE ON THE CORE MIDPLANE - PLANT B