

July 18, 1997

SECY-97-152

FOR: The Commissioners

FROM: L. Joseph Callan /s/
Executive Director for Operations

SUBJECT: STATUS OF SAFETY EVALUATION REPORT ON PROPOSED REDUCTION IN
AUGMENTED EXAMINATION REQUIREMENTS FOR BOILING WATER REACTOR
PRESSURE VESSELS PURSUANT TO 10 CFR 50.55a(g)(6)(ii)(A)
(SRM M970512B)

PURPOSE:

To inform the Commission of the status of the NRC staff's development of a safety evaluation report (SER) regarding the BWR Vessel and Internals Project (BWRVIP) proposed reduction in the extent to which boiling water reactor (BWR) licensees shall inspect their reactor pressure vessels (RPVs) in accordance with the requirements of Section 50.55a(g)(6)(ii)(A) to Title 10 of the Code of Federal Regulations, "Augmented examination of reactor vessel," [10 CFR 50.55a(g)(6)(ii)(A)]. The NRC staff's current estimate is that completion of a risk-informed evaluation, including industry input and ACRS review, will take approximately six months. Scheduling reliefs for inspections of the BWR RPV circumferential shell welds due during the Fall 1997 or Spring 1998 outage seasons will be granted for technically-justified requests.

DISCUSSION:

On May 12, 1997, the Commission was briefed by representatives of the BWRVIP and the NRC staff on the issues related to the requirements for a full inspection of reactor pressure vessel shell welds. The BWRVIP proposed, in the proprietary report "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWRVIP-05)," dated September 28, 1995, to reduce the scope of inspection of the BWR RPV welds from essentially 100 percent of their RPV shell welds to 50 percent of the axial welds and zero percent of the circumferential welds. By letter dated October 29, 1996, the BWRVIP modified their original proposal to increase the examination of the axial welds to 100 percent from 50 percent while still proposing to inspect zero percent of

the circumferential RPV shell welds.

The Commission, in a Staff Requirements Memorandum (SRM M970512B) dated May 30, 1997, requested that the NRC staff complete the SER on BWRVIP-05 on an expedited basis, and that the NRC staff should consider a tiered approach in gathering additional baseline information and/or implementing the rule. The SRM recommended that the SER (a) should address the BWRVIP proposal to examine 100 percent of the axial welds which would include examinations of some circumferential weld lengths near the intersections of the weld types to determine if this proposal could provide an appropriate level of sampling of the circumferential welds, (b) should provide a comprehensive evaluation of the probabilistic analysis contained in the BWRVIP proposed alternative in determining the acceptability of a proposed technical alternative and/or in pursuing changes to the rule, and, (c) should receive appropriate review, including review by the Advisory Committee on Reactor Safeguards (ACRS).

During the May 12, 1997, Commission briefing, in response to a question as to when the NRC staff could complete its review, the NRC staff responded that the review should be completed within six weeks. However, this estimate did not include the time necessary to complete a comprehensive evaluation of the probabilistic analysis contained in the BWRVIP-05 report, to assess a tiered approach in gathering baseline information, and to have the ACRS review the final SER, as per the guidance in SRM M970512B.

The NRC staff has initiated a broader, risk-informed review of the BWRVIP-05 proposal since the May 12, 1997, Commission briefing. This multi-disciplined approach is a concentrated effort drawing upon the resources of the Offices of Nuclear Reactor Regulation (NRR), Nuclear Regulatory Research (RES), Analysis and Evaluation of Operational Data (AEOD), and International Programs (OIP). One result of this effort was the identification of a transient at a foreign BWR of U.S. design in which the RPV was subjected to high pressure (1150 psi) at a low temperature (88°F). This cold overpressure transient is not included

as a design basis event for BWRs and was not considered in the BWRVIP-05 report which was focused only on design basis events. However, the recent recognition of this transient has led the NRC staff to determine that cold overpressure transients are of sufficient safety significance to be considered in this SER.

The NRC staff has performed a preliminary review of 229 licensee event reports and 81 event notifications which involved potential BWR overcooling or overpressure events since 1980. Of the 310 events identified, 35 were identified as potential precursors to cold overpressure events of the type that occurred overseas. These types of events are of particular interest because the fracture toughness of the RPV decreases at low temperatures resulting in greater potential for RPV failure. Preliminary evaluations of the foreign event indicate conditional failure probabilities for axial and circumferential welds significantly higher than those associated with the transients assumed in the BWRVIP-05 report. These preliminary NRC staff evaluations indicate that the conditional failure probabilities for the circumferential welds, instead of being approximately 30 orders of magnitude less than the axial welds' conditional failure probabilities (as stated in the BWRVIP-05 report), are about four orders of magnitude lower.

Further work is being performed to more fully assess the risk associated with these events for both the axial and circumferential welds at fluence levels projected to be reached later in life at some plants. This additional work includes further studies of the potential precursor events in order to better quantify the potential for cold overpressure events in BWRs, and additional probabilistic fracture mechanics analysis to both understand the sensitivities to various parameters and to support an uncertainty analysis. In addition, the NRC staff intends to request an industry evaluation of the potential for, and consequences of, non-design basis events such as cold overpressurizations, which were not addressed in the industry's BWRVIP-05 submittal. The NRC staff is preparing an interim SER, which will be discussed with the ACRS in August 1997; and, the ACRS will review the final SER, which will include the NRC staff's review of the industry's evaluation of non-design basis events.

The NRC staff's current estimate is that completion of a risk-informed evaluation, including industry input and ACRS review, will take approximately six months.

In order for the additional analysis requested by the Commission of the BWRVIP-05 report to be completed and adequately reviewed, the NRC staff is proposing to consider technically-justified schedular reliefs for requesting BWR licensees who are scheduled to perform inspections of the BWR RPV circumferential shell welds during the Fall 1997 or Spring 1998 outage seasons. These schedular reliefs would allow an inspection delay of up to 40-months, or two operating cycles (whichever is longer), for BWR RPV circumferential shell welds. Including those plants that plan to inspect in the Spring 1998 outage season ensures that there will be sufficient time for the NRC staff to perform the additional requested reviews and complete the SER. These reliefs would be based on appropriate technical justification and the determination that any risk from failures of circumferential welds would not be significant until later in plant life when high fluence values are reached. Granting reliefs for 40-months or two operating cycles is based on the consideration of the availability of inspection equipment and the need for licensees to reschedule inspections if they should be deemed necessary upon completion of the risk-informed evaluation.

A final conclusion regarding the need for circumferential weld examinations, or other actions that may be suggested by the risk informed assessment, will be reached when the final SER is completed. In light of the BWRVIP proposal to perform 100 percent examination of the axial welds, and the preliminary evaluation performed by the NRC staff which shows even higher conditional failure probabilities for axial welds than calculated by the industry, axial weld inspections would need to be performed on a schedule consistent with the requirements of 10 CFR 50.55a(g)(6)(ii)(A), and thus would not be considered for schedular relief.

COORDINATION

The Office of the General Counsel has been consulted on this issue and

has no
legal objection to the NRC staff's position.

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