NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Yankee Atomic Electric Company	0 5 0 0 0 2 2 9	1 OF 0 3

TITLE (4)
Determination of Inappropriate LOCA Methodology Assumption/Previously Approved

EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 5	1 3	8 5	8 5	-	0 0 1	- 0 1	0 6	1 4	8 5		0 5 0 0 0
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OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
F. N. Williams, Manager, Reactor Engineering Department	AREA CODE 4 1 3 4 2 4 - 5 2 6 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On May 13, 1985, at 1132 hours, while operating at 100 percent power, it was learned that the Loss of Coolant Accident (LOCA) analysis may not be in compliance with the requirements of Section I.A of Appendix K to 10 CFR 50 pertaining to axial power distribution assumptions. A notification was made pursuant to 10 CFR 50.72(b)(1)(ii)(A) at 1154 hours. To assure that the plant operation was within analyzed conditions, a more restrictive control rod limit was immediately implemented. The condition was discovered during a review of the LOCA analysis as the result of a notification from the NRC of deficiencies in the Exxon LOCA analysis.

This report is submitted due to the determination that the approved LOCA evaluation model [see NRC letter to YAEC, dated December 4, 1975, Amendment No. 21 to Facility Operating License No. DPR-3] is no longer valid because the assumptions regarding core axial power distribution are inappropriate. This LOCA analysis is based on a chopped-cosine axial power distribution when in fact a more limiting top-skewed axial profile could exist during periods of plant operation. As a result, the plant may have operated with an axial power profile which would result in more severe calculated consequences than identified in the LOCA analysis. A more restrictive control rod limit was imposed during the remainder of Core XVII and evaluation of future cores' operation continued. LER 77-30 previously reported an unrelated LOCA analysis error.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

On May 13, 1985, at 1132 hours, while operating at 100 percent power, it was learned that the current Loss of Coolant Accident (LOCA) analysis may not be in compliance with the requirements of Section I.A of Appendix K to 10 CFR 50 pertaining to axial power distribution assumptions. The plant was notified verbally by Corporate Headquarters and a subsequent Manager of Operations directive transmitted to the plant.

The NRC was notified, via the Emergency Notification System, pursuant to 10 CFR 50.72(b)(1)(ii)(A) at 1154 hours. The Resident Inspector was also notified at that time.

Immediate corrective action to assure that plant operation is bounded by the existing LOCA analysis has been effected by implementing a more restrictive control rod limit. Control rod Group C withdrawal was limited to not more than 84 inches, and subsequently, limited to 83 inches through End of Full Power Life (EOFPL). This limit on Group C operation serves to keep power skewed away from the top of the core. Because the core power distribution varies with core life, as well as control rod position, the need for further correction, as a result of increasing core exposure, was investigated. The results of this investigation subsequently permitted rod withdrawal of control group C, at or below 80% of rated full power, at a rate not to exceed 2 inches per day until fully withdrawn.

In March, 1985, the NRC staff became aware of errors in the Exxon PWR LOCA analysis methods. Because Yankee uses Exxon fuel, the NRC contacted Yankee Nuclear Services Division (YNSD) on March 22, 1985, and requested that YNSD evaluate concerns which the NRC had regarding Exxon LOCA analysis deficiencies. Of the deficiencies noted, one was found to be applicable. This concern dealt with the acceptability of the axial power distribution study which had been submitted in compliance with Appendix K in 1975. The NRC staff concluded in their safety evaluation of December 4, 1975 that use of the chopped-cosine power distribution was an acceptable basis for determining LOCA limits, however, this conclusion has now been questioned. Discussions with NRC staff in NRR have been ongoing since the onset of this issue.

As a result of these discussions, a subsequent evaluation has been done using the NRC's current interpretation of an acceptable evaluation model. The results showed that in the unlikely event that the plant was able to achieve top-skewed power distributions with a peak kw/ft equal to the technical specification limit, concurrent with a LOCA, the calculated peak clad temperature would exceed a value of 2200°F. It was also concluded that bottom-skewed power distributions were covered by the current technical specification limits. Therefore, instructions have been given to direct the plant to operate with control rods inserted sufficiently to assure mid or bottom-peaked power distributions in order to assure continued compliance with 10 CFR 50.46.

This report is submitted pursuant to 10 CFR 50.73(a)(2)(ii)(A) due to a determination that previously approved assumptions are inappropriate in current LOCA licensing methodology. The use of chopped-cosine axial power distributions in LOCA analyses, which was approved by NRC for Yankee in December 1975 (Amendment No. 21), may no longer be valid. Placing the above restrictions on control rod group C will provide reasonable assurance of compliance to the performance requirements of 10 CFR 50.46 in the event of a LOCA.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

It should be noted that there is a large degree of conservatism inherent in Appendix K LOCA licensing methods.

Plant operation for the remainder of Core XVII was conducted in a manner which assured that the power distribution was bounded by the existing LOCA analysis.

Further analyses have been performed showing that top skewed axial power distribution models are more representative of EOC operating conditions than the chopped cosine axial power distribution models. Core XVIII LOCA analysis recognizes this and uses the "worst case" burnup-dependent, xenon-induced power distributions in the burnup sensitivity analysis. (See YAEC Letter to USNRC dated August 30, 1985, "Core XVIII Refueling - Cycle-Dependent Parameters" Attachment A). The resulting peak LHGR curve provides a more limiting peak LHGR versus GWD/MTU than the curves generated for previous cores which were derived from chopped cosine axial power distributions only. It is anticipated that this modification to the LOCA analysis model will be used in all future LOCA analyses.

In addition to the inclusion of top skewed power distributions for EOC calculations in the Core XVIII LOCA analysis, the steam-ECC water interaction model has been modified to replace the 0.8 psid ΔP penalty with a 0.15 psid ΔP penalty during pumped ECCS flow after the accumulator has been emptied. The new value was determined by experiments conducted by EPRI. It more accurately represent system conditions. (For additional details, see YAEC Letter to USNRC dated August 16, 1985, "LOCA Injection ΔP" and YAEC Letter to USNRC dated September 16, 1985, "LOCA Injection ΔP Penalty".) A summary of an August 8, 1985 meeting to discuss proposed revisions to the ECCS codes and code assumptions is also documented in USNRC letter to YAEC dated October 22, 1985.

The staff Safety Evaluation approving these revisions is provided in USNRC letters to YAEC dated November 27, 1985, titled "Core XVIII Reload Safety Evaluation," and "Inspection ΔP Penalty for ECCS Evaluation Model."

YANKEE ATOMIC ELECTRIC COMPANY

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December 16, 1985

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Licensee Event Report 50-29/85-01, Revision 1

References:
(a) License No. DPR-3 (Docket 50-29)
(b) YAEC Letter to USNRC dated June 14, 1985. Licensee Event Report 50-29/85-01, "Determination of Inappropriate LOCA Methodology Assumption/Previously Approved"
(c) USNRC Letter to YAEC dated May 22, 1985, "Confirmation of ECCS Codes"
(d) YAEC Letter to USNRC dated August 16, 1985, "LOCA Injection ΔP Penalty"
(e) YAEC Letter to USNRC dated August 30, 1985, "Core XVIII Refueling - Cycle-Dependent Parameters"
(f) YAEC Letter to USNRC dated September 16, 1985, "LOCA Injection ΔP Penalty"
(g) USNRC Letter to YAEC dated October 22, 1985, "Meeting Summary - Meeting with YAEC on ECCS Code Revision"
(h) USNRC Letter to YAEC dated November 27, 1985, "Technical Specifications for Refueling Related Parameters"

Dear Sir:

In accordance with 10 CFR 50.73(a)(2)(ii), the attached Licensee Event Report, Revision 1, is hereby submitted. This update contains information submitted in References (d), (e) and (f) and supersedes the LER reported in reference (b). Changes are indicated by lines in the right hand margin.

Very truly yours,

Normand N St Laurent

Normand N. St. Laurent
Plant Superintendent

DAR/nm
Enclosure

cc: [3] NSARC Chairman (YAEC)
[1] Institute of Nuclear Power Operations (INPO)

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