

Detroit
Edison

Robert McKeon
Plant Manager

Fermi 2
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(313) 586-6249

10CFR50.73



November 5, 1990
NRC-90-0163

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Reference: Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: Licensee Event Report (LER) No. 90-011

Please find enclosed LER No. 90-011, dated November 5, 1990, for a reportable event that occurred on October 6, 1990. A copy of this LER is also being sent to the Regional Administrator, USNRC Region III.

If you have any questions, please contact Joseph Pendergast at (313) 586-1682.

Sincerely,

Robert McKeon

Enclosure: NRC Forms 366, 366A

cc: A. B. Davis
J. R. Eckert
R. W. DeFayette
W. G. Rogers
J. F. Stang

Wayne County Emergency
Management Division

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Fermi 2	DOCKET NUMBER (2) 0 5 0 0 0 3 4 1	PAGE (3) 1 OF 07
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TITLE (4)
Reactor Scram Due to Reactor Water Level Discrepancy

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)								
1	0	0	9	0	0	1	1	0	0	0	1	1	0	5	9	0	0	0	0

OPERATING MODE (8) 2	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §. (Check one or more of the following) (11)									
POWER LEVEL (10) < 1	<input type="checkbox"/> 20.402(b)	<input checked="" type="checkbox"/> 20.405(e)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(e)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(e)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)								

LICENSEE CONTACT FOR THIS LER (12)	
NAME Joseph Pendergast, Compliance Engineer	TELEPHONE NUMBER 3 1 3 5 8 6 - 1 6 8 2

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
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO					

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

On October 6, 1990, Fermi 2 was in startup and holding while plant personnel were investigating Reactor Water Level indication discrepancies. The discrepancy was noted during a channel check prior to heat-up. Instrumentation & Controls Technicians conducting troubleshooting on the level difference noticed at the remote location that the "B" reference leg instruments indicated approximately 20 inches lower than the equivalent RPS instrumentation associated with "A" reference leg at approximately 1750 hours. The I&C technicians were in the process of notifying the Control Room when at 1754 hours, a reactor scram on Low Reactor Water Level occurred.

The cause of this event was attributed to air voids in the "A" reference leg.

Initial troubleshooting was performed as close to pre-scram conditions as possible and, based on the results, the plant was placed in cold shutdown and the Drywell was deinerted for further investigation following the reactor scram. The sources of level indication difference were investigated and corrective actions were formulated. The corrective actions, the root cause evaluation, and the startup plan were reviewed by the On-Site Safety Review Organization prior to startup.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

Initial Plant Conditions:

Operational Condition: 2 Startup
 Reactor Power: <1 Percent
 Reactor Pressure: 52 psig
 Reactor Temperature: 288 degrees Fahrenheit

Description of the Event:

On October 6, 1990, Fermi 2 was in startup and holding while plant personnel were investigating Reactor Water Level indication (PDT) discrepancies as a result of a failed instrument channel check prior to heat-up. The instrument channel check indicated a 7 inch level difference for Reactor Water Level. The channel check acceptance criteria for this instrumentation is 5 inches. The Reactor Protection System (JC) (RPS) Reactor Water Level narrow range instrumentation is supplied from two reference legs. The RPS instruments supplied from the "A" reference leg are Division 1 RPS logic "A" and Division 2 RPS logic "B". The RPS instruments supplied from the "B" reference leg are Division 1 RPS logic "C" and Division 2 RPS logic "D" (see attached figure).

Immediately prior to the scram Instrumentation & Controls (I&C) Technicians troubleshooting the level difference noticed at the remote indication that the "B" reference leg indicated approximately 20 inches lower than the RPS instrumentation associated with "A" reference leg. The I&C technicians were in the process of notifying the Control Room when at 1754 hours, a reactor scram on Low Reactor Water Level occurred. The Low Reactor Water Level scram setpoint is 173.4 inches. Plant systems operated as designed and all of the control rods (JD) fully inserted.

Initial post scram troubleshooting was performed as close to pre-scram conditions as possible and, based on the results, plant management made the decision to proceed to cold shutdown so that further investigation could be completed to determine the cause for the Reactor Water Level discrepancy. Investigation by plant engineering personnel determined that the most probable cause was an air void in the "A" reference leg (PSX).

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

I&C Technicians weighed (i.e., the reference legs had the same pressure due to vertical height of water above the instruments) and backfilled each reference leg. The Drywell (NH) was deinerted to allow inspection of the instrument lines. The reference legs and instrument racks were walked down prior to startup. No instrument line leaks, slope problems or insulation displacements were identified during the walkdown.

The plant was re-started on October 8, 1990. During the second startup, water level indication differences of a smaller magnitude were observed between the Reactor Water Level narrow range indications. This water level discrepancy cleared at a pressure of about 70 psig.

Cause of the Event:

The cause of this event was attributed to air voids in the reference leg collapsing at a faster rate than the reference leg fill from condensing pot "A". This caused level instruments associated with the "A" reference leg to read a higher level than the instruments associated with the "B" reference leg, with the "B" level closer to the actual Reactor Water Level.

Control of reactor water level during the startup was being maintained by manual discharge through the Reactor Water Cleanup System to the condenser using level indication associated with the "A" reference leg (the higher, incorrect level) as the control parameter. This parameter was selected based upon the fact that there were multiple high water level indications on available Control Room instruments. Two of the three feedwater control Reactor Water Level indicators indicated higher water level.

Lower indication existed on all instruments associated with the "B" reference leg, including the RPS instruments. When this level difference was combined with level decreases that occurred during steam line heat-up, the low Reactor Water Level scram setpoint was actuated.

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TEXT (If more space is required, use additional NRC Form 306A's) (17)

There were several contributing factors to this scram, including the following: (1) the relatively short duration of the indication difference; (2) backup instrumentation was either off-scale high or remotely located; (3) the variations in Reactor Water Level that typically occurs during initial steaming; and (4) multiple high level indications from the same reference leg on the control panel used for water level monitoring.

In addition, General Electric Service Information Letter (SIL) 470, "Reactor Water Level Measurement", described this type of problem. At the time of the original evaluation of this SIL, the decision to not implement the backfilling recommendation was based on Fermi 2 operating experience and system design. Based on Detroit Edison's re-evaluation of this SIL, it has been concluded that backfilling of the reference legs should have been implemented.

Analysis of the Event:

The Reactor Water Level indication that was used as the control parameter read incorrectly high. The more correct level, "B", fell below the reactor scram set point as operations continued. A review of water level information from the Emergency Response Information System implies that the lowest Reactor Water Level was 170". Thus, this condition had no safety significance since (1) the fuel remained covered with water and (2) no Emergency Core Cooling System setpoints were challenged.

All narrow range instruments were below their calibrated conditions of 1000 psig, 135°F drywell temperature. The instruments associated with the "B" reference leg did cause a scram thus completing their safety function of maintaining an adequate water inventory for cooling the fuel. The content of stored energy in the fuel at the time of this event was below the nominal energy content assumed in the UFSAR Accident Analyses and as such posed no significant threat to the cladding barrier. This discrepancy has only been observed at low pressure/power conditions. Based on the above, the health and safety of the general public and plant safety was ensured at all times during this event.

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

Corrective Actions:

Initial corrective actions were focused on determining the most probable cause of the level indication difference. This cause was determined by (1) careful examination of indications and data taken during the scram and (2) results of walkdown inspections of the physical layout of equipment and checks for possible sources of indication differences, such as leaks and slope problems.

Additional corrective actions in the form of startup controls were applied by the On-Site Safety Review Organization (OSRO) prior to allowing restart. These controls consisted of:

- i) Lower heatup rate to allow additional time for monitoring level instrument response.
- ii) Data collection to check effectiveness of corrective action.
- iii) No steam draw until 125 psig to minimize impact (e.g., level/pressure transients) on recorded data.
- iv) Conservative level control (used lowest reading instrument).

Results of the data collection on the restart indicated that the magnitude of the level difference had decreased but it was still high enough to result in a failure of the channel check criteria. Subsequent review of the reference leg line configuration for effectiveness of the reference leg filling method used prior to restart, indicated that not all the air could be removed by the volume or velocity of the water used. Based on this, air is still believed to be present in the "A" reference leg. The corrective action for this is to clarify the existing backfill/flush workplan and to proceduralize it to establish better methods of backfilling/flushing. Following extended outages a backfill and/or flush will be performed for the reference legs.

The General Operating Procedure will be revised to require that steam will not be drawn until Reactor Pressure is above 100 psig other than normal Main Steam Line warm-up and that Reactor Water Level is controlled using the most conservative indicator up to 100 psig. This procedure revision will be completed by the end of December, 1990.

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

Urgent Required Reading describing the chronological series of events, cause of the event and corrective actions was issued to the operating shifts.

A Deviation Event Report was written to re-evaluate General Electric SIL 470. Plant Engineering personnel are currently reviewing the SIL.

Previous Similar Events:

There were no previous similar events due to reactor water level discrepancies during a startup.

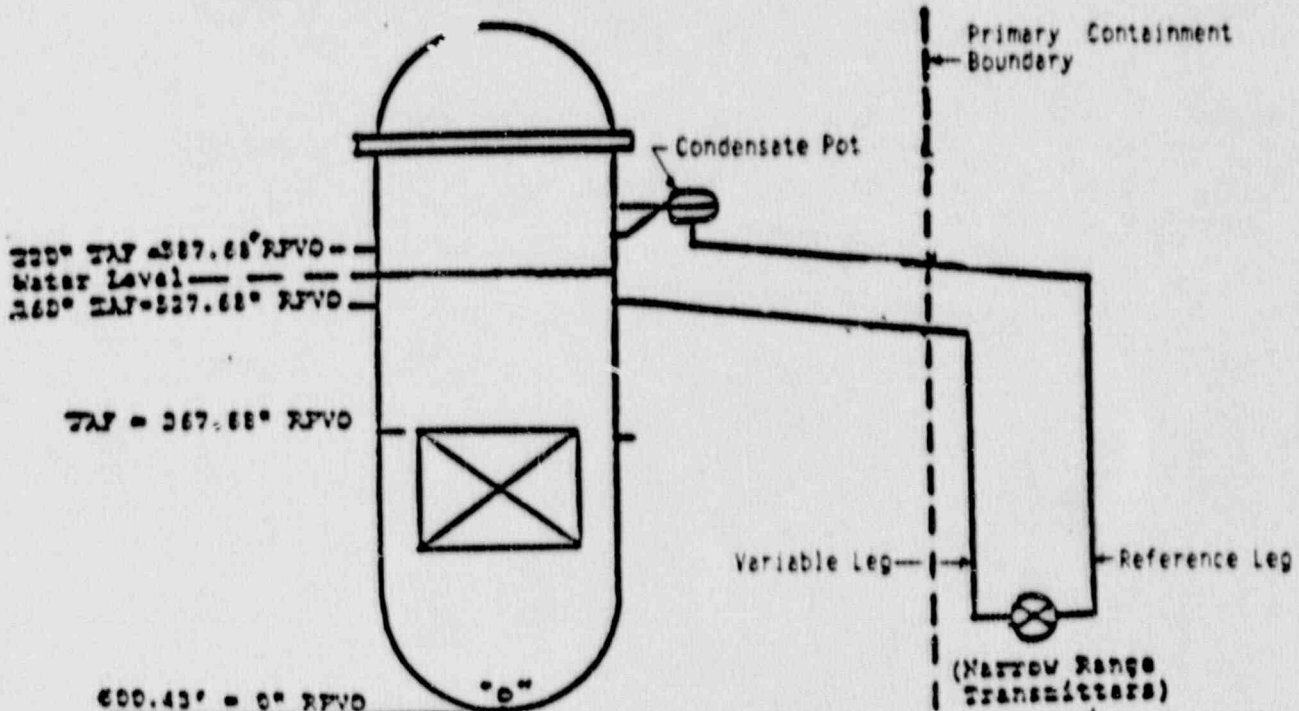
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TEXT (If more space is required, use additional NRC Form 386A's) (17)

REACTOR VESSEL WATER LEVEL INSTRUMENT
NARROW RANGE - DIV 1



600.43' = 0" RPVO
Also Supplies Wide Range Level = Post Accident Level

Ref A	Ref B	(Fuel Zone Range)		Ref Leg A	Ref Leg B
<u>NSSS</u>	<u>NSSS</u>	Ref A	Ref B	<u>RPS</u>	<u>RPS</u>
B21-NDB1A (1)	B21-NDB1C (1)	B21-NDB5A (1)	B21-NDB5B (11)	B21-NDBDA (1)	B21-NDBDC (1)
B21-NDB1B (11)	B21-NDB1D (11)			B21-NDBDB (11)	B21-NDBDD (11)
<u>ECCS</u>	<u>ECCS</u>	← Remote Shutdown (Wide Rng)		<u>ADS</u>	<u>ADS</u>
B21-ND91A (1)	B21-ND91B (11)	Ref A		B21-ND95A (1)	B21-ND95B (11)
B21-ND91C (1)	B21-ND91D (11)	C36-N402		B21-ND95C (1)	B21-ND95D (11)
				<u>Feed Cont</u>	<u>Feed Cont</u>
				C32-N004A	C32-N004B
				C32-N004C	C32-N004D

NOTES: Same as Wide Range Configuration
Reference: Same as Wide Range Configuration

Division noted in ()
TAF = Top of Active Fuel