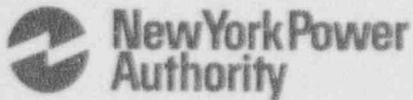


James A. FitzPatrick  
Nuclear Power Plant  
P.O. Box 41  
Lycoming, New York 13093  
315 342-3840



Harry P. Salmon, Jr.  
Resident Manager

March 12, 1993  
JAFP-93-0136

United States Nuclear Regulatory Commission  
Document Control Desk  
Mail Station P1-137  
Washington, D.C. 20555

SUBJECT: DOCKET NO. 50-333  
LICENSEE EVENT REPORT: 93-006-00 - Inoperability of  
Fire Pumps

Dear Sir:

This report is submitted in accordance with 10CFR50.73(a)(2)(i). This report is also submitted as a special report required by Technical Specifications 3.12.A.1.C, 3.12.A.1.d.2 and 6.9.B.2.

Questions concerning this report may be addressed to Mr. W. Verne Childs at (315) 349-6071.

Very truly yours,

HARRY P. SALMON, JR.

HPS:WVC:tld

Enclosure

cc: USNRC, Region I  
USNRC Resident Inspector  
INPO Records Center

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LICENSEE EVENT REPORT (LER)

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.

FACILITY NAME (1) James A. FitzPatrick Nuclear Power Plant	DOCKET NUMBER (2) 0 5 0 0 0 3 3 3	PAGE (3) 1 OF 1 1
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TITLE (4)  
Inoperability of Fire Pumps

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 2	2 6	9 3	9 3	0 0 6	0 0 0	0 3	1 2	9 3		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)					
POWER LEVEL (10) 0 0 0	20.402(b)		20.405(c)		50.73(e)(2)(iv)	73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		50.73(e)(2)(v)	73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(e)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	X	50.73(e)(2)(i)		50.73(e)(2)(viii)(A)	
	20.405(a)(1)(iv)		50.73(e)(2)(ii)		50.73(e)(2)(viii)(B)	
20.405(a)(1)(v)		50.73(e)(2)(iii)		50.73(e)(2)(ix)		

LICENSEE CONTACT FOR THIS LER (12)

NAME Mr. W. Verne Childs, Sr. Licensing Engineer	TELEPHONE NUMBER
	AREA CODE: 3 1 5 3 4 9 - 6 0 7 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)

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

EIIS Codes are in []

The plant was shutdown and in the cold condition for a maintenance outage. At 1820 hours on 2/25/93 Fire Pump [KP] 76P-2 was declared inoperable due to inadequate pump discharge pressure and on 2/26/93 at 0207 Fire Pump 76P-1 was declared inoperable when engine overheating was evident during a pump test. A backup source of fire suppression water was provided by a third full capacity fire pump. Fire Pump 76P-1 was replaced with a new pump and Fire Pump 76P-2 will be replaced with a new or rebuilt pump. Procedure revisions and continued trending of performance data will reduce the probability of recurrence.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 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.

FACILITY NAME (1) James A. FitzPatrick Nuclear Power Plant	DOCKET NUMBER (2) 0 5 0 0 0 3 3 3 9 3	LER NUMBER (6)			PAGE (3)	
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TEXT (If more space is required, use additional NRC Form 386A's) (17)

EIIS Codes are in []

Event Description:

The plant was shutdown and in the cold condition for a short maintenance outage. The Reactor had been shutdown by Manual Scram at 0140 hours on February 25, 1993, due to partial blocking of the cooling water intake structure [KE] with ice. A planned maintenance outage of approximately nine days was scheduled to start during the evening of February 26, 1993. The decision was made to commence outage work one day early. Refer to LER-93-004 for additional information concerning the partial blockage of the intake structure and resulting Reactor Manual Scram.

On February 25, 1993, at 1820 hours, Electric Motor Driven Fire Pump (76P-2) was declared inoperable based on engineering evaluation of pump performance testing data. The pump discharge pressure was approximately three pounds per square inch less than the minimum required value of 125 pounds per square inch (psig) at the rated flow of 2,500 gpm. Declaring Fire Pump 76P-2 inoperable resulted in entry into Technical Specification 3.12.A.1.c which is a seven day Action Statement for one inoperable fire pump.

On February 26, 1993, at 0207 hours, the West Diesel Engine Driven Fire Pump (76P-1) was declared inoperable when engine overheating was evident during a pump test. Declaring 76P-1 inoperable resulted in entry into Technical Specification Action Statement 3.12.A.1.d which requires:

1. Establishment of a backup fire suppression water system within 24 hours, and,
2. Submittal of a Special Report to the NRC by telephone within 24 hours, and,
3. Facsimile (or similar) confirmation of the telephone notification no later than the first work day following the event, and,
4. Submittal of a written Special Report within 14 days of the event. (Submittal of this Special Report is being made to satisfy the 14 day requirements of Technical Specification 3.12.A.1.d.2.c and 6.9.B.2.)

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 (F-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)

At the time that the second fire pump was declared inoperable, a backup fire pump 76P-4 was already inservice. Fire Pump 76P-4 is permanently installed to serve as a backup to Fire Pumps 76P-1 and 76P-2, as well as to provide additional fire protection capability to buildings such as the warehouses and training center. The third Fire Pump is briefly discussed in Technical Specification Bases 3.12.A/4.12.A and the NRC Safety Evaluation for Technical Specification Amendment 142 dated October 23, 1989. Fire Pump 76P-4 is essentially identical to the West Diesel Fire Pump (76P-1). It was designed and manufactured by the same vendor, has the same capacity, will automatically start when the fire water header pressure decreases to 85 psig, and can supply 100 percent of the potential demands on the High Pressure Water Fire Protection System in the event of fire. It should also be noted that when Electric Fire Pump 76P-2 was administratively declared inoperable on February 25, 1993 at 1820 hours, it was not physically removed from service. The pump remained capable of automatic starting when the Fire Water Header Pressure decreased to approximately 105 psig.

The NRC Emergency Operations Center was notified via the Emergency Notification System (ENS) telephone of the inoperability of Fire Pumps 76P-1 and 76P-2 at approximately 1900 hours on Friday, February 26, 1993. On Monday, March 1, 1993, the facsimile transmission of a letter which briefly described inoperability of fire pumps and establishment of a backup fire suppression water supply was completed to provide confirmation of the telephone notification.

Fire Pump 76P-1 was restored to an operable status at 1655 hours on March 4, 1993, after pump replacement and performance testing. This action resulted in the following conditions and status:

1. West Diesel Fire Pump 76P-1 operable (in a normal standby condition) in accordance with Technical Specification requirements.
2. Electric Fire Pump 76P-2 inoperable in accordance with Technical Specification requirements (but available for service in a normal standby condition and capable of delivering 2,500 gpm at slightly less than the required 125 psig).
3. Diesel Fire Pump 76P-4 (which is not required by Technical Specifications) available for service and capable of delivering rated flow and pressure following an automatic start at a fire header pressure of equal to or greater than 85 psig.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

The sequence of events which ultimately resulted in Fire Pumps 76P-1 and 76P-2 being inoperable at the same time was different for each pump and is described below.

Electric Motor Driven Fire Pump 76P-2

In November, 1992, plant Performance Engineering personnel completed an evaluation of 76P-2, which included trending of performance test data. It was concluded that 76P-2 had shown a steady decline in performance over the preceding time period of approximately seven years and would require replacement or rebuild to restore the pump to new (or nearly new) capability.

During performance testing of 76P-2 in the Fall of 1992, the pump was considered operable based on a measured flow of equal to or greater than 2,500 gpm and calculated discharge pressure of equal to or greater than 125 psig. Engineering evaluation of performance test data resulted in the pump being declared inoperable at 1820 hours on February 25, 1993, after it was determined that calculation of the pump discharge pressure included a correction for the elevation difference between the pump discharge pressure gage and water level in the forebay area. This elevation difference of approximately 13 feet resulted in correction of the observed discharge pressure by adding 0.433 psi for each foot of elevation difference to the observed discharge pressure. The actual correction should have been based on the elevation difference between the discharge pressure gage and the center line elevation of the pump discharge. The properly calculated pump discharge pressure was 122.4 psig compared to the minimum Technical Specification 4.12.A.1.e.3 requirement of 125 psig at 2,500 gpm.

It should be noted that calculation of the pump discharge pressure which includes correction for the elevation difference between the discharge pressure gage and the forebay level yields the total head produced by the pump. The total head value is the information necessary to compare pump performance against the manufactured pump curve to provide useful trend data. It is essentially the same method used to obtain performance data for safety related system pumps such as core spray [BM] or Residual Heat Removal/Low Pressure Coolant Injection (RHR/LPCI) [BO] pumps.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

On February 25, 1993, at 0000 hours, the plant was operating normally at 100 percent rated thermal power. Between 0000 hours and 0143 hours, the plant cooling water intake structure [KE] located approximately 900 feet from the shore line of Lake Ontario [BS] at a depth of approximately 12 feet below the lake surface apparently became partially blocked with ice. The blockage restricted the cooling water intake flow to an extent that water level in the forebay area and pump suction bays within the screenhouse was drawn down by the normal operation of three circulating water system [KE] pumps and two normal service water system [KG] pumps. The partial blockage of the intake resulted in water level decreasing to below the minimum suction level for fire pumps (239 feet, 6 inches). The reactor was manually scrammed to protect the heat sink required for safe shutdown as described in more detail in LER-93-004. A sequence of events related to inoperability of the fire pumps is presented below.

February 25, 1993:

- 0000 hours - Normal plant operation at 100 percent rated power. Condenser [SG] inlet temperature (after mixing with some discharge water) was 37F.
- 0100 hours - Condenser inlet temperature had increased to approximately 40F from decrease in forebay level due to partial intake blockage with ice and the warming effect of tempering flow.
- 0125 hours - Electric Fire Pump 76P-2 started automatically on low fire header pressure (105 psig). Apparently forebay water level had decreased to the point where the Fire Header Jockey Pump (76P-3) lost suction momentarily, resulting in a fire header pressure decrease.
- Between 0130 and 0135 hours - Electric Fire Pump 76P-2 was shutdown locally after verification of normal fire header pressure by an operator that had been dispatched to the area.
- Control Room operators noted condenser inlet temperature was 58F.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

- Control Room operator noted an increase in circulating water pump motor amperage (which is consistent with decreased suction pressure).
  - Fire Pumps 76P-2 and 76P-4 started automatically on low fire header pressure at 95 psig and 85 psig respectively.
  - Load reduction to allow a reduction in cooling water demand was initiated.
- 0138 hours - Circulating Water Pump 36P-1C shutdown. This reduced the total cooling water demand approximately 30 percent
- 0140 hours - The operator dispatched to the fire pump and greenhouse area reported water level in the forebay area was an estimated 10 feet below normal. The shift supervisor directed reactor shutdown by Manual Scram. No actual measurement of forebay water level was made.
- 0143 hours - Condenser inlet temperature peaked at approximately 67F. Two circulating water system pumps and two normal service water pumps continued in operation as the Control Room personnel were executing Abnormal Operating Procedures (AOPs) for Reactor Scram.
- 0147 hours - Fire Pumps 76P-1, 76P-2, 76P-4 and Jockey Pump 76P-3 were shutdown by operators and placed in manual to prevent automatic starting and potential pump damage due to loss of suction.
- 0210 hours - Forebay water level had increased to approximately 6 feet below normal (approximately 1 foot above the minimum fire pump suction level). Two Circulating Water System Pumps and two Normal Service Water System Pumps continued in operation.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

- 0213 hours - Circulating Water System Pump 36P-1A shutdown. One Circulating Water System Pump and two Normal Service Water Pumps continued in operation. Total cooling water demand was approximately 40 percent of the pre-event flow.
- 0215 hours - Forebay water level had increased to approximately one foot below normal.
- Between 0215 and 0430 hours - Fire Jockey Pump 76P-3 was returned to service to maintain normal fire header pressure of approximately 140 psig. Jockey Pump 76P-3 operation appeared to be normal and Fire Pumps 76P-1, 76P-2 and 76P-4 were restored to service with the capability of automatic starting.
- 0430 hours - Forebay water level normal.
- 0940 hours - Testing of Electric Fire Pump 76P-2 and Diesel Fire Pump 76P-4 for 20 minutes on recirculation flow completed with satisfactory results. No unusual noise, vibration or other indications noted.
- 1332 hours - Electric Fire Pump 76P-2 automatic start due to false main turbine bearing fire signal. (The Turbine Bearing Fire Protection Subsystem is a closed head pre-action system. Thus the only flow of water was that necessary to flood the system as none of the sprinkler/spray heads were fused.) No unusual noise vibration or other indications were noted and the pump was shutdown when normal fire header pressure was verified.
- 1820 hours - Electric Fire Pump 76P-2 declared inoperable based on engineering evaluation of pump performance test data. The data was from tests conducted prior to the partial blockage of the intake structure with ice.
- February 26, 1993:  
0207 hours - West Diesel Fire Pump 76P-1 declared inoperable due to engine overheating during pump performance testing.



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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			0   0   6	0   0	0   8	OF 1   1

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

Fire Pumps 76P-1, 2, 3, and 4 are designed for a minimum suction level of 239 feet 6 inches above sea level in the pump suction bays. As noted above, partial blockage of the intake resulted in a drain down of forebay and pump suction bays of approximately 10 feet. This resulted in a forebay water level between 236 and 237 feet above sea level. The bottom of the suction bell for fire pumps is at elevation 234 feet 8.75 inches; approximately 2 feet below the level observed by the operator at 0140 hours.

Telephone conversations with fire pump vendor personnel indicate that a forebay water level between 236 and 237 feet elevation would not be expected to cause damage to an operating fire pump for short time period that the pumps were operating. The relatively low flow while a fire pump is operating on recirculation flow (approximately 250 gpm) would not be expected to result in vortices and air being drawn into the pump. Notwithstanding the conversations with pump vendor personnel it is apparent that the Fire Jockey Pump (76P-3) did have some air drawn into the pump due to vortices at the pump suction or due to level in the pump suction bay decreasing to below the pump suction bell for a short time. This momentary loss of suction (or drawing of air) was evident from the Fire Header Pressure decrease which resulted in automatic starting of Fire Pumps 76P-1, 76P-2 and 76P-4.

West Diesel Fire Pump 76P-1

On February 26, 1993, Fire Pump 76P-1 was shutdown and declared inoperable when engine overheating was evident approximately seven minutes after engine start for performance testing. Engine cooling is provided by a portion of pump discharge flow which is directed to the engine cooling heat exchanger.

Inspection of a Y-strainer in the cooling water flow path revealed metal pieces which appeared to be from broken pump internal parts. The pump was removed and replaced with a new pump of the same design flow and developed head. Fire Pump 76P-1 was declared operable on March 4, 1993 at 1655 hours following performance testing.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

Cause of Event:

Electric Fire Pump 76P-2

The low discharge pressure on Fire Pump 76P-2 is attributed to normal wear. The pump has been inservice since 1973 during the completion of plant construction and preoperational testing. No major maintenance work such as replacement of wear rings or other internal pump parts had been conducted during the past 20 years. Following rebuild of the pump which was formerly in service as 76P-1 (or purchase of a new pump) the Electric Fire Pump will be replaced. The currently installed 76P-2 will then be disassembled and inspected. This inspection may provide additional information concerning the cause of the low discharge pressure.

Personnel did not recognize that the fire pump performance requirement of 2,500 gpm at 125 psig was different than the more common calculation of Total Developed Head (TDH) which is used for monitoring pump performance in systems such as Core Spray or RHR/LPCI.

West Diesel Fire Pump 76P-1

1. Engine Overheating: Overheating of the engine for Fire Pump 76P-1 was determined to be caused by plugging of the cooling water Y-strainer with broken parts from the pump internals.
2. Pump Failure: The cause of the pump failure is attributed to normal wear. The metal parts found in the engine cooling Y-strainer were from a pump shaft bearing support. The pump would perform normally with the failed bearing support which is intended to reduce harmonic vibration. Other pump bearings were also severely worn and the upper bearing near the pump packing indicated overheating which is attributed to inadequate lubrication (with water) during operation of the pump for a few minutes while the forebay water level was low.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

Analysis of Event:

The inoperability of Fire Pumps 76P-1 and 76P-2 at the same time would have seriously degraded the plant fire suppression capability if the third fire pump had not been previously installed and available for operation.

Partial blockage of the plant cooling water intake with ice was not safety significant. Reducing the cooling water demand allowed the water level in the forebay area and pump suction bays to quickly return to near normal level. Residual Heat Removal Service Water (RHRSW) [BI] pumps and Emergency Service Water (ESW) [BI] pumps are designed for a minimum pump suction water level of 235 feet.

The combined maximum cooling water necessary for RHRSW and ESW pumps is approximately 22,000 gpm. This is a small fraction of the cooling water demand for operation of the plant at 100 percent rated thermal power. Additional information concerning the safety significance of partial blockage of the intake structure with ice is contained in LER-93-004.

The event requires a report under 10CFR50.73(a)(2)(i)(B). That is, the improper calculation of Fire Pump 76P-2 discharge pressure resulted in unknowingly continued operation of the plant without corrective action to restore 76P-2 to a condition where the pump would meet minimum flow and discharge pressure.

This LER is also submitted to satisfy the 14 day Special Report requirement of Technical Specification 3.12.A.1.d.2.C due to inoperability of Fire Pumps 76P-1 and 76P-2 at the same time. Further, this LER is submitted to satisfy the 30 day Special Report requirement of Technical Specification 3.12.A.1.C due to Electric Fire Pump 76P-2 being inoperable for more than seven days.

Corrective Actions:

1. Fire Pump 76P-1 was replaced with a new pump and returned to service after performance testing.
2. Fire Pump 76P-2 will be replaced with a new or rebuilt pump as soon as possible but no later than June 1, 1993.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 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)

3. Fire pump performance test procedures will be revised to provide the proper steps for calculation of pump discharge pressure by the next required performance of that procedure.
4. Additional corrective actions related to detecting and mitigating cooling water intake blockage are discussed in LER-93-004.

Additional Information:

Failed Components: Fire Pump 76P-1  
 Manufacturer: Johnston Pump Company  
 Previous Similar Events: No LERs have been previously submitted concerning inoperability of both fire pumps.

Update Plans and Correction of Error in Prompt Report:

An update of this LER is NOT expected to be submitted unless examination of the fire pumps or other information results in a substantial change in the understanding of the potential consequences or safety significance of the event.

The initial notification of this event made via ENS and the facsimile transmission contained an error. The notifications indicated the following sequence of pump inoperability:

- Diesel Fire Pump 76P-1 inoperable at 0207 on February 26, 1993
- Electric Fire Pump 76P-2 inoperable at 1500 on February 26, 1993

The actual sequence was:

- Electric Fire Pump 76P-2 inoperable at 1820 on February 25, 1993
- Diesel Fire Pump 76P-1 inoperable at 0207 on February 26, 1993

The NRC Resident Inspector and Licensing Project Manager were both informed of the error verbally. The error did not have any effect on response to the event.