CENTERIOR ENERGY

PERRY NUCLEAR POWER PLANT
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Robert A. Stratman
VICE PRESIDENT - NUCLEAR

April 26, 1993
PY-CEI/NRR-1644 L

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

Perry Nuclear Power Plant
Docket No. 50-440
LER 93-010

Dear Sir:

Enclosed is Licensee Event Report 93-010 for the Perry Nuclear Power Plant.

Sincerely,

David P. Boyd for

Robert A. Stratman

RAS:RWG:ss

Enclosure: LER 93-010

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

IE22 1/1

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Perry Nuclear Power Plant, Unit 1	05000 440	1 OF 7

TITLE (4)
Reactor Shutdown Due to Service Water Pipe Rupture

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
03	26	93	93	-- 010 --	00	04	26	93	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.402(b)		20.405(c)	X	50.73(a)(2)(iv)		73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
	20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
	20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Ron W. Gaston, Compliance Engineer Extension 5004	(216) 259-3737

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

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

On March 26, 1993, at 1525 hours, a manual reactor scram was inserted due a rupture in a 30 inch section of underground Service Water piping. Prior to the event, leak isolation was in progress to determine the source of water which was earlier reported coming from the ground near the Water Treatment Building. An Alert was conservatively declared at approximately 1535 hours due to flooding in plant areas which potentially posed a threat to safe shutdown equipment.

All plant equipment functioned as designed during the plant shutdown with the exception of several minor equipment anomalies. No safety related equipment was affected as a result of the flooding.

The cause for the piping failure was attributed to induced axial piping stress caused by pipe bending as a result of a localized loss of soil support. Appropriate corrective action to effect repairs to the Service Water piping will be completed prior to plant startup. Additional corrective measures will also be taken to minimize water entry into plant buildings.

I. Introduction

On March 26, 1993, at 1524 hours, a fast reactor shutdown was initiated due a rupture in a 30 inch section of underground Service Water piping. Prior to the event, the plant was in Operational Condition 1 (Power Operation) at 100 percent of rated thermal power. At 1535 hours an Alert was declared due to flooding of plant areas.

The following NRC notifications were completed to satisfy the applicable reporting requirements:

Reporting Requirement		Description
10 CFR 50.72(a)(i)	[1 hour]	To report the Alert declaration
10 CFR 50.72(b)(i)(v)	[1 hour]	To report difficulty manning the Technical Support Center (TSC) due to flooding
10 CFR 50.72(b)(2)(ii)	[4 hour]	To report the manual shutdown of the reactor
10 CFR 50.72(b)(2)(ii)	[4 hour]	To report various ESF actuations
10 CFR 50.72(b)(2)(vi)	[4 hour]	To report a news release concerning the Alert declaration

The 10 CFR 50.72 notification to report difficulty in manning the TSC was later determined to be not required since no loss of emergency assessment capability actually occurred.

This event is additionally being reported in this LER to satisfy the corresponding requirements of 10 CFR 50.73(a)(2)(iv) regarding the initiation of a manual reactor shutdown and ESF actuations.

Additionally, a Region III NRC Augmented Inspection Team was dispatched to the site between March 27 and April 2, 1993 to review the circumstances surrounding this event.

II. Description of the Event

At 1315 hours on March 26, 1993 water was reported coming from the ground near the Water Treatment Building [MH] at an approximate rate of 75 to 100 gallons per minute (gpm). Walkdowns of plant buildings in the surrounding areas were performed to identify any abnormalities. Concurrent with this activity, attempts were made to determine the source of the leak by systematically isolating potential water sources in the area. At 1328 hours, the Emergency Service Water (ESW) [BI] B loop was secured with no effect on the leak. The ESW A and C loops were not operating at that time. Between 1411 and 1447, similar isolations were performed on the Two Bed Demineralizer and Mixed Bed Demineralizer systems which also had no effect on the leak.

At 1521 hours, the Service Water [KG] pump discharge header low pressure alarm was annunciated in the Control Room. The Control Room personnel responded by throttling the Nuclear Closed Cooling (NCC) [CC] heat exchanger [HX] bypass valve and starting the idle Service Water pump as directed by plant procedures. Shortly thereafter, plant personnel in the vicinity of the leak indicated that the amount of water coming from the area had substantially increased. At 1525 hours, the Shift Supervisor, who was at the leak site, directed the Unit Supervisor in the Control Room to commence a fast reactor shutdown in preparation for terminating Service Water flow. At 1526 hours the reactor was manually scrammed from 66 percent reactor power.

Control Room personnel entered Plant Emergency Instruction (PEI)-B13, "Reactor Pressure Vessel Control" at 1527, when reactor vessel water level dropped below Level 3 (178 inches above the top of the active fuel) due to level shrink after the scram. The lowest vessel level reached during the transient was 157 inches. At 1530, a plant cooldown was commenced using Reactor Core Isolation Cooling for level control and Bypass Valves for pressure control.

The plant had previously entered Off-Normal Instruction (ONI)-P41, "Loss of Service Water" prior to the fast reactor shutdown and continued with prescribed actions to stabilize the balance of plant systems supported by the Service Water System.

At 1535, an Alert was declared due to reports of significant flooding in plant buildings. The Service Water System was shutdown at approximately 1540 hours. At 1645 reactor vessel pressure control was shifted to the Safety Relief Valves (SRVs) [RV] due to the impending loss of condenser vacuum. Control Room Operators began closing Main Steam Isolation Valves (MSIVs) [ISV]. Main Condenser vacuum was manually broken at 1655 hours. An MSIV isolation signal was generated at 1658 as a result of the low condenser vacuum. All MSIVs and inboard drain valves had been manually closed prior to the isolation; therefore only the outboard drain valves repositioned in response to the isolation signal. Shutdown cooling utilizing Residual Heat Removal (RHR) A loop was established at 2014 hours on March 26, with the plant reaching cold shutdown (Mode 4) at 2210. At 0150 hours on March 27, 1993, the Alert was terminated and the recovery phase initiated.

III. Apparent Cause for the Pipe Failure

The eventual catastrophic failure of the 30 inch Service Water pipe is believed to have resulted from axial pipe stress caused by pipe bending due to a localized loss of soil support. The loss of soil support was caused by erosion from an existing leak on the underside of the pipe. It appeared that the leak had existed for an considerable period of time prior to the complete failure of the affected pipe section on March 26.

The exact cause for the initial leak may never be definitively determined due to the loss of fragments of pipe material during the event. However, it is believed that the leak may have been the result of several contributing factors. These include an axial strength which was adequate for normal system service loads, but was insufficient to accomodate possible additional localized loads/stresses due to items such as laminate degradation over time, fabrication defects, or other similar deficiencies. An ongoing evaluation will continue to investigate potential causal factors associated with the initiating leak.

IV. Equipment Malfunctions and Anomalies

The following summary includes equipment problems which appeared to be directly associated with the March 26 event:

As stated previously, PEI-B13 was initially entered at 1527 on March 26. Entry into PEI-B13 requires that the hydrogen analyzers be placed into service. When the lineups were completed for placing the instruments in service, they indicated a hydrogen concentration of 2.5 percent for the drywell head and 1.5 percent for the containment dome requiring entry into PEI-M51/M56, "Drywell And Containment Hydrogen Control". Subsequent chemistry analyses confirmed that the instruments were giving false high readings and PEI-M51/M56 was exited.

While performing procedural steps directed by ONI-P41, a misinterpretation on the part of an operator resulted in a premature shutdown of both condenser hotwell pumps. The termination of condensate flow caused steam to be discharged directly into the Offgas System [WF] without being condensed. Necessary corrective actions to return the system to service will be completed prior to plant startup.

The pump casing for the A Service Water Screenwash Pump split at some time during the event. The cause for the material failure is unknown at this time. The ongoing investigation for this occurrence will determine if the cause was associated with the pipe rupture.

Additional equipment related items include minor cavitation noted for the Control Rod Drive (CRD) [AA] Pump A due to loss of suction during the event. An investigation did not reveal any evidence of damage resulting from the cavitation. A glycol skid in the Offgas building was wetted during the event causing problems with the associated electrical controls and indications. The extent of damage will be determined from followup corrective actions.

V. Safety Analysis

As stated earlier, no safety-related equipment was affected as a result of this event and there were no radiological consequences associated with this event.

In the design for the Perry Nuclear Power Plant, an underground break of Service Water piping was not considered a significant threat for internal flooding of the plant or a challenge to the design capacity of the Underdrain System. Therefore, neither of these aspects are directly addressed in the Perry Updated Safety Analysis Report (USAR).

The Plant Underdrain System is designed for a postulated break in the 12 foot diameter Circulating Water System piping or failed expansion joints occurring inside the turbine building through flow from a fracture in the building basemat. The Underdrain System capacity is sized to accommodate the total volume of water from the design basis accidents (DBAs) described above, while maintaining the underground water level below Elevation (El.) 590-feet (ground level is El. 620-feet).

Although the internal and external pathways taken by the water during the March 26 Service Water System break were not specifically considered in the USAR Underdrain System analysis, the event was bounded by the DBA flooding scenarios.

A majority of the water inside the plant entered through spare conduits near the ceiling of Control Complex El. 599-feet. The conduits previously contained plugs which were expelled by the incoming water. The conduits are housed in an electrical penetration which originates in Electrical Manhole (EM) 1. EM 1, which is adjacent to the areas where the pipe rupture occurred, was not sealed; thereby allowing water to establish a gravity drain path through the electrical penetration and associated conduits.

Other buildings affected by internal flooding include the Auxiliary Building, Radwaste Building, Turbine Building, Intermediate Building, Turbine Power Complex and Emergency Service Water Pumphouse. Water in these buildings entered primarily through doors or electrical penetrations. Water levels in the buildings varied between 1 to 8 inches, below levels which could compromise the operability of any safety-related equipment. Therefore, since the flooding did not result in any safety related or safe shutdown systems being adversely affected, this event is not considered to be safety significant.

VI. Similar Events

A previous event involving a catastrophic rupture of fiberglass piping occurred on December 22, 1991. The 1991 event was reported to the NRC in LER 91-027 and the Perry response to Confirmatory Action Letter (CAL) 91-016A, (PY-CEI/OIE-0388 L) dated February 3, 1992.

The cause for the 1991 event was attributed to a pre-existing construction defect, combined with a degraded pipe support, resulting in undesirable loading stresses being placed on a fiberglass elbow. The December 1991 event involved an above ground transition point between the fiberglass and steel piping for an auxiliary condenser. The specific causal factors associated with the recent event involving the Service Water pipe rupture appear to be unique and unrelated to the previous failure of the Circulating Water System piping.

Water intrusion into plant buildings occurred through similar pathways in both events. Corrective actions from the December 1991 event involving the sealing of conduits and manhole covers had not been fully implemented at the time of the March 26 event. However, administrative actions taken to maintain Underdrain System peizometer tube caps in place and maintain covers on manholes when not in use may have partially mitigated the effects of flooding during the recent event.

VII. Corrective Actions

The failed portion of the 30 inch Service Water pipe is being repaired with a conservatively designed fiberglass reinforced plastic (FRP) replacement pipe. Particular attention is being paid to the interface with the existing Service Water piping to ensure a smooth loading and stress transition. An ongoing investigation to determine the root cause for the pipe failure will continue to investigate potential causal factors associated with the initiating leak.

Substantial portions of the remaining Service Water piping are undergoing internal visual inspections to determine the extent of damage. Several types of laminate degradation have been identified and categorized with respect to structural significance. Those considered significant will be repaired prior to startup from the current forced outage.

Due to the above inspections and repairs, it is expected, with a high level of confidence, that the Service Water System will be acceptable for continued service until Refueling Outage (RFO) 6 (currently scheduled for March 1997). Further engineering evaluation will be performed to determine appropriate long term corrective action, if required, to ensure satisfactory Service Water operation beyond RFO 6.

With regard to corrective actions for items described previously in Section IV, "Equipment Malfunctions And Anomalies":

1. The false readings indicated by the Hydrogen Analyzers were determined to be the result of leakage from fittings and valves on the Hydrogen Analyzer skids. One of the analyzers also required replacement of a catalyst cell. The Hydrogen Analyzers were satisfactorily calibrated after completing repairs.

2. Corrective actions required to restore the operability of the Offgas System will be completed prior to startup from the current forced outage. Procedures associated with the occurrence involving the Offgas System will be evaluated for potential enhancements.

3. The cause for damage to the Service Water Screenwash Pump casing will be determined as part of an ongoing evaluation. The evaluation will also determine whether the cause was directly associated with the Service Water pipe rupture.

4. The extent of water damage to the Offgas System glycol skid which was wetted during the event will be determined as part of overall followup corrective actions for this event.

5. Modifications will be implemented to seal identified water entry points for plant buildings.

The corrective actions summarized above are also included in a comprehensive listing of required actions being tracked by a Perry Incident Response Team (IRT). The IRT was established during the recovery phase of the March 26 event to coordinate investigations and evaluations associated with the event. Corrective actions are being prioritized for completion commensurate with their overall significance and will be completed under existing site procedures for corrective action and work control.

Energy Industry Identification System Codes are identified in the text as [XX].