

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Fermi 2	DOCKET NUMBER (2) 0 5 0 0 0 3 4 1	PAGE (3) 1 OF 4
-------------------------------------	---	----------------------------------

TITLE (4) **One Megawatt Thermal (1 MWt) Nonconservative Bias Found In Core Thermal Power Calculation**

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)											
MON	DAY	YR	YR	SEQUENTIAL NUMBER				REVISION NUMBER	MON	DAY	YR	FACILITY NAMES										
												DOCKET NUMBER (5)										
12	13	95	95	-	0	0	8	-	0	1	11	15	96	0	5	0	0	0				
			0 5 0 0 0																			

OPERATING MODE (9) **1** THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (11)

POWER LEVEL (10)	2	2	10 CFR _____ X OTHER <u>Violation of License Condition 2.C</u> (Specify in Abstract below and in text, NRC Form 366A)
------------------	----------	----------	---

LICENSEE CONTACT FOR THIS LER (12) **Mari Jaworsky - Compliance Engineer**

TELEPHONE NUMBER	AREA CODE
586-1427	313

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	CAUSE	SYSTEM

SUPPLEMENTAL REPORT EXPECTED (14) _____

[] YES (If yes, complete EXPECTED SUBMISSION DATE)	[x] NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (16)

On December 13, 1995, Detroit Edison discovered a nonconservative omission in the heat balance methodology for calculating core thermal power. Control Rod Drive (CRD) flow that is directed to the reactor recirculation pumps for seal flow contributes approximately four gallons per minute of cold water to the primary system. The impact on the heat balance calculation is that calculated core power is approximately one megawatt thermal (MWt) lower than actual power. Due to this bias, it is possible that Fermi 2 exceeded its licensed power limit of 3292 MWt on one or more occasions during Cycle 1 and 3293 MWt on one or more occasions during Cycles 2 and 3 by approximately one MWt. The current licensed power limit of 3430 MWt has not been exceeded as a result of this bias because of Fermi 2 turbine limitations.

Based on the low order of magnitude of the bias and conservatism inherent in power levels used for safety analyses, this condition did not result in any adverse impact on the health and safety of the general public.

As an interim measure, administrative controls have been implemented to limit core thermal power to 3429 MWt, which will ensure that the current licensed power limit of 3430 MWt is not exceeded. Detroit Edison has decided to incorporate the effects of CRD purge flow to the Reactor Recirculation Pump seals into reactor heat balance calculations by a modification to the Process Computer and Manual Heat Balance calculation methodologies via a change to the Radiative Heat Loss Constant.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Fermi 2	0 5 0 0 0 3 4 1	95	- 0 0 8	- 0 1	2	OF 4

Initial Plant Condition:

Operational Condition: 1 (Power Operation)
 Reactor Power: 22 Percent
 Reactor Pressure: 1020 psig
 Reactor Temperature: 540 degrees Fahrenheit

Description of the Event:

A. Background

Section 2.C(1) of the Fermi 2 Operating License states: "DECo is authorized to operate the facility at reactor core power levels not in excess of 3430 megawatts thermal (100% power) in accordance with the conditions specified herein and in Attachment 1 [Preoperational Test, Startup Tests and Other Items] to this license...." Previous to the third refueling outage, Fermi 2 was authorized to operate at 3292 megawatts thermal under the original operating license, and at 3293 megawatts thermal for the second and third reactor core cycles. The original 3292 megawatt rating was a typographical error in the operating license.

Section 2.F of the Fermi 2 Operating License states: "Except as otherwise provided in the Technical Specifications or Environmental Protection Plan, DECo shall report any violations of the requirements contained in Section 2.C of this license in the following manner: initial notification shall be made within 24 hours to the NRC Operations Center via the Emergency Notification System with written follow-up within thirty days in accordance with the procedures described in 10 CFR 50.73(b), (c) and (e)."

B. Event Description

On December 13, 1995, Detroit Edison discovered a nonconservative omission (bias) in the heat balance methodology for calculating core thermal power (CTP). Control rod drive (CRD) [AA] flow that is directed to the reactor recirculation (RR) pumps [AD][P] for seal flow contributes approximately four gallons per minute (gpm) of cold water to the primary system [AB] that had not been included in CTP calculations. The impact to the heat balance calculation is that calculated core power is approximately one megawatt thermal (MWt) lower than actual power.

This results in a nonconservative bias in the heat balance calculation. Due to this bias, it is possible that Fermi 2 exceeded its licensed power limit of 3292 MWt on one or more occasions during Cycle 1 and 3293 MWt on one or more occasions during Cycles 2 and 3 by approximately one MWt. The current licensed power limit of 3430 MWt has not been exceeded as a result of this bias because of Fermi 2 turbine limitations.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)				PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Fermi 2	0 5 0 0 0 3 4 1	95	-	0 0 8	-	0 1	3 OF 4

The General Electric (GE) design required approximately six gpm flow to the RR pumps for seal flow, with a net return of approximately four gpm of cold water to the recirculation system. According to GE, the flow from the CRD system to the RR pump, historically, has never been added to the nuclear heat balance and core thermal power calculations for any boiling water plants.

A historical review of CRD flow to the RR pump seals was performed, and as a result of procedural controls and documented RR seal purge flows, the net flow to the reactor is not expected to have exceeded 4.5 GPM at Fermi 2. A heat balance and core thermal power calculation evaluation determined that not including this flow to the reactor in the heat balance would have underestimated actual core power by approximately one MWt (approximately 0.03 percent power).

A review of other potential sources of flow to the reactor system that are not monitored or included in the plant heat balance was performed. No other unmonitored flow to the reactor system was identified.

Cause of the Event:

The heat balance concern was identified as a result of Fermi 2 operating experience review of an industry communication by another utility on the impact of design changes on their process computer, and subsequent communications by other plants. It was determined that the possibility exists that some sources of flow to the reactor system are not monitored or included in the plant heat balance. One identified source is the RR pump seal purge line, which has been designed to introduce approximately 4 to 6 gpm of unmonitored pump seal purge flow from the CRD system to the recirculation system.

The cause for neglecting the additional flow in the core thermal power calculations and heat balance from the RR pump seal purge flow was that the RR pump seal purge flow was considered insignificant during original heat balance and thermal power calculation methodology development.

Analysis of the Event:

The design basis Loss of Coolant Accident (LOCA), design basis Containment, and transient analyses incorporate a two percent power level measurement uncertainty. The maximum uncertainty due to instrument inaccuracies in the heat balance calculation of CTP depends on whether the Process Computer or the manual calculation methodology is used. Historically, the maximum uncertainty when the Process Computer [ID] was used was approximately 1.85 percent (0.15 percent margin). For manual CTP calculations, the calculation procedure requires that the calculated CTP be increased by 0.3 percent (0.4 percent historically), which is equivalent to derating the plant. This procedural control provides adequate margin to account for the RR pump seal flow. The available margins to the allowable uncertainty from instrument inaccuracies for Process Computer and manual heat balance calculations can absorb this

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)				PAGE (3)	
Fermi 2	0 5 0 0 0 3 4 1	YEAR		SEQUENTIAL NUMBER		REVISION NUMBER	
		95	-	0 0 8	-	0 1	4 OF 4

approximate one MWt nonconservative bias. Therefore, previous operation with this bias was within the bounds of the design basis LOCA, Containment, and transient analyses as described in Chapter 15 of the updated FSAR.

Therefore, the health and safety of the public were not adversely affected by this event.

Corrective Actions:

A. Immediate Corrective Actions

No immediate corrective actions were needed since the unit is already administratively derated for turbine related concerns.

B. Corrective Actions to Prevent Recurrence

As an interim measure, Conduct of Operations Manual, Chapter 3, "Policies and Practices" (MOP03) has been revised to provide administrative controls to limit core thermal power to 3429 MWt, which will ensure that the current licensed power limit of 3430 MWt is not exceeded.

Detroit Edison has actively participated in discussions with General Electric and industry groups to address this issue and to follow industry developments related to the heat balance and core thermal power calculation methodology. Detroit Edison has decided to incorporate the effects of CRD purge flow to the Reactor Recirculation Pump seals into reactor heat balance calculations by a modification to the Process Computer and Manual Heat Balance calculation methodologies via a change to the Radiative Heat Loss Constant. This action will be completed by May 30, 1997. Once this action is completed, the administrative controls in MOP03 will be removed.

Additional Information

A. Failed Components

None.

B. Previous LERs on Similar Problems

None.