October 26, 2000

MEMORANDUM TO: Stuart A. Richards, Director
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Steven D. Bloom, Project Manager, Section 2 ***/RA/***
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF MEETING HELD ON AUGUST 23, 2000, WITH THE WESTINGHOUSE OWNERS GROUP (WOG) TO DISCUSS RISK INFORMED ANTICIPATED TRANSIENT WITHOUT SCRAM PROGRAM

On August 23, 2000, representatives of the Westinghouse Owners Group (WOG) met with the Nuclear Regulatory Commission (NRC) staff to discuss their risk-informed (RI) anticipated transient without scram (ATWS) program. This meeting was a followup to a previous staff meeting on December 17, 1998, with the WOG on their program. Attachment 1 contains the list of meeting attendees. Copies of the slides used during the meeting as well as responses to issues raised at the December 17, 1998, meeting are available under ADAMS accession number ML003747517.

The WOG indicated that using RI ATWS could save some utilities between a half to a million dollars per cycle. The WOG stated that they are limited to have a moderator temperature coefficient (MTC) being either zero or negative which controls the fuel enrichment and the amount of burnable poison that must be in the fuel. They stated that WCAP-11992, "Joint Westinghouse Owners Group/Westinghouse Program: ATWS Rule Administration Process," was submitted with positive MTC curves, but was initially submitted for information only. WCAP-11992 was rejected by the NRC in July 1997. The WOG also stated that presently some plants have been given acceptance in their technical specifications (TS) to have a positive MTC during startup, however, these TS still limit the MTC to zero at 100 percent rated thermal power (RTP). Some plants are given this acceptance as long as the core is designed for an unfavorable exposure time (UET) that is limited to 5 percent based on the "base case" plant configuration (i.e., no rod insertion, no PORVs blocked, and 100 percent AFW). However, some other plants do not have this UET percentage limitation (e.g., Diablo Canyon). The WOG also stated that two pilot plants, Byron and Braidwood, which have the 5 percent UET limitation, will be submitting an application for review and approval by the NRC during the first quarter of 2001. A full NRC review is expected for this submittal. The WOG and NRC next discussed the eleven issues from the December 17, 1998, meeting. At the conclusion of the meeting the NRC stated that they would identify and provide a list of issues and/or areas where additional

information may still need to be provided based on the meeting discussions and the WOG responses to the issues identified from the December 17, 1998, meeting. These issues and areas requiring additional information are identified in attachment 2.

Project No. 694

Attachments: 1. Attendance List
2. Issues and Additional Information Need Identified from August 23, 2000, Meeting

cc w/atts:
Mr. H. A. Sepp, Manager
Regulatory and Licensing Engineering
Westinghouse Electric Corporation
P.O. Box 355
Pittsburgh, PA 15230-0355

Mr. Andrew Drake, Project Manager
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ACCESSION NO: ML003763629

OFFICE	PDIV-2/PM	PDIV-2/LA	PDIV-2/SC
NAME	SBloom:am	EPeyton	SDembek
DATE	10/26/00	10/25/00	10/26/00

OFFICIAL RECORD COPY

MEETING WITH WESTINGHOUSE OWNERS GROUP

MEETING ATTENDEES

RISK INFORMED (RI) ANTICIPATED TRANSIENT WITHOUT SCRAM (ATWS)

AUGUST 23, 2000

NAME	AFFILIATION
S. Bloom	NRC
E. Throm	NRC
T. Attard	NRC
D. Harrison	NRC
S. Lee	NRC
G. Lanik	NRC
M. Rubin	NRC
S. Long	NRC
A. Hiser	NRC
K. Jacobs	WOG/NYPA
B. Bryan	WOG/TVA
R. Florian	WOG/Southern Nuclear
A. Drake	WOG
J. Andre	Westinghouse
R. Ankney	Westinghouse
K. Balkey	Westinghouse
P. Kotwicki	Westinghouse
G. Ament	Westinghouse
A. Wong	ComEd

Attachment 1

ISSUES AND ADDITIONAL INFORMATION NEEDS IDENTIFIED
FROM AUGUST 23, 2000, MEETING

WOG AND NRC REGARDING PROPOSED RI-ATWS

1. The WOG did not address the potential for no auxiliary feedwater (AFW) to be available (e.g., resulting from maintenance and/or equipment failures) as a parameter of the possible plant configurations (i.e., auto or manual rod insertion, power-operated relief valve [PORV] availability, and AFW availability). The inclusion and consideration of no AFW being available would aid the staff in future reviews.

2. The WOG did not provide any information on the incremental conditional core damage probability (ICCDP) when operating in the various plant configurations. For each core design, calculating the ICCDP for operating in each plant configuration during: (1) the estimated operating time within the configuration's unfavorable exposure time (UET) period (e.g., based on a plant configuration management scheme and considering random failures), (2) operating throughout the UET period (i.e., assuming the plant operates throughout the entire UET period in that configuration), and (3) operating throughout the entire cycle (i.e., assuming the plant remains in that configuration throughout the cycle) would aid the staff in future reviews.

3. The number of days within a UET condition for the various plant configurations for the bounding core design was not provided. A chart that identifies the number of days within the UET condition for the various plant parameters for the bounding core design would aid the staff in future reviews.

4. Since there are different UETs calculated for plant configurations in which the only parameter that changed is the rod insertion mode (i.e., Auto or Manual), it appears that at least some partial rod insertion is credited in the analyses when in the Auto rod insertion mode. An explanation of how the WOG addresses this parameter in the UET calculations would aid the staff in future reviews.

5. Based on the meeting discussions, apparently all maximum ATWS pressure calculations were performed with equilibrium xenon levels at 100 percent power, except for the part-power calculations, which actually were 100 percent power with no xenon. The information provided gave UETs and probabilities for these conditions. A table of the peak pressures for the part-power conditions would aid the staff in future reviews.

6. It is not clear that the peak ATWS pressures at 100 percent power with no xenon bound the peak ATWS pressures at lower powers with no xenon, especially since the moderator temperature coefficient (MTC) can be more positive at lower powers (i.e., at 100 percent power MTC is limited by technical specifications to 0 pcm/°F, but at 70 percent power MTC can be as high as +5 pcm/°F). The identification of the part-power levels that produce the bounding peak ATWS pressures for the low, high, and bounding core cases and what bounding pressures are reached would aid the staff in future reviews.

7. For some cores, the peak ATWS pressures would occur at some point in time substantially after the beginning of the fuel cycle, when the different rates of burnable poison depletion, uranium depletion, fission product accumulation and plutonium breeding create the maximum net surplus reactivity. The full power UETs described in the information provided account for these factors. However, it is not clear if the peak pressures from an ATWS during a restart from a forced outage (> 3 days) in the period of maximum core reactivity is bounded by the pressures calculated for other conditions. The bounding pressure for the above condition would aid the staff in future reviews.

8. Identifying the initiating event conditions that result in the highest pressures and what pressures are reached would aid the staff in future reviews. Specifically, a table of the pressures reached for the different cores if no AFW, no PORVs, and no rod insertion are available for the initiating event that results in the highest pressure would aid the staff in future reviews.

9. The information provided includes distinct values for moderator temperature coefficient (MTC) at 150, 4000, 9000, and 21,512 MWD/MTU. Though helpful, this does not provide insight into the MTC behavior at low power and in-between these four points. A plot of MTC and peak pressure as a function of time for the limiting power level and limiting initiating event while in the UET domain for each core case would aid the staff in future reviews.

10. Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," addresses risk-informed approaches. As part of the engineering analysis, the RG indicates that consideration should be given to defense-in-depth and safety margins. One of the conditions for maintaining consistency with the defense-in-depth philosophy is "Over-reliance on programmatic activities to compensate for weaknesses in plant design is avoided." The WOG-proposed approach includes compensating for increased UETs (i.e., periods of inadequate plant capability to withstand the peak pressures resulting from an ATWS) that results from using higher reactivity core designs by some form of plant configuration management. The current information provided by the WOG may not result in any limitation on unfavorable MTC, and concomitantly on UET. The WOG needs to justify how their approach satisfies the above condition for maintaining consistency with the defense-in-depth philosophy. The WOG also needs to address how the plant configuration management schemes should be controlled by the utility.

11. The updated event tree and fault tree models used in support of the analyses were not provided. To aid the staff in future reviews, the updated models, the identification of the dominant cutsets and/or sequences, and the bases and/or references for the failure rates or unavailability values used for the basic events in the models should be provided.