Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

John A. Scalice
Site Vice President, Watts Bar Nuclear Plant

MAY 3 0 1996

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

Gentlemen:

In the Matter of) Docket Number 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 FACILITY OPERATING LICENSE NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/96018 - INADEQUATE PERFORMANCE OF A ICE CONDENSER SURVEILLANCE REQUIREMENT.

The purpose of this letter is to provide the subject LER. The enclosed report provides details regarding the inadequate performance of a ice condenser surveillance requirement. Submittal of this report is in accordance with 10 CFR 50.73(a)(2)(i).

If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

J. A. Scalice

Enclosure
cc: See page 2

040040

IE22-1

MAY 3 0 1996

cc (Enclosure):
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ENCLOSURE

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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)
WATTS BAR NUCLEAR PLANT - UNIT 1	05000390	1 OF 6

TITLE (4)

Inadeqate Performance of Ice Condenser Surveillance Requirement

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 NAME	DOCKET NUMBER
04	30	96	96	-- 018 --	00	05	30	96	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	013

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

	20.2201(b)		20.2203(a)(2)(v)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Rickey Stockton, Compliance Licensing Engineer	(423) 365-1818

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
A	BC	DR	W351	NO					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X	YES (If yes, complete EXPECTED SUBMISSION DATE).	NO		07	01	96

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

On April 30, 1996, with Unit 1 operating in Mode 1 at 13 percent rated thermal power (RTP), TVA identified that a portion of the required ice condenser lower inlet door inspections required by Surveillance Requirements (SR) 3.6.12.3 and 3.6.12.4 were not performed. The inspections performed on February 23, 1996, for Surveillance Instruction (SI) 1-SI-61-5 were found not to include all of the inlet doors. These unperformed inspections were determined to constitute a missed surveillance requirement and therefore, reportable under 10CFR50.73 (a)(2)(i).

Upon discovery of this condition, TVA declared the doors not inspected inoperable and entered action B of Technical Specification (TS), Limiting Condition for Operation (LCO) 3.6.12. Surveillance Instruction 1-SI-61-5, "18 Month Ice Condenser Lower Inlet Door Inspection," was re-performed on May 13, 1996, and LCO 3.6.12 was exited later that day. The subsequent investigation determined that the cause was personnel error due to a misinterpretation of the Surveillance Instruction. Corrective actions included disciplinary action for the individuals and an enhancement of the procedure to require inspection of all attributes on 100 percent of the lower inlet doors.

I. PLANT CONDITIONS

Watts Bar Nuclear Plant Unit 1 was operating in Mode 1 at 13 percent RTP.

II. DESCRIPTION OF EVENT

A. Event

Previous to this event in July 1995, December 1995, and February 1996, SI 1-SI-61-5 was performed to inspect the lower ice condenser inlet doors (Energy Industry Identification System (EIIS) Code BC/DR) to satisfy surveillance requirements under TS 3.6.12. On April 30, 1996, with Unit 1 operating in Mode 1 at 13 percent RTP, TVA identified that a portion of the required ice condenser lower inlet door inspections required SR 3.6.12.3 and 3.6.12.4 were not performed in the February 1996 inspection.

The previous inspections performed in July 1995 and December 1995 for the Surveillance Instruction had also initially been found not to include all of the inlet doors. However, these inspections were subsequently completed within the time requirement of the SR.

Upon discovery of the February 1996 condition, TVA declared the doors not inspected inoperable and entered action B of LCO 3.6.12 which requires verification of maximum ice bed temperature to be less than or equal to 27 degrees F and restore ice condenser doors to operable status and closed positions. The SI was re-performed on May 13, 1996, with several doors (i.e., 15 of 48) exceeding the allowed force from the required 40 percent open position; but, after the doors were exercised, they met the acceptance criteria. No ice buildup or restrictions were found. LCO 3.6.12 was exited later that day at 1645 EDT.

B. Inoperable Structures, Components, or Systems that Contributed to the Event

There were no inoperable structures, components, or systems other than the subject inlet doors that contributed to the event.

C. Dates and Approximate Times of Major Occurrences

DATE	TIME	EVENT
7/95		Surveillance Instruction 1-SI-61-5, "18 Month Ice Condenser Lower Inlet Door Inspection," performed.
12/95		Surveillance Instruction 1-SI-61-5, "18 Month Ice Condenser Lower Inlet Door Inspection," performed.
2/96		Surveillance Instruction 1-SI-61-5, "18 Month Ice Condenser Lower Inlet Door Inspection," performed.
4/30/96	2150	Declared lower inlet doors not inspected inoperable and entered action B of LCO 3.6.12.

5/13/96 Surveillance Instruction 1-SI-61-5 re-performed. Lower inlet doors declared operable and LCO 3.6.12 exited.

D. Other Systems or Secondary Functions Affected

No other systems or secondary functions were affected.

E. Method of Discovery

The missed inspections were discovered during a system engineer's review (for a reason other than a normal closure review) of the completed Surveillance Instruction package.

F. Operator Actions

Operations personnel declared the affected doors inoperable and entered action B of LCO 3.6.12 to begin monitoring the ice bed temperature every four hours to confirm the temperature was less than or equal to 27 degrees F.

G. Automatic and Manual Safety System Response

There were no automatic or manual safety system responses due to this condition.

III. CAUSE OF EVENT

The root cause of this condition was determined to be personnel error by maintenance workers due to a misinterpretation of the surveillance instruction. The requirements of SI 1-SI-61-5 were to inspect 100 percent of the doors for ice, frost, or debris and to verify torque required to cause each inlet door to open at less than 675 inch-pounds. The SI also required that a torque test on greater than or equal to 50 percent of the doors to determine the opening and closing torque values from a preset door position of 40 percent open. Discussions with the involved individuals revealed that after the February SI pretest briefing the understanding that the individuals had was that only 50 percent of the doors were to be inspected and tested. Some of these individuals had also participated in all three performances of this SI.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

A. Evaluation of Plant Systems/Components

The ice condenser doors consist of the lower inlet doors, the intermediate deck doors (EIIS Code BC/DR), and the top deck doors doors (EIIS Code BC/DR). The functions of the doors are to:

a. Seal the ice condenser from air leakage during normal operation; and

b. Open in the event of a Design Basis Accident (DBA) to direct the hot steam/air mixture from the DBA (line break in the lower compartment) into the ice bed, where the ice would limit containment peak pressure and temperature during the accident transient.

Limiting the pressure and temperature following a DBA assures containment design conditions are not exceeded and therefore minimizes the release of fission product radioactivity from containment to the environment.

The operability of these doors is verified through the performance of 1-SI-61-5. The ice condenser inlet doors are visually inspected to verify that they are not impaired by ice, frost, or debris. This provides assurance that the doors are free to open in the event of a DBA. For this unit, the frequency is once per 18 months (every 3 months during the first year after receipt of license).

Testing of the inlet doors for opening torque under the SI provides assurance that no doors have become stuck in the closed position. For this unit, the frequency of 18 months (every 3 months during the first year after receipt of license) is based on the passive nature of the door mechanism (i.e., once adjusted, there are no known factors that would change the setting, except possibly a buildup of ice, however, ice buildup is not likely because of the door design, which does not allow water condensation to freeze).

The torque test surveillance ensures that the inlet doors have not developed excessive friction and that the return springs are producing a door return torque within limits. The purpose of the friction and return torque specifications is to ensure that, in the event of a small break LOCA or SLB, all of the 24 door pairs open uniformly. This assures that, during the initial blowdown phase, the steam and water mixture entering the lower compartment does not preferentially pass through only a part of the ice condenser, depleting the ice locally, while bypassing the ice in other bays.

B. Evaluation of Personnel Performance

Upon review of the procedure, the instructions required each door to be inspected and it was determined the procedure was adequate to implement the Surveillance Requirements. The individuals involved in the performance of the SI appeared to have been influenced by previous SI performances where only a portion of the doors were initially inspected. Had the individuals performed a self-check and performed the procedure as stated, the improper surveillances would not have occurred.

C. Safety Significance

Although not associated with the reportable condition, the re-performance results of 1-SI-61-5 are as follows: All of the lower inlet doors met the initial opening force of 675 inch-pounds (SR 3.6.12.4). However, 15 doors were found not to meet the Technical Specification Surveillance Requirements for opening (SR 3.6.12.5.1) and frictional torque (SR 3.6.12.5.3). Both SRs require the doors to be in the 40 percent open position.

Specifically, 15 doors exceeded the opening torque acceptance criteria (13 doors by less than 2.8 percent or 5.6 inch-pounds, 1 door by 13 percent or 25.68 inch-pounds, and 1 door by 23 percent or 45.75 inch-pounds). The door paired in the same ice condenser opening with the last door above met the acceptance criteria. Additionally, 3 of the 15 doors exceeded the frictional torque acceptance criteria by 0.3 percent or 0.125 inch-pounds.

After being exercised, the subject doors met the SR. In addition, the SI re-performance verified that no ice buildup or restriction existed. SRs 3.6.12.5.1 and 3.6.12.5.3 are required to be performed on a greater than or equal to 50 percent sample every 3 months. Since the doors performed under the February 1996 inspections met the SR, the doors were within frequency of the TS requirements. However, additional analysis is required to determine the full effect of the above conditions on the function of the ice condenser. TVA will also review the established 40 percent open torque values to determine if they are unnecessarily restrictive. A supplemental LER providing the results of this analysis will be provided by July 1, 1996.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

The immediate corrective actions for this event are described under the operator actions section of this report.

B. Corrective Actions to Prevent Recurrence

The personnel involved in the inadequate performance of 1-SI-61-5 received disciplinary action in accordance with TVA personnel policy.

Although Technical Specification Surveillance Requirement 3.6.12.5 still requires the performance of a torque test on a sampling of greater than or equal 50 percent of the doors, TVA has enhanced SI 1-SI-61-5 to require all attributes for inspection and testing to be performed on 100 percent of the lower inlet doors.

In addition, plant management conducted standdown meetings on May 6 and 7, 1996, with plant personnel on plant events caused by personnel errors.

TVA will evaluate the SI results for the first year after receipt of license to determine whether the conditions experienced for the 15 doors require additional corrective actions. This action will be completed by December 16, 1996.

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

The subject inlet doors not inspected during the February 23, 1996, SI performance were considered inoperable until the SI was re-performed.

2. Component/System Failure Information

a. Method of Discovery of Each Component or System Failure:

The missed inspections were discovered during a system engineer's review (for a reason other than a normal closure review) of the completed Surveillance Instruction package.

b. Failure Mode, Mechanism, and Effect of Each Failed Component:

The missed inspections were not completed as required by SI 1-SI-61-5.

c. Root Cause of Failure:

The missed inspections were not completed due to personnel error involving a misinterpretation of the Surveillance Instruction.

d. For Failed Components With Multiple Functions, List of Systems or Secondary Functions Affected:

See analysis of event section for discussion of the functions affected.

e. Manufacturer and Model Number of Each Failed Component:

Westinghouse - Ice Condenser Lower Inlet Doors

B. Previous Similar Events

LER 390/96003 submitted March 28, 1996, involved a surveillance that was not performed on the ice condenser divided barrier seal. However, that LER differed in that the inspections were to be performed on a personnel hatch for detrimental misalignments, cracks or defects. This inspection was not performed prior to the final hatch closure.

VII. COMMITMENTS

The actions taken in response to this event have been completed with the exception of the review of the SI results to be completed by December 16, 1996 and the additional analysis to be provided in a supplemental LER by July 1, 1996.. These are tabulated in Section V, Corrective Actions.

Enclosure
LER 50-390/96016

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20603.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Watts Bar Nuclear Plant - Unit 1	05000390	1 OF 7

TITLE (4)

AUTOMATIC TURBINE AND REACTOR TRIPS DUE TO LOSS OF BOTH MAIN FEEDWATER 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 NAME	DOCKET NUMBER
										05000
04	28	96	96	016	00	05	27	96	FACILITY NAME	DOCKET NUMBER 05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
OPERATING MODE (9)	1	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)	072	20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	X 50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Walt Lewellyn, Compliance Licensing Engineer	(423)-365-8048

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
D	SH	N/A	N/A	N						

1SUPPLEMENTAL 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 April 28, 1996, at 1109 EST, WBN Unit 1 in Mode 1 experienced an automatic turbine trip from 72 percent power due to the trip of the Main Feedwater Pump (MFP) 1A, while MFP 1B was removed from service for maintenance. Trip logic was satisfied when MFP 1A tripped due to high condenser backpressure coincident with MFP 1B shutdown for Maintenance to repair a leaking valve. The primary side responded as expected. The Reactor Coolant System (RCS) performed as required, and the control rods all dropped and were confirmed to be fully inserted. The Auxiliary Feedwater pumps started as designed and flow was controlled to limit the cooldown.

The cause of the event was inadequate written instructions. System Operating Instruction (SOI)-2 & 3.01, "Condensate and Feedwater System," caused valves to be positioned such that MFP 1A tripped. When MFP 1B was removed from service, the turbine above seat drain valves were opened in accordance with the procedure to prevent condensate buildup above the steam supply valves. With the valves open, additional steam and condensate dumped directly to the condenser resulted in pressure buildup in MFP 1B condenser with only bypass cooling available. A contributing cause was the design of the vacuum line connection between Main Feedwater Pump Turbines (MFPTs). Difficulty in maintaining vacuum in an isolated condenser had been previously recognized and a modification to tie the pump turbine condensers to the main condenser had been issued and staged for implementation.

Corrective actions included (1) revising SOI-2 & 3.01 to remove the step that opens the above seat drain valves for the stop valves when shutting down a MFPT, (2) providing a vacuum line which directly connects the MFPT condenser to main condenser, and (3) revising the condenser low vacuum alarm setpoint to provide early warning prior to trip setpoint.

Power ascension was resumed after the MFPs were placed in service following the completion of the vacuum line modification.

I. PLANT CONDITIONS:

WBN Unit 1 was in Mode 1 at approximately 71.5 percent power operation, with the Reactor Coolant System temperature and pressure of 561 degrees F and 2235 psi, respectively.

II. DESCRIPTION OF EVENT

A. Event

On April 28, 1996, having reduced power to 80 percent to address Number 3 and Number 4 heater drain flow oscillations, a decision was made at 1015 EST to remove MFP 1B (Energy Industry Identification System [EIIS] Code P) from service to facilitate repairs to valve [EIIS Code ISV] 1-ISV-3-0577(MFP B Feedwater Recirculation line). The Standby MFP was started and flow through the B MFP reduced. At 10:55 a. m., MFP B was manually tripped and a runback to 72 percent occurred. The runback occurred because the Balance of Plant (BOP) runback had been armed. Unit 1 had been above 85 percent power (arming setpoint) and the reset point on a turbine runback BOP pressure switch (EIIS Code 63) was designed to initiate a runback when one MFP is removed from service and the plant is above 72 percent.

After the runback, actions were taken to remove MFP 1B from service and open the above seat drain lines in accordance with SOI-2 & 3.01. Placing the MFP trip/reset switch in trip resulted in the Main Feedwater Pump Turbine (MFPT) condenser (EIIS Code COND) cooling to automatically isolate leaving only bypass cooling to the MFPT condenser. In accordance with a procedure step on the MFP shutdown process, valves (EIIS Code FCV) FCV 46-41A and -41B were opened to drain the steam and condensate from above the seats of the high and low pressure steam stop valves (EIIS Code SHV) to the MFPT condenser, and as a result of the limited amount of cooling available, the condenser pressure increased. The interaction between MFPTs (EIIS Code TRB) 1A and 1B condenser drain tank equalizing vent line and loop seal lines resulted in a gradual loss of condenser vacuum in the MFPT 1A condenser and the eventual trip of MFP 1A at 11:09. Because the alarm and trip setpoint were set at the same point, no recovery was possible. With two MFPs tripped and the unit power above the 50 percent setpoint, the logic for main turbine trip and reactor trip was completed. All systems responded normally to the trip. The RCS average temperature trended to 557 degrees F with no overcooling observed. All Auxiliary Feedwater (EIIS Code BA) pumps started as designed and supplied flow at 80 degrees F. All control rods dropped and were confirmed to be fully inserted. The unit was stabilized in Mode 3, and there were no abnormal radiological conditions throughout the event.

B. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT

No inoperable structures, components, or systems contributed to the event

C. Dates and Approximate Times of Major Occurrence

Time	Event
10:15	Decision Made to Isolate MFP B, UT the 577 Valve and Repair Due to Leak
10:27	Started Standby MFP and Began Reducing Flow through MFP B
10:55:34.563	MFPT 1B Tripped. Feedwater Flow/Level Stabilized in Steam Generator - Manual Trip of MFP B
10:55:34.598	Turbine Runback BOP (PS-47-13E) to Approximately 72-Percent (840 MWe)
10:57:19.687	Tavg-Tref Deviation (TS-68-2P/Q)
11:01	Entered Administrative Operating Instruction (AOI)-37, "Turbine Runback Response"
11:04:42.855	MFPT Condenser Drain Tank Level HI LCV-6-209, LS-6-206A/B
11:06:30:782	MFPT Condenser Drain Tank Level LO LS-6-206 D/E
11:08:32.652	MFPT B Condenser Vacuum LO (PS-2-252E)
11:09:56.141	Turbine Trip -MFPT A and B Tripped
11:09:56.142	MFPT 1A Tripped
11:09:56.245	Turbine Trip - Auto Stop Oil Pressure LO
11:09:56.254	Reactor Trip/Turbine Trip
11:09:56.889	Steam Generator 1 Feedwater Flow HI (FS-3-35E) and Steam Generator 4 Feedwater Flow HI (FS-3-103E)
11:09:56.897	Steam Generator 1 Feedwater Flow HI (FS-3-35A)
11:09:58.112	Rods at Bottom
11:10:10.025	Generator 1 Reverse Power Caution
11:11	Entered Emergency Operations (E-O), "Reactor Trip or Safety Injection"
11:13	Entered Emergency Standard (ES)-0.1, "Reactor Trip Response"
11:26	Entered General Operating Instruction (GO)-2, "Reactor Startup"

D. Other Systems or Secondary Functions Affected

No other systems or secondary functions were affected by this event.

E. Method of Discovery

The turbine runback and turbine/reactor trip were annunciated in the control room.

F. Operator Actions

The operators entered and performed the steps of procedures E-O, ES-0.1, and GO-2.

The operators recognized a MFPT 1B diaphragm rupture and isolated steam seals.

G. Automatic and manual safety system responses

1A MFPT tripped.

Turbine and reactor trips and AFW start were experienced.

III. CAUSE OF EVENT

A. Immediate Cause

The turbine/reactor trip occurred upon loss of the MFP A (MFP B was secured for maintenance).

B. Root Cause

The cause of the event was the inadequacy of written communication. SOI-2 & 3.01 caused valves to be positioned in a way which resulted in the trip of MFP 1A, and subsequent turbine and reactor trips. When MFP 1B was removed from service, the turbine above seat drains were opened in accordance with procedure to prevent condensate buildup above the low pressure and high pressure steam supply valves. The procedure was appropriate for opening the above seat drain valves when the turbines are being started, however, the above seat drain valves should have remained closed when MFP 1B was removed from service at greater than 50 percent power. The above seat drains route condensate and steam directly into the MFP 1B condenser. When MFP 1B was removed from service, the main condensate flow path through the MFP condenser tubes was automatically isolated leaving only a limited amount of flow through bypass valves. The MFP turbine drains being open directly to the MFP condenser with limited cooling medium through the tubes resulted in a pressure build-up in MFP 1B condenser. The interface between MFP 1A and 1B through the condensate drain tank resulted in a backpressure increase in MFP 1A and the eventual trip of MFP 1A.

A contributing cause was the design of the system. The automatic isolation on the 18-inch condensate cooling lines of the non-operating main feedwater turbine pump condenser contributes to the limited condensation capability of the condenser. Manual bypass flow (1.5 inches) is limited and will compensate for steam seal flow but not stop valve leakage and continual operation through the above seat drains on the stop valves. Difficulty in maintaining vacuum in the isolated condenser had been previously recognized and a modification to tie the pump turbine condensers to the main condenser had been issued and was staged for implementation.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

There were no safety implications to the public related to the event. With two MFPs tripped, the logic was made up for a main turbine trip and reactor trip. All systems responded normally to the trip, and AFW was automatically actuated as expected. The primary side responded as designed. All rods inserted fully into the core, and the unit was stabilized in Mode 3. The plant responded within the design basis, and there were no abnormal radiological conditions throughout the event.

V. CORRECTIVE ACTIONS

1. Immediate Corrective Actions

Unit 1 was stabilized in Mode 3. A trip investigation was initiated.

2. Corrective Actions to Prevent Recurrence

SOI-2 & 3.01 was revised to remove the step that opens the above seat drain valves for the low pressure and high pressure stop valves when shutting down a MFPT.

A vacuum line has been provided to directly connect the MFPT condenser to the main condenser.

The MFPT condenser low vacuum alarm setpoint has been revised to provide early warning prior to trip setpoint.

(The modifications above were also addressed in LER 50-390/96015.)

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

There were no failures that rendered a train or a safety system inoperable.

2. Component/System Failure Information

a. Method of Discovery of Each Component or System Failure:

N/A

b. Failure Mode, Mechanism, and Effect of Each Failed Component:

N/A

c. Root Cause of Failure:

N/A

d. For Failed Components With Multiple Functions, List of Systems or Secondary Functions Affected:

There were no secondary functions affected.

e. Manufacturer and Model Number of Each Failed Component:

N/A

B. <u>Previous Similar Events</u>

LER 96009 - On February 29, 1996, condensate supply and discharge valves had been closed during maintenance on the MFPT 1B. Later, on March 13, 1996, inlet isolation valves closed which resulted in isolating the condensate flow to the condenser. With condensate isolated, the gland seal steam was no longer being condensed and was pulled into the suction of the main condenser vacuum pumps. The condenser vacuum pumps were then unable to remove non-condensables, which resulted in the loss of vacuum to the main condenser. A manual turbine trip and a manual reactor trip resulted. Corrective action included operating procedure revisions (SOI-2 & 3.01), verification of proper operation of automatic MFPT condenser flow switch and setpoint isolation logic, and providing a vacuum flow path from the MFPT condensers directly to the main condenser to prevent steam binding of the main condenser vacuum pumps. This modification was scheduled to be completed during a subsequent outage, prior to commercial operation.

LER96015 - On April 21, 1996, the 1A MFP tripped due to low MFPT condenser vacuum. This resulted in AFW auto start (Engineering Safety Feature [ESF] actuation). Vacuum line adjustments were in progress by assistant unit operators (AUOs) in accordance with SOI-2 & 3.01, Section 5.10, step 30) to address recurring problems with main condenser vacuum back pressure. The MFPT lines had to be throttled to prevent steam induction to the suction of the main condenser vacuum pumps. No permanent method existed for the AUOs to directly read main condenser vacuum. A contributing factor was considered to be the setpoint for the low vacuum alarm which has the same setpoint as the MFPT trip. Pump restart was authorized based on the addition of operator aids and based on briefing operating crews on the event.

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B. Previous Similar Events (Continued)

As discussed in V.2 of LER 96016, corrective actions for both LERs addressed the MFPT low vacuum alarm and MFPT condenser vent to the main condenser.

VII. COMMITMENTS

All actions are complete; there are no commitments.