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Document Control Branch (Document Control Desk)

SUBJECT: Special Rept 1-091-0101,on 910920,LPI sys inadvertently overpressurized,causing of loss approx 12,400 gallons of RCS inventory to liquid waste disposal sys.Caused by mgt deficiency.Procedures revised & training conducted.

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DUKE POWER

December 12, 1991

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Special Report Concerning
Low Pressure Injection System

Gentlemen:

This report is provided for information regarding overpressurization of the Low Pressure Injection System.

If you have any questions, please contact Rick Matheson at (803) 885-3119.

Very truly yours,

J. W. Hampton/RLS

J. W. Hampton
Vice President

/ftr

Attachment

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IE22
1/1

LICENSEE EVENT REPORT (LER)

FACILITY NAME(1)	DOCKET NUMBER(2)	PAGE(3)
Oconee Nuclear Station, Unit 1	05000 269	1 OF 18

TITLE(4)
Low Pressure Injection System Overpressurized Due to Management Deficiency

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)
										05000
09	20	91	91	Special Report	0	12	12	91		05000

OPERATING MODE(9)	N	THIS REPORT IS SUBMITTED PURSUANT TO REQUIREMENTS OF 10CFR (Check one or more of the following)(11)					
POWER LEVEL(10)	0		20.402(b)		20.405(c)		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)	X	OTHER (Specify in Abstract below and in Text) Special Report
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		
			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	
	AREA CODE	
Henry R. Lowery, Chairman, Oconee Safety Review Group	803	885-3034

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	
F	BP	V	L265	Yes							

SUPPLEMENTAL REPORT EXPECTED(14)		EXPECTED SUBMISSION DATE(15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUMMISSION DATE)	X NO				

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

On September 20, 1991, at approximately 0000 hours, while in cold shutdown after a refueling outage, the Unit 1 Low Pressure Injection (LPI) System was inadvertently overpressurized causing a loss of approximately 12,400 gallons of Reactor Coolant System (RCS) inventory to the Liquid Waste Disposal System. In preparation for start up, RCS pressure was inappropriately increased without performing the required procedure step of aligning the LPI System into the "Switchover" mode. This alignment is necessary to prevent the rated pressure of various components and portions of the LPI System piping from being exceeded. When the RCS pressure reached the setpoint of the LPI System relief valves, reactor coolant was relieved to the High Activity Waste Tank. RCS inventory was maintained using normal makeup and reserve volume from the Borated Water Storage Tank. The RCS was depressurized and the LPI relief valves reseated, thus terminating the event at approximately 0410 hours on September 20, 1991. The root cause of this event is management deficiency. Corrective actions include management oversight of Control Room activities, procedure revisions, and training regarding shutdown issues.

BACKGROUND

The Low Pressure Injection (LPI) [EIIS:BP] System is used to remove decay heat from the core during shutdown conditions. Three LPI pumps [EIIS:P] are available to take suction from the decay heat drop line which originates at the bottom of the Reactor Coolant System (RCS) [EIIS:AB] reactor vessel [EIIS:VSL] hot leg. The LPI pumps discharge through either of two LPI coolers to the reactor vessel (See Attachment 1). The cooling medium for the LPI coolers is from the Low Pressure Service Water [EIIS:BI] System, supplied from Lake Keowee.

The original design of Units 1 and 2 LPI Systems did not allow RCS pressurization sufficient to reach minimum Reactor Coolant pump (RCP) net positive suction head. Also, the LPI coolers on Units 1 and 2 are not designed to withstand the elevated pressure from the combined suction head of the RCS and the discharge head of the LPI pump. Modifications to piping were made, prior to initial plant operation, to accommodate this. Therefore, in plant evolutions that require running the RCPs while the LPI System is removing decay heat from the core, the LPI System is required to be aligned in the "switchover" mode. The B LPI cooler is aligned to the suction side of either A or C LPI pump rather than to the normal discharge side of either of the three LPI pumps (See Attachment 2). Only one LPI cooler is available for decay heat removal in this mode. The LPI System is required to be in switchover mode before RCS pressure is increased above 125 psig.

The LPI pump suction relief valves (1LP-26 and 1LP-27) [EIIS:V] are set to relieve at 200 psig at 350 degrees F. The LPI cooler relief valves (1LP-36 and 1LP-37), located on the inlet side of the coolers, are set to relieve at 370 psig at 350 degrees F. All four of these relief valves are piped such that when the valve relieves, the water is directed to the High Activity Waste Tank.

High Pressure Injection (HPI) [EIIS:BQ] seal flow is required to the Reactor Coolant pumps when RCS pressure is above 100 psig. The HPI System can also supply Pressurizer Auxiliary Spray during low pressure operation. This alignment of HPI System water to the pressurizer spray header provides cooler water for depressurization rather than the normal alignment of RCS coolant.

EVENT DESCRIPTION

A sequence of events table is included with this report. See Attachment 3.

On September 19, 1991, at approximately 1830 hours, when Unit 1 Operations personnel received turnover, the unit status was as follows: the unit had been shut down for 50 days in a scheduled 55 day refueling outage, the core had been refueled, the Reactor Coolant System (RCS) pressure was at 60 psig with a steam bubble in the pressurizer, and the Low Pressure Injection (LPI) System was in service in normal lineup providing two trains of decay

heat removal from the core during refueling. The 1A High Pressure Injection (HPI) pump was in service.

Many outage related activities were being performed in preparation for unit startup. The Control Room Senior Reactor Operator (CR SRO) was involved in running the 1B HPI pump for post maintenance testing, completing valve checklists that were in progress, completing containment isolation procedures, valve testing, returning feedwater heaters to service, and the completion of a seal supply filter leak test. The CR SRO was responsible for the oversight of these jobs and was involved in providing direction for several of these jobs at the time of the incident.

Reactor Operator (RO) A was involved in the seal supply filter leak test, placing feedwater heaters into service, answering phone calls and attending to miscellaneous job activities as they arose. RO B was the dedicated operator monitoring RCS temperature and pressure. RO C was involved in running 1B HPI pump for testing and monitoring the pump parameters.

At 2151 hours, the 1B HPI pump was started for post maintenance testing. This test was being performed at this time so that a backup pump with an automatic start function would be available for seal supply to the Reactor Coolant Pumps (RCPs) at RCS pressures greater that 100 psig. The 1C HPI pump was available for backup, but would require operator action if 1A HPI pump failed.

Due to increasing upper bearing temperatures on 1B HPI pump, the Unit Supervisor gave instructions, at approximately 2200 hours, to the ROs in the Control Room to increase RCS pressure to 90 psig. The increased RCS pressure would result in increased letdown flow, and therefore, makeup flow would be increased. Historically, the HPI pumps run smoother at higher flow rates, which result in lower bearing temperatures. He instructed them not to exceed 100 psig. The pressure was increased to 90 psig.

During this time the CR SRO observed the increase in pressure and asked RO B why the pressure was being increased. RO B told him that the Unit Supervisor had authorized the increase in pressure. The Unit Operations Coordinator (UOC) was monitoring the 1B HPI pump test and was evaluating the results to determine if the pump met the acceptance criteria. RO C was continuously monitoring the pump parameters because the upper bearing temperature was near the operating limit.

The decision was made by the UOC that the 1B HPI pump had met the acceptance criteria. However, because of the bearing temperature trend, the 1B HPI pump was left in service. The pump parameters still had to be monitored by RO C.

At approximately 2255 hours, the UOC and the Unit Supervisor decided that RCS pressure could be increased to 300 psig in order to provide NPSH for the RCP runs. The RCPs were to be run for five minutes each to verify pump operability. This general discussion took place in the Unit Supervisor's office.

At 2300 hours the Unit Supervisor called the control room and told RO A that he was cleared to increase RCS pressure to 300 psig. RO A relayed this message to RO B who was the operator at the controls, monitoring temperature and pressure. RO B energized the pressurizer heaters to increase pressure to 300 psig.

The CR SRO again observed the RCS pressure increase some time after 2300 hours and before approximately 2350 hours. He asked RO B why he was increasing pressure. RO B replied that the Unit Supervisor had cleared the pressure increase to 300 psig.

At 2352 hours, RO C placed 1B letdown filter into service.

At approximately 0000 hours on September 20, 1991, RO C observed the High Activity Waste Tank (HAWT) level increasing, pressurizer level decreasing and the makeup flow rate higher than normal. He informed the other ROs and the CR SRO of these indications. Suspecting a gasket leak in the letdown filter that he had previously placed in service, RO C bypassed 1B letdown filter at 0013 hours. Non-licensed operators (NLOs) were dispatched to the auxiliary building using procedure OP/0/B/1106/33, "Primary System Leak Identification", as guidance to locate the leak.

At approximately 0016 hours, RO C informed the UOC and the Shift Supervisor of the increased leakage.

The CR SRO referred to the abnormal procedure for excessive RCS leakage. At approximately the same time an NLO reported that drains were overflowing in the HPI pump room. It was later determined that the source of the leak was not in this room, but, due to the piping configuration of the drains to the HAWT, these drains had overflowed.

Two Craft Maintenance Technicians were entering the LPI pump room to check valves. As they started to descend the spiral staircase, they observed water spraying from 1LP-26 (LPI Pump Suction Relief Valve). They immediately exited the room and reported this finding to their acting supervisor. The Craft Maintenance Technician (acting supervisor) called Unit 1 control room at 0025 hours, and reported that this valve was leaking.

Due to this phone call and upon reviewing the piping flow diagrams, at 0027 hours, the Shift Supervisor and the UOC realized that the LPI System should be in switchover mode. After confirming that the LPI System was not aligned in switchover mode with the RCS pressure at 245 psig, the Shift Supervisor directed RO B to de-energize the pressurizer heaters in order to begin reducing RCS pressure. The LPI pump differential pressure was observed to be approximately 175 psig during this event. This pressure combined with RCS pressure of 245 psig caused the LPI cooler inlet piping to be pressurized to approximately 420 psig.

The Shift Supervisor questioned the Unit Supervisor, the CR SRO, and the ROs to determine exactly what had happened and to develop a plan of action for reducing RCS pressure.

The Superintendent of Operations and the Unit Operations Manager had been notified and arrived on site during this time. They discussed the event with the Shift Supervisor and the method to be used for depressurization.

At approximately 0130 hours, the Shift Supervisor directed the ROs to depressurize the RCS using Pressurizer Auxiliary Spray per OP/1/A/1102/10, "Controlling Procedure for Unit Shutdown". This alignment depressurizes the RCS by introducing water from the HPI pump discharge piping directly to the pressurizer spray header. NLOs were dispatched to perform the valve alignment. One of the valves necessary to perform the alignment could not be identified by the NLOs. After reviewing the piping drawing, an alternate valve was closed to make the alignment. After more investigation, the valve identification tag was found obscured by insulation. The insulation was removed from the tag. At 0234 hours, the use of Pressurizer Auxiliary Spray was begun to reduce to RCS pressure. By 0243 hours the RCS pressure was less than 200 psig. Pressurizer cooldown rate was closely monitored.

At approximately 0300 hours, Operations notified the Radiation Protection (RP) group of the leakage in the LPI room in preparation for NLOs to enter the room to check the relief valves. RP began collecting air samples and performing contamination surveys in the room.

At approximately 0330 hours, while RP personnel were obtaining air samples, they observed that valve 1LP-26 had stopped leaking, indicating that the relief valve had reseated. The RP Supervisor informed the Unit Supervisor that the leak had stopped.

At approximately 0410 hours the HAWT level trend returned to normal, indicating that all the relief valves had reseated. NLOs entered the rooms after consulting the RP group for radiological instructions. They verified that the relief valves had reseated by monitoring tailpipes for flow.

RCS pressure was further reduced. At 0454 hours, Pressurizer Auxiliary Spray was secured and RCS pressure was stabilized at approximately 98 psig.

During the time that RCS inventory was being lost to the waste tanks through the relief valves, the level in the Letdown Storage Tank was being maintained by borated water from the 1A Bleed Holdup Tank (the normal makeup source). When that water supply was exhausted, 1,250 gallons of water from the Borated Water Storage Tank (BWST) was added. A contingency plan was being formed by the Shift Supervisor to continue to supply makeup from the BWST and from the Concentrated Borated Acid Storage Tank, if the loss of inventory had not been stopped.

Operations shift personnel requested a sample of the Low Pressure Service Water from the LPI cooler discharge to be analyzed for radioactivity to ensure no LPI cooler leaks had developed.

During this event, the design pressure rating of portions of the LPI System was exceeded for approximately four hours. The Design Engineering Department was requested to perform an operability evaluation to determine if damage to the LPI System had occurred. The results of this evaluation were received at approximately 2115 hours on September 20, 1991. It stated that the LPI System was operable and safe for continued operation. Design Engineering recommended that two pressure gauges in the LPI System be replaced and that two additional pressure gauges be recalibrated to verify their operability. These actions were performed by September 23, 1991. This restored the LPI System to full operability.

CONCLUSIONS

The Low Pressure Injection (LPI) System was pressurized to approximately 245 psig on the suction side of the LPI pumps and to approximately 420 psig on the discharge side of the pumps. This exceeded the design pressures of the system causing the relief valves located at the suction of the pumps and the relief valves located at the inlet of the coolers to lift. The lifting of these relief valves caused a loss of approximately 12,400 gallons of Reactor Coolant System (RCS) inventory which was contained within the Liquid Waste Disposal System. This event could have been avoided if the LPI System had been placed into switchover mode before the RCS was pressurized to 125 psig.

On September 7, 1991, a similar shutdown event occurred involving the LPI System and is being reported in another special report (PIR 1-091-0096). In that event the RCS was heated up due to a loss of Low Pressure Service Water cooling flow to the LPI coolers. The cause of that event was management deficiency, inadequate policy to assure the existence of continuous safe shutdown conditions. The control room personnel were not focused on critical safety functions during shutdown. The corrective actions for that event were ineffective in the implementation of management expectations regarding supervisor and operator responsibilities in the control room and the understanding of the "chain of command".

Portions of the corrective actions for that event had been implemented and communicated to the Operations personnel, but there was evidence that Station Management's expectations had not been understood by most of the Operations personnel that were involved in this event. Another Control Room Senior Reactor Operator (CR SRO) had been assigned to the Unit 1 and 2 Control Room. This CR SRO's function was intended to provide oversight in shutdown activities and maintain a "big picture" awareness of plant status. The majority of the Unit 1 and 2 CR SRO's time had already been devoted to activities involving the shutdown unit. From the second CR SRO's perspective, his responsibilities had changed very little. This corrective action was ineffective because Station Management did not succeed in

implementing the changes to attain the results desired. A substantial portion of the communication process is to ensure that the intended message is received. Station Management did not attain sufficient feedback from the Operations personnel to ensure that the message had been received and understood as intended. The root cause of this event is management deficiency, deficient communication, inadequate management interface. A policy had been developed after the event that occurred on September 7, 1991 to define the roles of the CR SRO and the Operator at the Controls. This policy had been verbally communicated in meetings with the Operations shift personnel. However, the personnel that were interviewed after this event had left the meetings with a different interpretation of the expectations than was intended by Station Management.

Also, the Unit Supervisor and the CR SRO were not providing adequate management interface in preparing to start up the unit. They were not communicating with each other concerning the changes and evolutions that were being planned.

The Supervisors were not aware of the "big picture". They were not providing adequate supervision while changes were being made to critical plant parameters and they were not ensuring that appropriate procedures were being used to make these changes. As the message was relayed, through several chains of command, to increase pressure, no one questioned whether this action was appropriate by procedure. The CR SRO did question RO B at two different times when he saw the pressure increase, but still did not ensure that all procedure requirements had been met.

Critical plant parameters were being changed without reference to the startup procedure. Each person who communicated the instructions to increase pressure to 300 psig, assumed that someone else had referred to the procedure. It is the responsibility of the person performing the action to ensure that all required limits and precautions, prerequisites and previous steps have been completed. This responsibility was not fulfilled by RO B when he began the pressure increase, therefore a contributing cause of this event is inappropriate action, failure to follow procedure when one existed. The Controlling Procedure for Unit Startup contained a step to align the LPI System to Switchover mode per OP/1/A/1104/04 (LPI System). The following step stated to increase pressure to greater than NPSH for the reactor coolant pumps.

The controlling procedure for startup was not readily accessible to the operators. It had been placed on a side table during previous hold points while preparing for unit startup. During unit startup the procedure should be referenced before any actions are taken to maneuver the plant parameters. Other deficiencies were observed in the proper use of procedures. There was a failure to follow procedures as described in the Station Directive 2.2.1 in that some steps had been performed out of sequence with no explanation given on the procedure. The startup procedure contains a flow chart to assist the user in maintaining the "big picture". This flow chart was not used by the Unit Supervisor, the CR SRO, or the

ROs. Also, the outage schedule showed a timeframe for the LPI System to be placed into switchover mode, but this was also not used.

The abnormal procedure that was used, Excessive RCS Leakage, contained no instructions to notify the Radiation Protection (RP) group. The RP group was notified of the leak from 1LP-26 in the LPI room by Operations at approximately 0300 hours. The abnormal procedures will be revised to ensure procedural guidance for notification of Radiation Protection is included where appropriate.

Several operators expressed concern that systems training for startup and shutdown activities was not provided to the extent necessary. They felt that the training was much stronger in regard to emergency operating procedures. Operations will initiate supplemental training to Licensed Operators in the procedures used for shutdown, startup, and prolonged operation at cold shutdown.

During this event, even though the CR SRO had been designated as the person in the control room who was to watch the total picture, he allowed himself to become involved in the details of the work activities. He did not ask for help or exercise his command over control room activities. Operations management will form a team of shift representatives to evaluate issues dealing with command and control. This is a broad category that will include communications, lines of responsibility, duties of the operator at the controls, quality standards, turnover practices, watchstanding techniques, and other control room practices.

A review of past events indicates that this problem is recurring. In addition to the RCS heatup event due to loss of LPI decay heat removal capability on September 7, 1991, there have been five other events in the past two years which have involved, to some extent, less than adequate awareness of plant status. (See Attachment 4). The corrective actions for these events did not prevent the occurrence of this event.

There was an equipment failure on valve 1LP-26, due to the external leakage through the cap gasket. This is a Lonergan model LCT-11/L3 valve. This is an NPRDS reportable equipment failure. There were no personnel injuries or excessive personnel exposures associated with this event. The 12,400 gallons of RCS inventory that was lost through the LPI System relief valves was contained within the Liquid Waste Disposal System and within the bounds of the Radiation Control Area. No radioactive spill or release to the environment occurred.

CORRECTIVE ACTIONS

Immediate

1. The pressurizer heaters were de-energized to reduce Reactor Coolant System (RCS) pressure.

2. Makeup to the RCS was provided per the Excessive RCS Leakage abnormal procedure to account for inventory lost from the relief valve to the Liquid Waste Disposal System.

Subsequent

1. The RCS was depressurized using Pressurizer Auxiliary Spray per the Controlling Procedure for Unit Shutdown.

2. Verification was performed to ensure that the Low Pressure Injection (LPI) System relief valves had reseated.

3. Design Engineering performed an operability evaluation of the LPI System and found it to be operable.

4. Two pressure gauges were replaced and two other pressure gauges were recalibrated within the LPI System to verify proper operation as recommended by Design Engineering.

5. Relief valve 1LP-26 was replaced because of the leakage through the cap gasket.

6. Beginning on September 20, 1991, a management representative possessing a Senior Reactor Operator (SRO) license was placed on shift to provide management oversight.

7. The Controlling Procedures for Unit Startup on Units 1 and 2 were revised to clearly state that the LPI System must be placed in switchover mode prior to increasing the Reactor Coolant System pressure above 125 psig.

8. Operations Management Procedure 2-1 has been expanded to designate an Operator at the Controls (OATC), who has prime responsibility for monitoring critical plant parameters. Duties of the OATC, the Unit Supervisor and the Control Room Supervisor are delineated, as well as the proper chain of command and communication channels.

9. The Operations Superintendent and Shift Operations Manager met with each Operations shift to explain the duties of the operator at the controls and to discuss the problems associated with shutdown events.

Planned

1. A team of shift representatives, formed by Operations management, will evaluate issues such as command and control, communication practices, lines of responsibility, duties of the OATC, duties of the SROs, and quality standards.

2. Operations will initiate supplemental training to Licensed Operators on shift in the procedures used for shutdown, startup, and prolonged operation at cold shutdown.

3. Operations Management Procedure 2-1 will be revised to also include the duties and responsibilities of the Shift Supervisor.

4. Operations abnormal procedures will be reviewed and revised as necessary to ensure procedure guidance for notification of Radiation Protection is included where appropriate.

SAFETY ANALYSIS

Design Engineering (DE) performed an analysis of the effect of the overpressurization on Unit 1 Low Pressure Injection (LPI) System. This analysis included the piping, valves, coolers, and instrumentation. Based on actual observed pressure measurements of 245 psig on the suction side of the LPI pumps and 175 psig LPI pump differential pressure, the pressure of the piping on the discharge side of the LPI pumps was estimated to be 420 psig. Using conservative assumptions of instrument error, the calculation showed that the most limiting component of the analysis was a section of the LPI cooler inlet piping. Based on a conservative calculation of instrument error, DE estimated that this pipe could have been pressurized to 24 psig greater than the calculated maximum code design pressure of 420 psig during this event. Maximum code design pressure is a calculated pressure for a specific pipe size, material and design temperature. It is based on code maximum allowable stress for the material and material specification minimum wall thickness. Even though this section of piping could have been pressurized to 24 psig greater than the maximum code design pressure, DE concluded that this was acceptable based on the fact that this piping can be hydrostatically tested to 600 psig. Considering code conservatism, they deemed that the pipe was not subjected to any damaging stress during the incident and that the LPI System was safe for continued operation.

Design Engineering recommended that two pressure gauges in the LPI System be replaced and two others be recalibrated. These actions were performed by the station.

After the event, a sample was taken of the Low Pressure Service Water (LPSW) downstream of the LPI coolers and analyzed for radioactivity. No indication of radioactivity above minimum detectable activity was found. The sample results supported the radiation monitor response. This verified that the LPI coolers were not damaged.

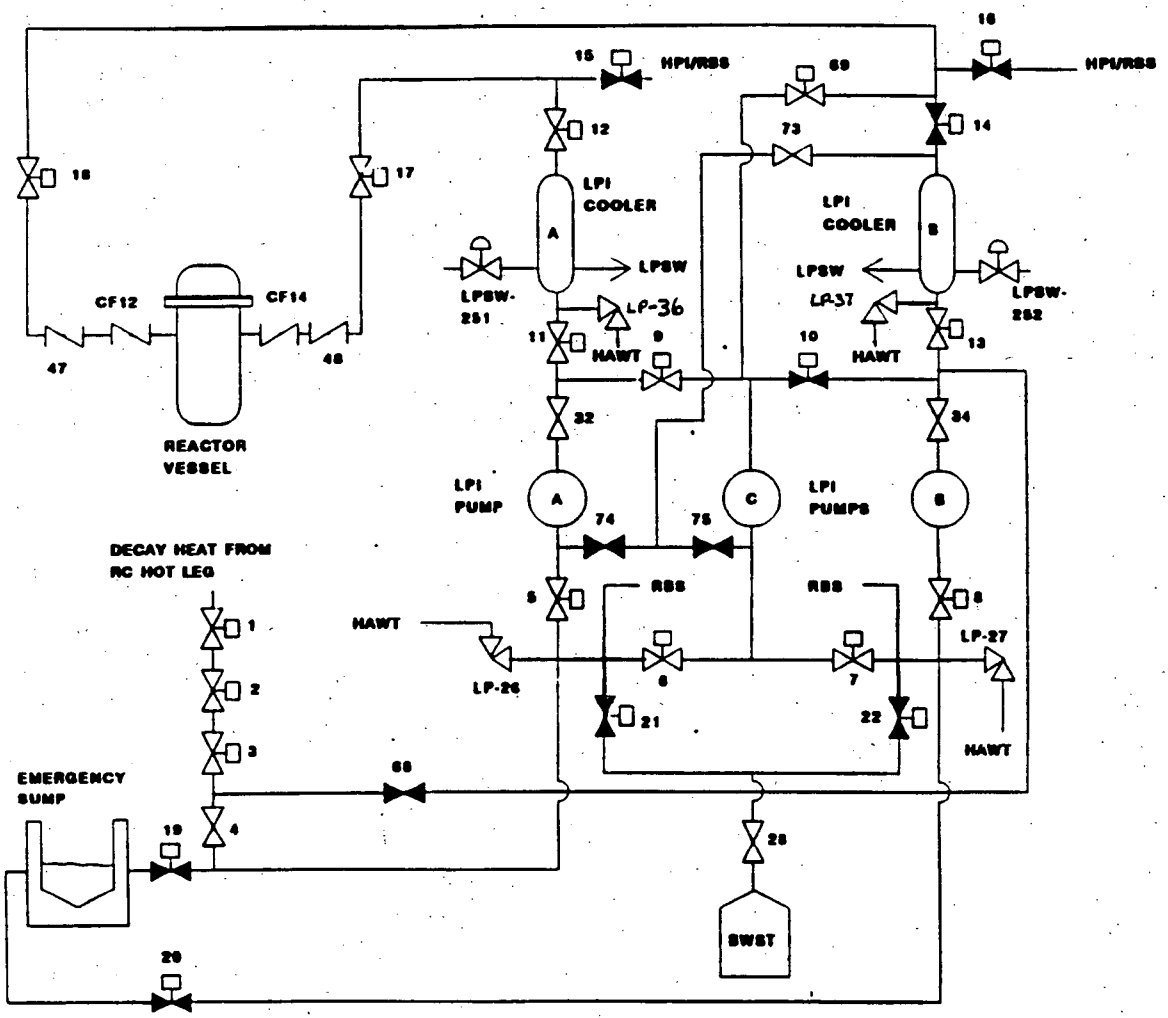
An air sample was taken in the LPI pump room in which valve 1LP-26 was leaking. Air sample results showed less than .25 percent maximum permissible concentration of radioactivity. Three operators were given body burden analyses after entering the rooms. No activity was present.

A historical trace was examined for the auxiliary building gas radiation monitor, and the Unit 1 ventilation monitors. No significant increase occurred. The inventory of volatile radioactive gases in the RCS is relatively low at this time in the outage. If a similar event had occurred at the beginning of the outage, while reducing RCS pressure, the concentrations of radioactivity would have been higher and a radioactive release to the auxiliary building would have been more likely.

If the LPI System relief valves had failed to reseat, then the LPI System would have been aligned to the switchover mode of operation. This alignment bypasses the two LPI pump suction relief valves and the A LPI cooler inlet relief valve. The B LPI cooler inlet relief valve would not have been subjected to the elevated pressure because in switchover mode the cooler is aligned before the LPI pump. The highest pressure that this valve would have been subjected to in switchover mode was 245 psig. Per the manufacturer, this valve should reseat at approximately 260 psig, therefore it is expected that this valve would have reseated when the switchover alignment was made.

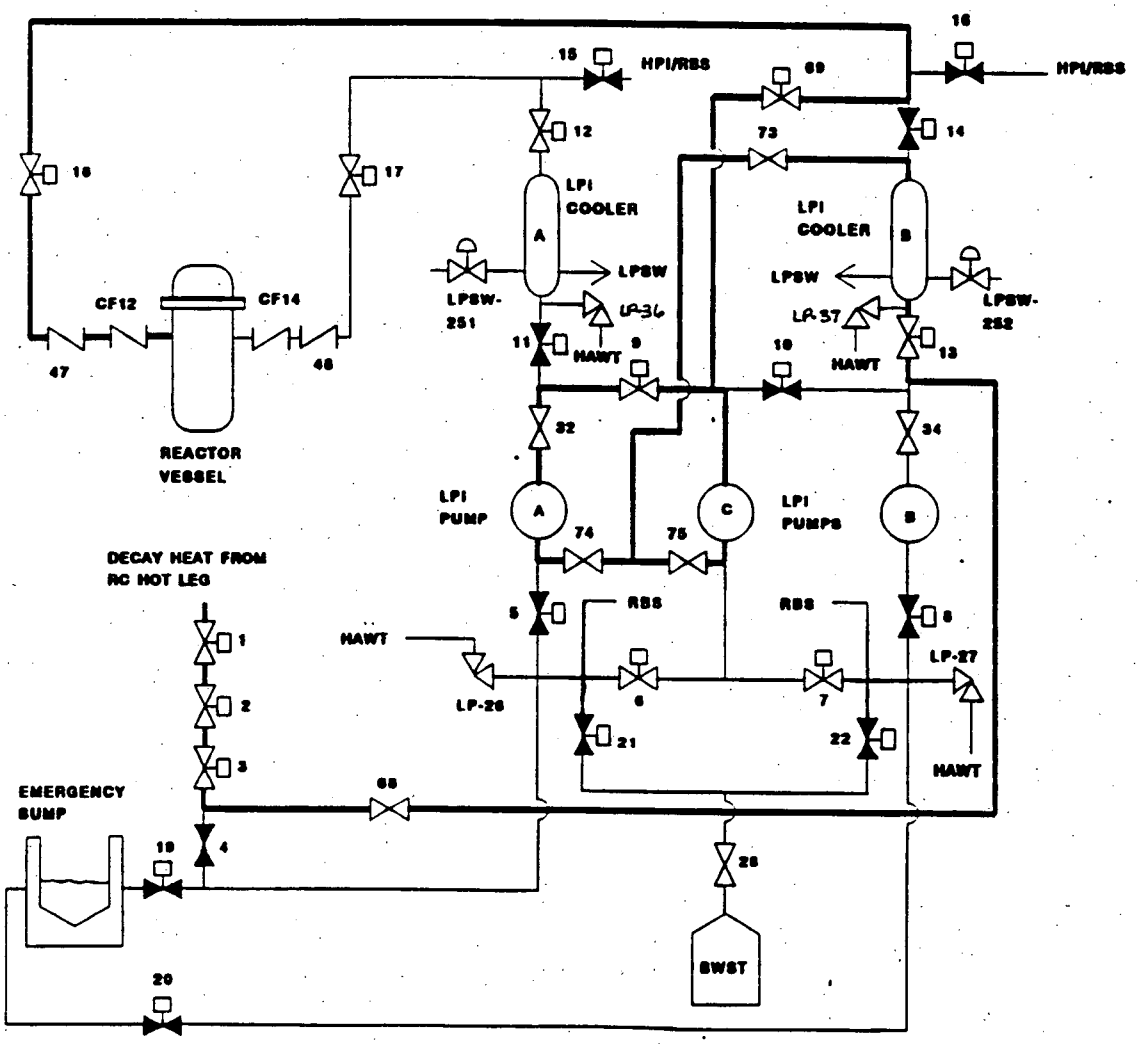
Approximately 12,400 gallons of RCS inventory was released from the LPI System to the Liquid Waste Disposal System. The highest leak rate was approximately 60 gallons per minute. This leak rate is well within the capacity of a High Pressure Injection pump to makeup for lost inventory. The released water was contained within the Radiation Control Area and the Liquid Waste Disposal System. There were no personnel injuries or excessive personnel exposures associated with this event. No personnel were contaminated. No radiative material was released to the environment. The health and safety of the public were not compromised as a result of this event.

ATTACHMENT 1



LOW PRESSURE INJECTION SYSTEM

ATTACHMENT 2



LOW PRESSURE INJECTION SYSTEM
SWITCHOVER MODE

ATTACHMENT 3

SEQUENCE OF EVENTS FOR LPI OVERPRESSURIZATON

DATE	TIME	EVENT
9/19/91	1830	Shift Turnover occurs. Plant conditions are as follows: Day 50 of 55 day refueling outage. Reactor was refueled. RCS was intact with a pressurizer steam bubble. RCS Pressure = 60 psig 1C LPI Pump in service through both LPI Coolers in normal lineup. 1A HPI Pump in service. Procedure for Unit Startup is in progress.
	2151	1B HPI pump started for testing.
	2200	RCS Pressure increased to 90 psig to increase letdown flow.
	2300	Unit Supervisor called Control Room. He told RO A "cleared" to increase RCS pressure to 300 psig.
	2300	RO A told RO B (responsible for RCS temperature and pressure control) that Unit Supervisor wanted to increase pressure to 300 psig.
	2300	RO B energizes pressurizer heaters to increase pressure to 300 psig.
	2300-2350	CR SRO observes RCS pressure increase.
	2352	RO C placed 1B letdown filter in service.
09/20/91	0000	RO C, while monitoring HPI pump, noticed increase in HAWT level, makeup flowrate, and decreasing pressurizer level. Informed RO A and B.
	0013	RO C bypasses letdown filter, suspecting a gasket leak.

ATTACHMENT 3
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SEQUENCE OF EVENTS FOR LPI OVERPRESSURIZATON

DATE	TIME	EVENT
	0014	RO A and B send NLOs to check for LPI and HPI leakage.
	~0016	RO C informs Unit OPS Coordinator and Shift Supervisor, of increased leakage.
	~0020	CR SRO refers to Abnormal Procedure for excessive RCS leakage.
	~0020	NLO find drains in HPI pump room overflowing.
	0025	Control room receives call from Craft Maintenance Technician that leakage exists from 1LP-26 (LPI Pump Suction Relief Valve).
	0027	Shift Supervisor and Unit OPS Coordinator observe RCS pressure and LPI lineup and realize that the unit should be in switchover mode.
	0027	Shift Supervisor directs RO B to deenergize pressurizer heaters.
	~0100	Shift Supervisor confers with ROs and SROs in Unit 1 Control Room to determine what had happened. He decides not to enter switchover mode, but to depressurize RCS using Pressurizer Auxiliary Spray.
	0130-0200	Control Room sent NLOs to lineup Pressurizer Auxiliary Spray. (Valves are in Penetration Room) Problem with aux spray lineup: The identification label for valve (1HP-241) was obscured by insulation. Downstream valve closed.

ATTACHMENT 3
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SEQUENCE OF EVENTS FOR LPI OVERPRESSURIZATON

DATE	TIME	EVENT
	0234	Began using Auxiliary Spray (PRZR temperature = 391 degrees F, LDST Temperature = 93.1 degrees F, RCS Pressure = 207 psig.
	0243	RCS Pressure decreases below 200 psig.
	0300	RP Shift Supervisor notified of leakage in LPI pump room. Air samples and contamination surveys initiated.
	0410-0415	Relief Valves reseat (HAWT level increase stabilizes, Stop).
	0454	Secured Aux Spray with RCS pressure at 98 psig

ATTACHMENT 4

SUMMARY OF RECURRING EVENTS OVER TWO YEARS INVOLVING FAILURE TO CONTROL CRITICAL PLANT PARAMETERS

1. LER 269/90-09: UPPER SURGE TANK LEVEL ALLOWED TO DECREASE BELOW TECHNICAL SPECIFICATION REQUIRED LEVEL.

   On June 4, 1990, during startup activities on Unit 1, level in the Upper Surge Tank (UST), which holds the Condensate system surge volume, decreased below the Technical Specification required six feet. The volume of the Unit 1 Condensate system was being maintained with input from Unit 3 auxiliary steam and output to Unit 3 Condensate Storage Tank. When the input from Unit 3 was lowered, no actions were taken to stop the decrease in UST level until after the Technical Specification limit was violated. The root cause was an inappropriate action on the part of the Reactor Operators in charge. No one had full responsibility for monitoring UST level. A lack of supervisory participation was also noted.

2. STATION REPORT OS-90-10: POWER LEVEL INCREASE EXCEEDED PROCEDURAL LIMIT.

   On October 28, 1990, Unit 2 was escalating power following a refueling outage. A problem with a control rod drive position indication prevented automatic control rod withdrawal. The reactor operator who withdrew rods in manual exceeded the procedural limit for power escalation rate. He did not observe or correctly interpret the indications that power was being excessively increased. The Control Room Supervisor also did not provide adequate guidance during this evolution.

3. LER 287/91-01: UNPLANNED REACTOR PROTECTIVE SYSTEM ACTUATION DURING DEPRESSURIZATION.

   On February 13, 1991, an unplanned Reactor Protective System (RPS) trip occurred during a planned shutdown of Unit 2. The root cause of this event was an inappropriate action on the part of the Reactor Operator controlling the shutdown. He was not observing the correct pressure indication.

SUMMARY OF RECURRING EVENTS OVER TWO YEARS INVOLVING FAILURE TO CONTROL CRITICAL PLANT PARAMETERS

4. LER 270/91-03: OVERPRESSURIZATION OF LETDOWN STORAGE TANK.

On April 16, 1991, Operations performed a routine addition of hydrogen to the Unit 2 Letdown Storage Tank, a Reactor Coolant System (RCS) volume control tank. During the addition, pressurization continued following closing from the control room of the isolation valve. This indicated a valve failure. A contributing factor was that the Reactor Operator performing the task did not adequately monitor hydrogen pressure after closing the valve to assure that the pressure increase had stopped. The problem was discovered by the non-licensed operator who operated manual valves in the lineup and heard flow to the tank after isolation.

5. PIR 3-091-0042: UNIT 3 EXCEED RATED THERMAL POWER LIMIT.

On April 20, 1991, Unit 3 was operated at greater than 100.5 percent thermal power for greater than one hour. The cause was an incorrect switch setting in the automatic circuitry of the Integrated Control System. The reactor power had been slowly increasing over a three hour period. Although the malfunctioning equipment was identified by the Reactor Operators, reactor power was not reduced manually until after the limit had been exceeded.