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U.S. Nuclear Regulatory Commission
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Washington, D. C. 20555

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

Subject: 1991 Annual Operating Report for Fermi 2

In accordance with Fermi 2 Technical Specification 6.9.1.4 and NRC Regulatory Guide 1.16, the Detroit Edison Company is submitting the Annual Operating Report for the Fermi 2 Nuclear Power Plant for the period of January 1, 1991 through December 31, 1991 (see Enclosure 1).

The 1991 Annual Operating Report for Fermi 2 satisfies the reporting requirements of 10CFR20.407, (Personnel Monitoring Report), Technical Specification 6.9.1.5.a (Annual Exposure Report by Function), Technical Specification 6.9.1.5.b (Safety/Relief Valve Challenges), Technical Specification 6.9.1.5.c (Emergency Core Cooling System Outages), and Technical Specification 6.9.1.5.d (Specific Activity Analysis of the Primary Coolant). The 1991 Annual Operating Report also includes a section on service life of the main steam bypass line. This satisfies the commitment stated in Detroit Edison letter VP-86-0154 to the Nuclear Regulatory Commission dated November 7, 1986.

If you have any questions or comments regarding this report, please contact Mr. Joseph Pendergast, Compliance Engineer, at (313) 586-1682.

Sincerely,

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Enclosure

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ANNUAL OPERATING REPORT

JANUARY 1 - DECEMBER 31, 1991

DETROIT EDISON COMPANY

NRC DOCKET NO. 50-341

FACILITY OPERATING LICENSE NO. NPF-43

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1.0 Introduction

The Fermi 2 Nuclear Power Plant site is located on the western shore of Lake Erie in Frenchtown Township, Monroe County, Michigan. The Nuclear Steam Supply System is a General Electric BWR 4, with a Mark I pressure-suppression containment. The plant is fully owned by the Detroit Edison Company.

2.0 Summary of Operating

2.1 Summary of Operating Experience

This summary covers the operation of Fermi 2 from January 1, 1991 to December 31, 1991. During this period, Fermi 2 generated 6,180,932 MWH (net) and was available 73.8 percent of the time. The forced outage rate was 1.1 percent.

The reactor was re-started on January 1, 1991 after an outage to repair the number 3 low pressure turbine. The main generator was synchronized to the grid at 0310 hours, January 2. The plant was administratively limited to as low as 80 percent of rated power because of concerns for main turbine vibration. The plant was on line from January 2, until March 12.

On March 12, the moisture separator reheater relief valve manifold drain line to the condenser separated. The reactor was manually scrammed due to an impending loss of condenser vacuum. The piping system and supports were repaired and additional supports were added to the piping system to reduce line movement. Following the repairs, the main generator was synchronized to the grid at 1715 hours, March 13. The plant remained on line until March 30.

On March 30, the plant was taken off line for the second refueling outage.

There were 1587 work requests performed during the outage. The major outage work performed included:

- o Replacement of 165 Control Rod Blades. Refueling floor activities including control rod blade changeout were completed in 55 days, 4 1/2 days ahead of schedule. Also, 13 control rod drive mechanisms were replaced.
- o Retubing of the main condenser with titanium condenser tubes to improve reactor water chemistry. The main condenser retubing project was completed in 63 days, 2 days ahead of schedule.

- o Replacement of the 4th and 5th stage blades on all 3 low pressure turbines and inspection of the high pressure turbine. Turbine generator maintenance work was completed in 70 days (one day behind schedule).

The outage was scheduled for 72 days. The main generator was synchronized to the grid June 10, resulting in an actual outage length of 72 days 13 hours.

The plant was removed from the grid on June 14 to perform planned turbine balancing.

On June 27, an overheating of the 2A main unit transformer was detected by Quality Assurance inspectors. The main generator breakers CM and CF were manually opened resulting in a reactor scram due to a turbine control valve fast closure. The overheating was caused by circulating current due to inadequate clearance between the transformers oil coolant piping and the isophase bus duct housing. Repairs were made and the main generator was synchronized to the grid on June 28.

The main generator was taken off the grid on September 25, for repair of the generator slip rings. The reactor remained critical. Repairs were made and the main generator was synchronized to the grid on September 29.

On December 10, the main generator was taken off the grid for replacement of the main unit transformer 2A. The replacement was successfully completed and the generator was synchronized to the grid on December 20. The main generator remained synchronized to the grid through the rest of the year.

2.2 Summary of Outages and Forced Reductions Greater than 20 Percent of Full Power

February, 1991

- February 2, 1991 - Power Reduction

Reduced power from approximately 80 percent of rated power to 58 percent of rated power to repair the south reactor feed pump drain line.

- February 22, 1991 - Power Reduction

Reduced power from approximately 80 percent of rated power to 60 percent of rated power for control rod pattern adjustment.

March, 1991

- March 12, 1991 - 34.9 Hours Shutdown

Moisture separator reheater relief valve manifold drain line to the condenser separated. The reactor was manually scrammed from approximately 90 percent of rated power due to an impending loss of condenser vacuum. The piping system and supports were repaired and additional supports were added to the piping system to reduce line movement. This was reported by Licensee Event Report (LER) 91-004.

- March 16, 1991 Power Reduction

Reduced power from approximately 92 percent of rated power to 60 percent of rated power for additional moisture separator reheater repairs.

- March 30, 1991 - 1741 Hours Shutdown

Shutdown for the second refueling outage.

June, 1991

- June 14, 1991 - 118.3 Hours Shutdown

Shutdown for main turbine balancing and feed water heater repairs. During the subsequent startup and prior to generator synchronization to the grid, the plant was shutdown on June 17, from approximately 20 percent rated power for additional feedwater system repairs.

- June 23, 1991 - Power Reduction

Reduced power from approximately 54 percent of rated power to 33 percent of rated power due to south reheater seal tank repairs.

- June 27, 1991 - 38.7 Hours Shutdown

Reactor scram from approximately 100 percent of rated power due to manually opening main generator output breakers CM and CF. This action was in response to a main unit transformer 2A overheat condition. This was reported by LER 91-015.

July, 1991

- July 13, 1991 - Power Reduction

Reduced power from approximately 100 percent of rated power to 54 percent of rated power for completion of the Maximum Extended Operating Domain test program.

September, 1991

- September 25, 1991 - Power Reduction

Reduced power from approximately 100 percent rated power to 18 percent rated power and removed the main generator from the grid to perform corrective maintenance on the main generator slip rings.

October 1991

- October 19, 1991 - Power Reduction

Reduced power from approximately 100 percent of rated power to 79 percent of rated power. The power change was made for performance of high pressure turbine valve surveillance, deep and shallow control rod pattern adjustments and main unit transformer 2A testing.

- October 26, 1991 - Power Reduction

Reduced power from approximately 100 percent of rated power to 67 percent of rated power. The power reduction was due to the south heater drain pump bearing failure and the resulting reactor recirculation pump run back.

November 1991

- November 5, 1991 - Power Reduction

Reduced power from approximately 100 percent of rated power to 79 percent of rated power in order to take the center heater drain pump out of service for repair of a steam leak on the discharge line vent valve.

- November 25, 1991 - Power Reduction

Reduced power from approximately 100 percent of rated power to 75 percent of rated power in order to take the center heater drain pump out of service for maintenance.

- November 29, 1991 - Power Reduction

Reduced power from approximately 100 percent of rated power to 78 percent of rated power, due to the shutdown of the north heater drain pump. Center heater drain pump was placed in service.

December 1991

- December 10, 1991 - 234.9 Hours Shutdown

Shutdown to replace main unit transformer 2A.

2.3 Fuel Performance

The plant completed its second fuel cycle and began its third fuel cycle following a 72.5 day refueling outage. The core currently contains 316 cycle one fuel bundles, 220 cycle two fuel bundles and 228 new fuel bundles, 4 of which are Asea Brown Boveri SVEA-96 Lead Fuel Assemblies.

The reactor was operated in a control cell core mode with only one sequence for both cycle two and three during 1991, so there were no control rod sequence exchanges.

Power reductions were required on three separate occasions for shallow rod pattern adjustments (2-cycle two; 1-cycle three) and six shutdowns after achieving criticality (2-cycle two; 4-cycle three) occurred during the year. Reactor power was administratively derated to as low as 80 percent at the close of cycle two due to turbine vibration problems. During cycle three, power reductions for rod pattern adjustments were less frequent than in previous fuel cycles following completion of the Maximum Extended Operating Domain test program, when full usage of the extended operating regions was realized.

Cycle two produced 71 effective full power days (EFPD) and cycle three produced 178 EFPD in 1991. There were no indications of fuel pin leakage or other fuel failures during the year.

2.4 Shore Barrier Survey

A survey of the Fermi 2 shore barrier was completed as per Procedure 43.000.01, "Shore Barrier Surveillance", and as required by Technical Specification 4.7.3. The results of the survey indicated no damage, significant movement, or deterioration of the barrier. All forty-seven survey point elevations were within the tolerance specified in Technical Specification Table 3.7.3-1. Civil Engineering Drawings 6C721-44 through 49 were revised to incorporate the survey data. No unusual incidents occurred in 1991 that would have required additional surveillance.

2.5 Safety Relief Valve Challenges

There were no safety relief valve challenges during 1991.

2.6 Personnel Monitoring and Exposure

Pursuant to 10CFR20.407(a)(2), a tabulation of the number of individuals monitored by range of measured exposure is shown in Table 2.6-1. Whole body exposures were determined using the thermoluminescent dosimeter (TLD) technique.

Table 2.6-2 provides a breakdown of radiation exposure by work and job function as required by Technical Specification 6.9.1.5(a). Radiation exposures were determined using the direct reading dosimeter (DRD) technique and were adjusted by the total TLD to DRD dose ratio. The number of measured individuals (with radiation exposures >100 mrem) reported in Tables 2.6-1 and Table 2.6-2 are different due to the measurement techniques. There was one person which had a dose greater than one REM. The actual dose was 1.075 REM.

Table 2.6-1

Statistical Summary Report
of the Number of Individuals for Whom
Personnel Monitoring was Provided
For the Period
January 1, 1991, to December 31, 1991

NUMBER OF INDIVIDUALS IN EACH RANGE	ESTIMATED WHOLE BODY EXPOSURE RANGE (REM)
1965	No Measurable Exposure
539	Exposure < 0.100
358	0.100 to 0.249
269	0.250 to 0.499
50	0.500 to 0.749
6	0.750 to 0.999
1	1.000 to 1.999
0	2.000 to 2.999
0	3.000 to 3.999
0	4.000 to 4.999
0	5.000 to 5.999
0	6.000 to 6.999
0	7.000 to 7.999
0	8.000 to 8.999
0	9.000 to 9.999
0	10.000 to 10.999
0	11.000 to 11.999
0	12.000 and Over

TABLE 2-B-2
ANNUAL EXPOSURE REPORT BY FUNCTION
01/01/91 to 12/31/91

Work & Job Function	Number of Personnel > 100 Mrem		Total Man-Rem (Corrected for TLD)	
	Station Employees	Utility Employees and Others	Station Employees	Utility Employees and Others
Reactor Ops & Surveillance				
Maintenance Personnel	4	0	1.485	0.001
Operating Personnel	56	0	16.666	0.000
Health Physics Personnel	26	0	6.353	0.000
Supervisory Personnel	0	1	1.321	0.018
Engineering Personnel	5	0	1.626	0.021
Routine Maintenance				
Maintenance Personnel	15	0	5.338	0.000
Operating Personnel	1	0	0.451	0.000
Health Physics Personnel	0	0	0.075	0.000
Supervisory Personnel	0	0	0.231	0.000
Engineering Personnel	0	1	0.247	0.000
Inservice Inspection				
Maintenance Personnel	1	0	0.769	0.000
Operating Personnel	7	0	1.362	0.000
Health Physics Personnel	0	0	0.157	0.000
Supervisory Personnel	4	0	1.138	0.000
Engineering Personnel	2	0	0.897	0.000
Special Maintenance				
Maintenance Personnel	74	0	18.669	0.000
Operating Personnel	6	0	2.007	0.000
Health Physics Personnel	8	0	2.198	0.000
Supervisory Personnel	4	0	1.232	0.000
Engineering Personnel	8	1	2.535	0.009
Waste Processing				
Maintenance Personnel	0	0	0.147	0.000
Operating Personnel	0	0	0.044	0.000
Health Physics Personnel	7	0	1.712	0.000
Supervisory Personnel	0	0	0.016	0.000
Engineering Personnel	0	0	0.000	0.000
Refueling				
Maintenance Personnel	4	0	2.060	0.000
Operating Personnel	2	0	0.390	0.000
Health Physics Personnel	1	0	0.551	0.000
Supervisory Personnel	0	0	0.209	0.000
Engineering Personnel	2	0	0.490	0.000
Totals				
Maintenance Personnel	98	0	28.469	0.001
Operating Personnel	72	0	20.921	0.000
Health Physics Personnel	42	0	11.146	0.000
Supervisory Personnel	8	0	4.149	0.018
Engineering Personnel	17	0	5.996	0.030
Grand Totals	237	0	70.581	0.043

2.7 Service Life of Main Steam Bypass Line

In accordance with Detroit Edison letter VP-86-0154, dated November 7, 1986, the cumulative time the main steam bypass lines are operated with the bypass valves between 30 percent and 45 percent opened will be reported annually. A cumulative value of 100 days is not to be exceeded without prior NRC notification.

Evaluations performed by Stone and Webster and by Hopper and Associates concluded that the bypass lines are acceptable for safe operation when operated within the 100 day constraint. Based on these evaluations, the new main steam bypass piping that was installed in 1985 has a service life which will allow it to function for the life of the plant under anticipated operating conditions. The total value for 1991 is 5.53 days and the cumulative value is 30.98 days, well within the constraint of 100 days. The annual average use of the bypass lines is expected to decrease in the future.

2.8 Specific Activity Analysis of the Primary Coolant Exceeding the Limits of Technical Specification 3.4.5

During 1991, the specific activity of the primary coolant did not exceed the limits of Technical Specification 3.4.5.

2.9 ECCS Outages

Pursuant to Fermi 2 technical specification 6.9.1.5.c, a summary of ECCS system outages which occurred between January 1, 1991 and December 31, 1991 is provided. The tabulation of ECCS outage hours (Table 2.9-1) includes both forced and planned outages for the low pressure coolant injection (LPCI), core spray, high pressure coolant injection (HPCI), and automatic depressurization systems (ADS). An outage was considered to be whenever one of the ECCS systems was out-of-service at a time it was required to be operable per Technical Specifications.

ECCS Outages

Table 2.9-1

ECCS Outage Hours
January 1, 1991 to December 31, 1991

<u>ECCS System</u>	<u>Forced Hours</u>	<u>Planned Hours</u>
LPCI Division I	0.0	20.16
LPCI Division II	0.0	14.08
Core Spray Division I	14.3	16.48
Core Spray Division II	0.0	15.58
HPCI	52.23	52.28
ADS	0.0	0.0

DIVISION I LOW PRESSURE COOLANT INJECTION

ECCS System Outage: Division I Low Pressure Coolant Injection
Out of Service from 0510 02/05/91 to 0120 02/06/91
Duration: 20.16 hours Planned Outage

Outage Summary:

The division I LPCI system was removed from service to perform various corrective maintenance (CM) and preventive maintenance (PM) activities. Following completion of the activities and required surveillances, the division I LPCI system was returned to service.

DIVISION II LOW PRESSURE COOLANT INJECTION

ECCS System Outage: Division II Low Pressure Coolant Injection
Out of Service from 0605 02/12/91 to 2010 02/12/91
Duration: 14.08 hours Planned Outage

Outage Summary

The division II LPCI system was removed from service to perform various CM and PM activities. Following completion of the activities and required surveillances, the Division II LPCI system was returned to service.

DIVISION I CORE SPRAY

ECCS System Outage: Division I Core Spray
Out of Service from 0501 03/05/91 to 2130 03/05/91
Duration: 16.48 hours Planned Outage

Outage Summary

The division I core spray system was removed from service to perform various PM activities. Following completion of the activities and required surveillances, the division I core spray system was returned to service.

ECCS System Outage: Division I Core Spray
Out of Service from 2037 12/22/91 to 1055 12/23/91
Duration: 14.30 hours Forced Outage

Outage Summary:

The division I core spray system was declared inoperable after closing and deenergizing a normally open motor operated valve (MOV) in the discharge path. The action taken was as a result of a slow pressure increase in the system. The valve was returned to service and the normal surveillance completed. The system was declared operable after returning the deenergized MOV to service.

DIVISION II CORE SPRAY

ECCS System Outage: Division II Core Spray
Out of Service from 0600 02/19/91 to 2135 02/19/91
Duration: 15.58 hours Planned Outage

Outage Summary:

The division II core spray system was removed from service to perform various PM activities. Following completion of the activities and required surveillances, the division II core spray system was returned to service.

HIGH PRESSURE COOLANT INJECTION

ECCS System Outage: High Pressure Coolant Injection
Out of Service from 1420 01/16/91 to 2312 01/16/91
Duration: 8.87 hours Forced Outage

Outage Summary:

The HPCI system was removed from service to replace a trip unit that failed during a surveillance. The trip unit failed due to a degraded transistor. Following completion of the replacement and required surveillance, the HPCI system was returned to service. This was reported in LER 91-001.

ECCS System Outage: High Pressure Coolant Injection
Out of Service from 0145 06/11/91 to 0922 06/11/91
Duration: 7.62 hours Planned Outage

Outage Summary:

The HPCI system was removed from service to purify its hydraulic oil system. Following the purification the HPCI system was returned to service.

ECCS System Outage: High Pressure Coolant Injection
Out of Service from 1900 07/18/91 to 0402 07/19/91
Duration: 9.03 hours Forced Outage

Outage Summary:

The HPCI system was removed from service to repair/rework the valve position indication of valve E41-F402 which was discovered to not indicate closed during stroking for surveillance testing. Following rework of E41-F402 position indication and the required surveillance, the HPCI system was returned to service.

ECCS System Outage: High Pressure Coolant Injection
Out of Service from 0600 09/04/91 to 0550 09/05/91
Duration: 23.83 hours Planned Outage

Outage Summary:

The HPCI system was removed from service to perform various CM and PM activities. Following completion of the activities and required surveillances, the HPCI system was returned to service.

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ECCS System Outage: High Pressure Coolant Injection
Out of Service from 1245 10/04/91 to 0935 10/05/91
Duration: 20.83 hours Planned Outage

Outage Summary:

The HPCI system was removed from service to purify its hydraulic oil system. Following the purification, the HPCI system was returned to service.

ECCS System Outage: High Pressure Coolant Injection
Out of Service from 1953 11/20/91 to 0613 11/22/91
Duration: 34.33 hours Forced Outage

Outage Summary:

The HPCI system was removed from service to replace a failed hydraulic actuator (EGR) that resulted in a HPCI system failure to start. Following troubleshooting, EGR replacement, and the completion of required surveillances, the HPCI system was returned to service. This was reported in LER 91-020.

AUTOMATIC DEPRESSURIZATION SYSTEM

ECCS System Outage: Automatic Depressurization
Out of Service from 0000 0/00/91 to 0000 0/00/91
Duration: 0.0 hours No Outages

There were no ADS outages at a time when ADS was required to be operable per Technical Specifications.