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U.S. NUCLEAR REG. COMM.
ADVISORY COMMITTEE ON
REACTOR SAFEGUARDS

February 5, 1980

Advisory Committee on Reactor Safeguards
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. Paul Boehnert

Subject: Anticipated Transients Without Scram (ATWS)

Reference: NUREG-0460, Vol. 3, Anticipated Transients Without Scram for Light Water Reactors, December, 1978.

Dear Mr. Boehnert:

At the January 25, 1980 meeting of the ACRS Subcommittee on ATWS, Dr. W. Kerr asked for comments on Alternative 3a and Alternative 4a plant modifications as proposed by the NRC staff as solutions to ATWS.

Dr. S. H. Hanauer offered guidance at the January 25, 1980 meeting as to differences between Alternatives 3 and 4 as described in NUREG-0460 and Alternatives 3a and 4a as tentatively defined by the NRC staff. In addition to the requirements of Alternative 3, Alternative 3a would require instrumentation to withstand peak pressures if these instruments are required for reactor shutdown; and stability problems would have to be addressed for the BWR. Alternative 4a may be identical to Alternative 4 except it will be clearer as to the number of valves required and as to the analysis required by the NRC staff.

Based on Dr. Hanauer's statement of differences between Alternatives 3 and 3a, and 4 and 4a, I concur with the NRC staff's position on Alternatives 3a and 4a. The basic decision as to an acceptable ATWS solution then basically depends on the acceptability of Alternatives 3 and 4, or as extended by the NRC staff, on Alternatives 3a and 4a.

Alternative 3 was proposed by the NRC staff as an ATWS solution to operating plants and plants under construction (NUREG-0460 Vol. 3 proposed January 1, 1978 as the cutoff date for construction permits) and Alternative 4 for new plants (construction permits after January 1, 1978). Table I (extracted from NUREG-0460) lists the plant modifications by reactor vendor for Alternatives 1 through 4. Alternative 3 includes the prevention measures of Alternative 2 and supplements them with mitigation measures. Alternative 3 requires PWR analyses to be performed which demonstrates the integrity of the primary coolant system boundary and the functionability of valves needed for long-term cooling following the conditions calculated for specified ATWS events (95% Moderator Temperature Coefficient, all other parameters at their nominal valves, and no additional failures other than the scram system). Alternative 3 requires BWRs to perform analyses, provide Recirculation Pump Trip, and modify the Standby

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Liquid Control System (SLCS) to achieve increas :apacity (43 gpm to 86 gpm) and automatic injection.

Alternative 4 in Table 1 requires PWRs to add safety valves (Westinghouse plants appear to have sufficient valve capacity) sufficient to comply with Service Level C of the ASME code, and to demonstrate functionability of valves needed for long-term cooling following conditions calculated for specified ATWS events (99% Moderator Temperature Coefficient and reliability based failure assumptions.) BWRs are required to provide Recirculation Pump Trip and an automatically operated liquid poison injection system of sufficient capacity that, in conjunction with other BWR systems, can assure long-term core cooling.

At the January 25, 1980 ACRS meeting, Dr. Hanauer stated that the NRC will immediately imp ement most of the hardware fixes specified under Alternative 3 of NUREG-0460 Vol 3 (< 1 yr). In addition, all plants will be subject to the requirements specified under Alternative 4 of NUREG-0460 with installation to be completed over the next 1 to 5 years.

I concur with the proposed plan of action of the NRC. I did not concur with the plan as originally published in NUREG-0460 Vol. 3. The new plan emphasizes prevention by the installation of additional prevention equipment and eventual improved mitigation (additional valves, 99% MTC, and reliability based failure assumptions).

Sincerely,

Walter C. Lipinski

Walter C. Lipinski
Reactor Analysis and Safety Division

WCL/b

TABLE 1

Alternate Plant Modifications

	1	2	3	4
B&W	Nothing	. BUSS[2] . AMSAC[3]	. BUSS[2] . AMSAC[3] . Analysis[8]	. AMSAC[3] . Add safety valves . Analysis[8]
CE	Nothing	. SPS[2] . AMSAC[3]	. SPS[2] . AMSAC[3] . Analysis[8]	. AMSAC[3] . Add safety valves . Analysis[8]
W	Nothing	. AMSAC[3]	. AMSAC[3]	. AMSAC[3] . Analysis[8]
GE	Nothing	. ARI[2] . SD[7] . RPT[1] . Logic[4]	. ARI[2] . RPT[1] . Logic[4] . Automatic 86 gpm SLCS[5] . SD[7] . Analysis[8]	. RPT[6] . Automatic, high capacity liquid poison injection . Analysis[8]

[1] The approved Monticello design is an acceptable RPT design for all BWR 4 plants. The approved Zimmer design is an acceptable RPT design for all BWR 5 and 6 plants. There may be other acceptable designs which must be treated on a plant specific basis.

[2] A system which is diverse and independent from RPS, meeting IEEE-279 and acting as backup to the electrical portion of the current scram system.

[3] ATWS mitigating system actuation circuitry satisfying criteria in Appendix C.

[4] Changes in logic to reduce vessel isolation events and permit feedwater runback.

[5] Modified SLCS piping to assure delivery of 86 gpm of poison and automatic actuation circuitry satisfying parts A through H of Appendix C with reliability equivalent to the mechanical portion of the SLCS.

[6] Recirculation pump trip satisfying criteria in Appendix C.

[7] Modification of scram discharge volume.

[8] Analysis remains to be performed and reviewed to confirm expected mitigation capability as described in Sections 2.2 and 2.3.