



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

APR 7 1981

MEMORANDUM FOR: Stefan S. Pawlicki, Chief  
Materials Engineering Branch  
Division of Engineering

FROM: Thomas J. Walker  
Materials Engineering Branch  
Division of Engineering

SUBJECT: MINUTES OF PWR OWNER'S GROUPS MEETING WITH NRC  
ON MARCH 31, 1981

PURPOSE OF MEETING: Discussion of thermal shock to reactor pressure vessels by overcooling transients and the potential consequences of subsequent repressurization at relatively low temperatures.

ENCLOSURES: (1) Attendance.  
(2) View Graphs of the presentation of the concerns of the staff for potential damage to pressure vessels upon repressurization.

MEETING SUMMARY:

The NRC staff met with the PWR Owner's Groups (B&W, CE and Westinghouse) and representatives of their respective vendors to discuss the subject of thermal shock to reactor pressure vessels from overcooling transients. Attendance at the meeting is recorded in enclosure (1).

The staff noted that this subject is not a new one; both industry and the NRC have held meetings and issued written reports on the subject for several years. Some of the older pressure vessels contain welds with relatively high copper content. Such vessels may be approaching a fluence level which has degraded material properties to the extent that there is concern of significant crack growth in the event of a cooldown transient if a small crack existed at a copper sensitized point. The post-transient repressurization at low pressure vessel wall temperature leads to the condition of concern. Qualitative and some quantitative analysis of the problem was provided by the staff as represented by the view graphs in enclosure (2).

The major comments following the staff presentation were:

- It was stated that Westinghouse was currently studying the mixing problem. However it was not clear just what was expected. Was it mainly long term development that was to be considered?
- Denton noted that they would like the vendors to make a plant-by-plant assessment of the problem and discuss only the most serious with NRC. That is, industry should scope and bound the problem.

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- One vendor noted that detailed studies had been conducted for the new plants on a generic basis.
- The staff noted that it is mainly some of the older plants with poorer welding technique control that could have near term problems. The staff would prefer to have general reports evaluating the problem with plant-by-plant results in the Appendix.
- One vendor noted that they were attempting to identify where the most sensitive welds are with the bounding calculations. They reported that the work is currently under way. Also they are looking at increasing the water storage temperature.
- A second owner's group stated that they intended to define appropriate work on the basis of this meeting.
- One industry representative noted that they were only funded for analysis for responding to a request arising from NUREG-0737. They are grouping plants to look at 2" and 6" break LOCA's, nozzles, and the impact of WRST temperatures. This work will be completed at the end of FY 81.
- Denton emphasized that we need best estimates of the transients - not compounded conservatisms to produce unrealistic "worst" transients. It was pointed out that remedial measures are plant specific; for example, Rancho Seco has longitudinal weld seams subjected to high fluence. However, it is also relatively easy to maintain the injection water at an elevated temperature for this plant.
- EPRI is currently: (1) conducted a large annealing study with Westinghouse, (2) evaluating irradiated material properties, and (3) is conducting a coolant mixing program.

Some general observations and discussion noted that:

- Ruling out immediate repressurization in sensitive cooldown cases results in a safe system, but
- Crack growth during subsequent repressurization could jeopardize the vessel, requiring extensive inspection and possible repairs. This would be very expensive to the utility.
- Fracture toughness should be maintained to relieve the thermal shock sensitivity.
- Various concepts should be tried: annealing may not be satisfactory and is difficult; changing the core design to reduce the vessel fluence should be considered, i.e. lower the neutron production in elements nearest the pressure vessel wall and accept a small derating of the plant if necessary.

The staff requested a response from industry regarding how and when they could respond to a request to provide an accounting of what immediate problems existed.

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(The industry representatives then requested a private caucus which was granted).

Subsequent to the caucus the industry representatives reported:

- They will submit a letter report by May 15, 1981 summarizing the efforts to date of the various owners groups.
- They are in agreement that a cooperative approach is needed, with close NRC contact to minimize necessary effort and develop answers in a timely manner.
- It was agreed that this potential problem should be evaluated and the necessary plans developed before it requires immediate action on an urgent basis.

*T. J. Walker*

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Enclosures:  
As stated

cc: See Distribution

Contact: T. J. Walker  
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ENCLOSURE (1)

ATTENDANCE

PWR OWNER'S GROUPS - NRC MEETING  
MARCH 31, 1981

<u>Name</u>	<u>Affiliation</u>
R. Klecker	NRR/DE/MTEB
T. Walker	NRC/RES/MCR
W. Bock	ACRS
H. Vagins	NRR/RES/MNRB
T. Marstor	EPR
D. Basdekas	NRC/RES
L. Shao	NRC
V. Panciera	NRC
J. Dann	McCrow-Hill
J. Strosnider	NRC/RES/MNRB
R. Dieterich	SMJD
P. Wagner	NRC/NRR/ORB#4
R. Gill	Duk Power Company
G. Liebler	CE Owners Group
T. Murley	NRC/NRR/DST
J. Zudans	
D. Speyer	Common Edison/MOG
J. Clifford	NRC/PTRB
B. Sheron	NRR/RSB
B. King	Westinghouse
J. Westhoven	CE
J. Taylor	B&W
T. Naton	CE
M. Kupinski	NUSCO/CE Owners Group
T. Meyer	Westinghouse
W. Johnson	Westinghouse
R. Vollmer	NRR/DE
V. S. Noonan	NRC/DE
R. Douglass	CE Owners
R. Wells	Westinghouse Owners Group
J. Mattimoe	B&W Owners Group (SMJD)
W. Hazelton	NRC/NRR/DE/MTEB
H. Denton	NRC