

EXPIRES 04/30/98

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Millstone Nuclear Power Station Unit 2

DOCKET NUMBER (2)

05000336

PAGE (3)

1 OF 3

TITLE (4)

Reanalysis of Main Steam Line Break Indicates Possible Fuel Failures

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 NAME	DOCKET NUMBER
04	08	98	98	-- 007 --	01	10	30	98	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)						
POWER LEVEL (10)		000		20.2201(b)		20.2203(a)(2)(v)			50.73(a)(2)(i)	50.73(a)(2)(viii)
				20.2203(a)(1)		20.2203(a)(3)(i)		X	50.73(a)(2)(ii)	50.73(a)(2)(x)
				20.2203(a)(2)(i)		20.2203(a)(3)(ii)			50.73(a)(2)(iii)	73.71
				20.2203(a)(2)(ii)		20.2203(a)(4)			50.73(a)(2)(iv)	OTHER
				20.2203(a)(2)(iii)		50.36(c)(1)			50.73(a)(2)(v)	Specify in Abstract below in NRC Form 366A
				20.2203(a)(2)(iv)		50.36(c)(2)			50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME: R. G. Joshi, MP2 Regulatory Compliance Manager  
 TELEPHONE NUMBER (include Area Code): (860) 440-2080

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)

YES (If yes, complete EXPECTED SUBMISSION DATE): X NO

EXPECTED SUBMISSION DATE (15)

MONTH:      DAY:      YEAR:

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 8, 1998, during a reanalysis of the FSAR Section 14.1.5, Main Steam Line Break (MSLB) accident, and as a result of issues identified during the Configuration Management Program review, it was discovered that non-conservative assumptions related to the power distributions and reactivity data were contained in the calculation which supports the existing MSLB analysis. These non-conservative assumptions may result in violation of either the fuel centerline temperature fuel design limit (peak linear heat generation rate at or less than 21 kW/ft) or departure from nucleate boiling fuel design limit.

The cause of this condition is an inadequate review by Siemens Power Corporation of the impact of variations in cycle to cycle radial peaking factors due to loading pattern changes.

The Siemens analyses have been completed and the design basis analyses predict violation of the fuel design limits. The radiological consequences following an MSLB have been assessed. The off site doses are within the acceptance limits of 10 CFR 100 and the control room operator doses do not exceed the limits of 10 CFR 50 Appendix A, Criterion 19.

A license amendment request has been submitted to the NRC for approval. This license amendment request provides the reanalysis results, including the radiological consequences.

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

**I. Description of Event**

On April 8, 1998, during a reanalysis of the FSAR Section 14.1.5, Main Steam Line Break (MSLB) [SB] accident, as a result of issues identified during the Configuration Management Program review, it was discovered that non-conservative assumptions related to the power distributions and reactivity data were contained in the calculation which supports the existing MSLB analysis. These non-conservative assumptions may result in violation of either the fuel centerline temperature fuel design limit (peak linear heat generation rate at or less than 21 kW/ft) or Departure from Nucleate Boiling (DNB) fuel design limit. At the time of the discovery of this condition, the unit was defueled.

The MSLB analysis presented in FSAR Section 14.1.5 is performed by Siemens Power Corporation to determine the potential for degradation in fuel performance during a post-trip condition with Control Element Assemblies (CEA) inserted except for the most reactive CEA which is stuck out. Under these conditions, following a MSLB with the most positive reactivity insertion, the potential exists for a post-trip return to power. With a post-trip return to power, the potential exists for violation of the fuel centerline temperature limit or DNB fuel design limit. Non-conservative assumptions in the existing analysis for the MSLB accident could result in violation of the fuel design limits. The most significant of these non-conservative assumptions concerns the radial power distribution with CEAs inserted and the most reactive CEA stuck out. This radial power distribution was used in the Cycle 10 MSLB analysis and was bounding for that fuel cycle. However, fuel management changes associated with subsequent fuel cycles resulted in radial power distributions that exceeded the radial power distributions used in the Cycle 10 MSLB analyses. This non-conservative assumption may result in the MSLB analysis not meeting the fuel centerline melt acceptance criteria.

The MSLB analysis of record presented in FSAR Section 14.1.5 states results that indicate that the fuel design limits are not exceeded. In an SER dated March 20, 1989, the NRC concluded that the MSLB analysis is acceptable based on the fact that the fuel design limits are not violated. However, based on the recently completed Siemens reanalyses, the fuel design limits will be exceeded, and fuel failure will occur.

Since the statements described in the SER were not challenged, they became part of the MP2 design bases. A condition regarding "no fuel failures" was not satisfied and, as a result, this condition is being reported pursuant to 10 CFR 50.73(a)(2)(ii)(B), a condition that was outside of the design basis of the plant.

**II. Cause of Event**

The cause of this condition is an inadequate review by the Siemens Power Corporation of the impact of variations in cycle to cycle radial peaking factors due to loading pattern changes.

**III. Analysis of Event**

The MSLB analysis presented in FSAR Section 14.1.5 was performed for Cycle 10 by Siemens Power Corporation to determine the potential for degradation in fuel performance during a post-trip condition with all Control Element Assemblies (CEAs) inserted with the most reactive CEA stuck out. Consistent with the Siemens Power Corporation methodology, for Cycles 11 through 13, the MSLB accident was determined not to require reanalysis based on a reactivity balance. However, the power distribution variations from cycle to cycle were not appropriately considered in the Siemens methodology.



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The MSLB event is a postulated accident that is not expected to occur during the life of the plant. As such, the fuel design limits may be exceeded provided the core geometry remains coolable and the radiological consequences are within the limits provided in 10CFR100. However, the prediction of fuel failure following an MSLB event is outside the design basis of the plant.

The reanalysis of the MSLB event has been completed. Separate analyses were performed to maximize the fuel conditions for pre-trip conditions and also for post-trip conditions. Fuel failure is predicted in both the pre-trip and post-trip phase. The pre-trip phase predicts violation of the DNB fuel design limit. The post-trip phase predicts violation of the fuel centerline temperature fuel design limit. The radiological consequences following an MSLB have been assessed. The off site doses are within the acceptance limits of 10CFR100 and the control room operator doses do not exceed the limits of 10 CFR 50 Appendix A, Criterion 19. A license amendment request has been submitted to the NRC for approval. This license amendment request provides the reanalysis results, including the radiological consequences.

Based on the above, this event is considered to be of low safety significance.

IV. Corrective Action

The failure of the process for identifying this type of error, and measures to prevent future analytical problems will be dispositioned via the Millstone corrective action program.

The following corrective actions have been completed:

1. The Siemens reanalyses have been completed.
2. Siemens Power Corporation performed a self-assessment on their MSLB methodology, and identified a number of improvements. A license amendment request has been submitted to the NRC which implements the MSLB methodology change.
3. An FSAR change has been approved that includes the revised analyses for the MSLB accident.

V. Additional Information

Similar Events

None

Energy Industry Identification System (EIIIS) codes are identified in the text as [XX].