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ComEd

July 25, 1997

JSPLTR #97-0140

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

Enclosed is the second supplement to Licensee Event Report 94-021, Docket 50-237, which is being submitted pursuant to 10 CFR 50.73(a)(2)(v)(B) which requires the reporting of any event that alone could have prevented the fulfillment of the safety function of systems that are needed to remove residual heat. This supplement is submitted in accordance with NuReg 1022 Rev 1 draft 2 to correct technical information regarding the root cause of the event.

The original report identified the root cause of the failure of the High Pressure Coolant Injection (HPCI) check valve as an inadequate review of Information Notice 82-26. A subsequent root cause analysis concluded that a change to the HPCI test procedure in 1988 to warm the turbine at low speed produced the flow-induced vibrations which caused the check valve failure. HPCI test procedure revisions in 1993 and 1994 increased the warming speed of the turbine and significantly reduced the periods of vibration for the check valve.

This correspondence contains no additional commitments.

If you have any questions, please contact Terry Riley, Dresden Regulatory Assurance Supervisor at (815) 942-2920 extension, 2714.

Sincerely,

J. Stephen Perry
Site Vice President
Dresden Station

Enclosure

cc: A. Bill Beach, Regional Administrator, Region III
NRC Resident Inspector's Office

IE22

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

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

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Unit 2	05000237	1 OF 11

TITLE (4)
HPCI Turbine Vendor Test Specifications Change Did Not Consider the Effects on Exhaust Check Valves Design

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
									None	
08	04	94	94	-- 021 --	02	07	25	97	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9): 1
POWER LEVEL (10): 099

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

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

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Mark Churilla, System Engineer Ext. 3085	(815) 942-2920

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
B	BJ	INV	R340	Y					

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 August 4, 1994, at 1559 hours, with Unit 2 at 099% rated core thermal power, while performing Dresden Operating Surveillance (DOS) 2300-03, High Pressure Coolant Injection (HPCI) System Monthly Operability Verification, the turbine tripped due to high exhaust pressure. Inspection and functional check of the turbine drain system was performed to verify correct operation. The exhaust line check valves were functionally tested and the rupture diaphragms were also replaced. DOS 2300-03 was reperformed on August 7, 1994 and exhaust pressure again was observed to be increasing abnormally. The turbine was manually tripped prior to exhaust pressure reaching 30 psig. Following a failed Local Leak Rate Test (LLRT) on the turbine exhaust check valves, Unit 2 was shut down. An inspection of the 2-2301-74 valve, the HPCI turbine exhaust stop check valve, revealed that the valve disc was found separated from the piston guide assembly causing a blockage in the exhaust line. Tack welds which prevent the disc from unthreading from the piston were found failed. The tack weld failures were caused by flow induced vibration that was a result of vendor test specifications that did not consider the effect on exhaust check valve design. The valve was repaired and tested satisfactorily. The safety significance of this event is considered minimal since all other Emergency Core Cooling Systems were available throughout this event. There have been no previous failures of this type.

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2527 Mwt rated core thermal power.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX] and are obtained from IEEE Standard 805-1984, IEEE Recommendation Practice for System Identification in Nuclear Power Plants and Related Facilities.

EVENT IDENTIFICATION:

HPCI [BJ] Exhaust Check Valve Failed due to Test Procedure Not Considering Effects on Check Valve

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 2 Event Date: 08/04/94 Event Time: 1559

Reactor Mode: N Mode Name: R Power Level: 099%

Reactor Coolant System Pressure: 1004 psig

B. DESCRIPTION OF EVENT:

On August 4, 1994, at 1559 hours, with Unit 2 at 099% rated core thermal power, while performing Dresden Operating Surveillance (DOS) 2300-03, High Pressure Coolant Injection System Monthly Operability Verification, the turbine tripped due to high exhaust pressure. Prior to the trip, the turbine was operated for approximately 5 minutes at 2500 rpm during manual trip verification. Following the manual trip, the turbine was rolled back up to 2500 rpm for a fifteen minute warming period. During the time the turbine was being rolled back up to 2500 rpm, steam was noted to be leaking from the turbine shaft Low Pressure Gland Seal area. The turbine automatically tripped approximately one minute into the warming evolution. The HPCI system was declared inoperable and the steam supply was isolated. Following the failure of the test, the exhaust line high pressure switches, 2-2368A and 2-2368B, were functionally checked. Both switches actuated at 100 psig (+/- 3 psig). In order to determine the cause of the steam leakage out of the turbine shaft low pressure gland seal, a walkdown of the cooling water valving was performed. The walkdown found the 2-2399-94 valve, the HPCI cooling sensing line valve, closed. The closure of this valve decreased the cooling water flow to the Gland Seal Condenser (GSC). The valve was restored to the proper position. There was no further testing or troubleshooting performed on August 4, 1994.

Based on Commonwealth Edison experience, the high exhaust pressure was believed to have been caused by the presence of water in the turbine exhaust. Two previous turbine high exhaust events, within Commonwealth Edison at other stations concerning HPCI/RCIC turbines, have been caused by the presence of water in the turbine exhaust. During this event, an unexpected exhaust drain [WK] pot high level alarm did annunciate and clear during the initial warming of the turbine control valves. The high level alarm indicated the presence of water in the turbine exhaust drain pot prior to turbine operation. In addition, several weeks earlier, the turbine exhaust drain pot high level alarm annunciated while the HPCI system was in its normal standby condition. The drain pot was drained and the leakage into the drain pot was later determined to be caused by steam leakage past AO2-2301-28, HPCI Inlet Drain Pot Discharge valve.

On August 5, 1994, a multi-disciplined troubleshooting team (team) was assembled to assess the turbine trip and prepare the system for a retest, if possible. The team consisted of the System Engineering Supervisor, HPCI System Engineer, Site Engineering Supervisor, General Electric Site Representative, Unit 2 Master Work Scheduler and the Operations Department Supervisor. In addition, the Quad Cities System Engineer was taking part in our teleconference for additional insight of similar problems at Quad Cities. The team was responsible for determining the cause of the turbine exhaust high pressure problem and to resolve it prior to retesting the turbine. The following actions were presented to the team by the HPCI System Engineer: inspection or functional check of the exhaust check valves 2-2301-45, HPCI Turbine Exhaust Check Valve 2-2301-74, HPCI Turbine Exhaust Check Valve, 2-2301-34, HPCI Turbine Drain Exhaust Check Valve, 2-2301-71, HPCI Turbine Drain Exhaust Check Valve, replace the rupture diaphragms, functionally check exhaust drain pot level switch, check turbine drain restricting orifices for blockage, inspect AO2-2301-28, review the potential impact of the new revision to DOS 2300-03, and functionally check gland seal condenser (GSC) drain pressure switch.

The team discussed the aforementioned items and the sequence of the events that occurred on August 4, 1994. The areas focused on were the high exhaust line pressure alarm and the steam leak from the turbine shaft low pressure gland seal area. The team determined that the probability of a turbine exhaust check valve failure was not the potential cause of the high exhaust pressure. This was based on the short duration of the exhaust high pressure alarm and the fact that the turbine operated for approximately 5 minutes prior to failure. It was determined that the HPCI exhaust check valves would be functionally tested during performance of the HPCI retest, as provided for in DOS 2300-03. The original duration of the exhaust alarm that was reported to the team on August 5, 1994, was .07 seconds. The exhaust alarm duration was determined from review of the Sequence of Events Recorder (SER) [IQ] print out. The following actions were recommended by the team: verified turbine case drain restricting orifice is free of blockage, functionally checked Gland Seal Condenser (GSC) pressure switch, functionally checked the Exhaust Drain Pot Level Switch, and installed exhaust line instrumentation to monitor pressure. The team reviewed the new DOS 2300-03 procedure revision that was used during the performance of the August 4, 1994, test, replaced the rupture diaphragms, and performed a valve check list on all valves in the HPCI room.

As Background, the HPCI turbine exhausts steam to the suppression pool through a 24 inch spring loaded duo-check valve and 12 inch stop check valve. During normal turbine and pump operation the exhaust pressure is 35 psig at 4000 rpm. The duo-check and stop check valves require exhaust pressure to be greater than 10 psig to remain full open. The corresponding turbine speed for 10 psig is approximately 2000 rpm. If the turbine is operated below 2000 rpm the exhaust pressure is not sufficient to maintain the check valves in the open position. Consequently, the duo-check will close under spring pressure choking off flow which causes the 12 inch stop check valve to also close. The valves will then continue to cycle until sufficient exhaust pressure is maintained. This results in flow induced vibration in the 2-2301-74, Turbine Exhaust Stop Check Valve.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Dresden Nuclear Power Station, Unit 2	05000237	94	-- 021 --	02	4 OF 11

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

The review of new revision to DOS 2300-03 focused on the change made to the initial speed at which the turbine is brought up to for manual turbine trip verification prior to the 15 minute warm-up period. A February 1993 revision changed the 15 minute warm-up period speed from 1000 rpm to 2500 rpm to reduce the amount of time the turbine was operated at low flow conditions. The July 1994 revision changed the initial turbine speed from 1000 rpm to 2500 rpm to further reduce the operation of the turbine at low flow conditions. Both changes were made with General Electric concurrence. General Electric concurrence was needed since original vendor manual test instructions included steps to pre-warm the turbine at reduced speeds. Pre-warming of the turbine was implemented in September of 1988 after a Quality Assurance Audit in 1987 identified that the turbine vendor manual pre-warming instructions were not included in stations monthly test surveillance. General Electric has stated that the process of bringing the turbine up to an initial speed of 2500 rpm is acceptable. The HPCI turbine has been fast start tested numerous times without any exhaust pressure problems occurring. Therefore, based on previous operation of the turbine and recommendations from General Electric, it was determined that the new procedure revision (July 1994) used for this event was not a contributing factor to the high exhaust pressure.

Following the original recommendations, the duration of the high exhaust line pressure alarm was later verified, on August 5, 1994, to be 7 seconds instead of the reported .07 seconds. This oversight was the result of the HPCI System Engineer mis-reading the SER printout. After discovering the mistake, the decision was made by the team leader to continue with the present course of action and add the requirement to replace the rupture diaphragms.

In addition, the team recommended that the Operations Department perform a valve checklist on all valves in the HPCI room prior to the next test. The performance of the check list would identify any valve mispositioning prior to the performance of the next test.

The following repairs and inspections were completed successfully on August 6, 1994: verified turbine case drain restricting orifice is free of blockage, functionally checked Gland Seal Condenser (GSC) pressure switch, functionally checked the Exhaust Drain Pot Level Switch, installed exhaust line instrumentation to monitor pressure, and replaced the rupture diaphragms. In addition, the HPCI valve check list was performed on all valves in the HPCI room on August 7, 1994. Due to a lack of control room personnel manpower, the performance of the HPCI test was postponed until August 7, 1994.

On August 7, 1994, an extensive Heightened Level of Awareness (HLA) meeting was held with the operating crew prior to retesting HPCI. The HLA was conducted by the HPCI System Engineer. The areas that were covered extensively involved the verification of the HPCI Exhaust Line Check valves' operation. The Nuclear Station Operator (NSO) was informed that the expected exhaust line pressure would be a maximum of 35 psig at full turbine speed. The instructions were given to the NSO to trip the turbine if exhaust pressure approached 35 psig prior to reaching full speed conditions on the turbine (4000 rpm).

At 1900 hours, the HPCI operability surveillance began. The initial warming of the turbine was performed to functionally check the drain system. The exhaust drain pot and associated drain line check valves were verified to be operating satisfactorily by the system engineer. The turbine was then rolled up to 1600 rpm when it was noted by the NSO that exhaust pressure was increasing at a higher than normal rate. The turbine was manually tripped prior to the exhaust pressure reaching 30 psig. The HPCI steam supply was immediately isolated to prevent the turbine from starting on an Emergency Core Cooling System initiation signal. The 2-2301-74 valve was then manually closed to isolate the exhaust line.

After the August 7th run, investigation of the turbine exhaust check valves was pursued. A local leak rate test (LLRT) of the HPCI turbine exhaust check valve volume was performed and leakage was found which exceeded the Technical Specifications (TS) limit. (The LLRT failure is being addressed in a separate Licensee Event Report (LER) Docket 50-237, number 94-022). Since the HPCI exhaust line check valves could not be repaired on line, the reactor was shutdown.

The 2-2301-45 valve, HPCI Turbine Exhaust Check Valve, was disassembled and inspected under work request D25915. The check valve seats were found to be slightly worn due to normal valve operation. This failure did not affect the operation of the HPCI system.

The 2-2301-74 valve, HPCI Turbine Exhaust Check Valve, was disassembled and inspected under work request D25919. The valve disk separated from the valve guide piston which resulted in a blockage in the valve. Due to the blockage the HPCI system was inoperable following the failure of the 2-2301-74 valve on August 4, 1994 until reactor pressure was reduced below 150 psig on August 8, 1994. Further inspection revealed that the four tack welds, which prevent the disc from unscrewing from the piston, had broken due to fatigue.

C. CAUSE OF EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(v)(B), which requires the reporting of any event that alone could have prevented the fulfillment of the safety function of systems that are needed to remove residual heat.

The root cause of this event is vendor test specifications that did not consider the effect on exhaust check valve design (NRC Cause Code B). In 1988 as a result of a Safety System Functional Inspection (SSFI), Dresden changed the HPCI system surveillance test to a slow - warm-up procedure versus the previous fast-start process. The change brought Dresden into compliance with the current vendor technical manual for the turbine. The turbine vendor technical manual recommendations did not consider the impact on the balance of the system ie., the exhaust check valves. The warm-up procedure, provided by the turbine vendor caused low flow induced vibration which led to the fatigue failure of the tack welds on the 2-2301-74, turbine exhaust check valve. Dresdens' HPCI turbine and exhaust line design are unique in the industry.

The closure of 2-2399-94, Cooling water sensing valve was determined to have been inadvertently closed during maintenance in the area on August 3, 1994. The valve is orientated next to oil filters which were cleaned. It is believed that during maintenance the valve was inadvertently closed by being brushed against.

On August 19, 1994, the tack welds that prevent the disc of the HPCI Turbine Exhaust stop check valve (2-2301-74) from unthreading from the piston were inspected by engineering and a member of the System Material Analysis Department (SMAD). Three important items were noticed during the inspection and are listed as follows:

1. The four tack welds were found broken. There was evidence of beaching marks (rough, chevron-shaped surface with curved rows extending from the initial crack area) on the surface of the tack weld fracture area. These marks are evidence that the initial cracks were caused by fatigue.

2. The tack welds were worn. Only one of the four tack welds had a surface with small remains of beaching marks.

3. The threads of the two components of the piston, which are normally covered if the two components are properly fastened, had very little corrosion. This is relative to the rest of the surface of the piston surrounding the threaded region.

From these observations, it was concluded that the fracture of the tack welds was due to fatigue. The remaining tack weld failed and the separation of the guide piston and valve disc occurred during the August 4, 1994 HPCI surveillance.

SMAD reported on September 21, 1994 to Dresden Station management that "Based on the presence of beach marks and 20+ years of operation, fatigue is the probable cause of failure, with flow-induced vibration as the likely cause. The HPCI system is subjected to pressure and thermal cycling during startup and shutdown. Fluctuations in steam flow (vibratory loading) during operation create stresses in mechanical equipment, such as valve body internals."

The actual fracture of the fourth tack weld was recent. This conclusion is proven by the condition of the surface of the fractures. The extent of the wear of the fracture surface was enough to remove most of the beaching marks except for the small traces found on one of the four tack welds.

The separation of the two piston components would have occurred during the August 4, 1994 HPCI surveillance. This conclusion is supported by the fact that the HPCI Turbine Exhaust pressure has remained constant until this last turbine operation. This assumes that the HPCI turbine exhaust pressure will increase as the length of the piston is increased as it separates. Also, water was noted in the HPCI turbine before operation. This water can cause higher vibrations in the exhaust line and consequently an adverse effect on the check valve piston. These higher vibration amplitudes could have caused the two piston components to unscrew and finally separate; whereas, the previous vibration amplitude was not large enough. Therefore, it is believed that water in the HPCI turbine was a contributing cause to this event. Although the exhaust drain pot level alarm cleared during the performance of DOS 2300-03, it is believed that some water remained in the system. A verification which would have insured that the turbine was completely free of water, following the alarm, was not performed.

A maintenance history review indicated that the 2(3)-2301-74 valves have never been disassembled. However, as stated below, an inspection of the 2301-74 valve was scheduled to take place during Unit 2's upcoming refueling outage. A further review of the station safety related check valves with piston type design indicated that the 2-1402-8A, Core Spray [BM] pump discharge check valve, was a similar style and manufacturer. In addition, it was found that Quad Cities HPCI 2301-74 valve had a similar piston type design as Dresden's 2301-74 valve. The tack welds on the Quad Cities valve were found cracked during routine check valve inspection in April, 1994.

A search of industry operating experience was performed and two documents were found which are related to this event: INPO Significant Operating Experience Report (SOER) 86-3, Check Valve Failures or Degradation, and NRC Information Notice (IN) 82-26, RCIC and HPCI Turbine Exhaust Check Valve Failures.

NRC IN 82-26 had been previously reviewed by Dresden Station engineering personnel in September, 1982. This review noted that IN 82-26 discussed the failure of swing check valves that had been observed in the nuclear industry. The 2301-74 valve is not a swing check valve such as the valves whose failures at other plants was discussed in IN 82-26, but is a stop check valve and is not prone to the type of valve failure discussed in IN 82-26. The five recommendations contained in IN 82-26 are paraphrased from General Electric Application Information Document (AID) 56, entitled "HPCI/RCIC Turbine Exhaust Check Valve Cycling" dated August 1981. AID-56 discusses cyclic performance of the turbine exhaust check valves of HPCI/RCIC turbines of a "wheel" design (manufactured by Terry), which do not require pre-warming. Dresden's HPCI turbines were designed and manufactured by GE, is bladed and not of a "wheel" design, and require pre-warming.

INPO SOER 86-3 had also been reviewed by ComEd personnel when it was originally issued. The present check valve inspection program at Dresden Station was based on the SOER. The SOER recommends (page 10) the inclusion of six systems for BWRs based on industry experience (HPCI was not one of the systems recommended) and addition of other systems (not specified in the SOER) based on in-house experience. Included in the initial Dresden Administrative Procedure (DAP) 11-25, General Check Valve Inspection Program Revision 0, dated October 31, 1988 were a dozen HPCI Check Valves per unit. At the time of the initial studies and reviews for the Check valve program the monthly HPCI test surveillance did not include pre-warming of the turbine. Consequently, low flow conditions were minimal, system operation times were typically less than 30 minutes a month and exhaust check valve LLRT historical performance data indicated only 3 LLRT failures since the units started up. The last failure occurred on Unit 3 in 1982. Although there is no documentation to indicate whether the aforementioned factors were considered during the HPCI check valve review, the experience described above along with the fact that the 2301-74 valves had never failed could lead to a justification for excluding the 2301-74 check valves from inspection.

Changes made to the monthly test surveillance, requiring pre-warming of the turbine, were made in September of 1988. Low flow conditions, although not anticipated, resulted from the pre-warming. As a result the LLRT failure rate increased for the turbine exhaust check valves. Since low flow was the probable cause of the LLRT failures actions were initiated to correct the low flow conditions. The actions included modifications to replace the exhaust check valves and procedural changes to reduce the amount of time of low flow operation. During the time the proposed actions were being pursued functional checks of the exhaust check valves were being accomplished by the Quarterly HPCI Check Valve Inservice Tests (IST) and refuel tests such as Integrated Leak Rate Test (ILRT)and LLRTs. Due to an increase in Unit 2 and 3 HPCI online maintenance, modifications and new quarterly fast start testing requirements, the number of HPCI surveillances performed per year and the amount of time to perform each surveillance increased starting in 1992. At the time the 2(3)-2301-74 valves were under consideration for inclusion into the check valve program. The valves were added to the program as part of Dresden Station's decision to extend the program to all check valves on safety-related systems in January of 1994. This commitment was made in 1992 as a Company wide response to the NRC's audit of the check valve program at Byron Station. After having been added to the program, the valve was scheduled for inspection during Unit 2's upcoming refueling outage.

D. SAFETY ANALYSIS:

The HPCI system is designed with several exhaust overpressure protection devices. Pressure switches 2-2368A and 2-2368B are connected in parallel and are set to trip at 100 psig. Upon actuation of either pressure switch, the HPCI Turbine and Stop Valve will trip. The Exhaust Line also has a rupture diaphragm which opens at 125 psig to further prevent exhaust line overpressurization.

On August 4, 1994, the turbine tripped as designed when one of the exhaust pressure switches actuated. The HPCI system was isolated and declared inoperable. Further testing that was conducted on August 7, 1994 insured turbine exhaust pressure did not exceed 30 psig in order not to challenge the turbine overpressurization devices. Following the testing the HPCI system, the supply steam was isolated to prevent the turbine from initiating. In addition, the 2-2301-74, HPCI Exhaust check valve, was manually closed to provide an exhaust isolation.

The safety significance of this event is considered minimal since the turbine protective devices operated as designed and all other Emergency Core Coolant Systems required by Technical Specification 3.5.C.a.2 were operable during this event.

E. CORRECTIVE ACTIONS:

Nuclear Tracking System (NTS) tracking code numbers are identified in the text as (XXX-XXX-XX-XXXXX).

Two changes to the HPCI monthly surveillance testing procedure DOS 2300-03 have been made to reduce the potential for fatigue failure due to flow induced vibration. The first change increased the 15 minute warm-up period speed from 1000 rpm to 2500 rpm in February of 1993. The second change increased the initial turbine speed prior to the manual turbine trip verification from

1000 rpm to 2500 rpm in July of 1994. The changes made in 1993 and 1994 have minimized the operation of the turbine at low exhaust flow conditions while maintaining turbine vendor pre-warming requirements.

Since the review of IN 82-26, the OPEX program has provided the reviewers with instructions to improve the responses and to assure that the concerns raised in the OPEX document are addressed. These instructions are part of DAP 2-11, Operating Experience Review, and have been in the DAP since May of 1993. The instructions ask for the specific and/or generic applicability to the station.

Dresden Station created an administrative procedure to control corrective actions effectiveness reviews per Dresden Improvement Plan 1.II.4.4.1.d. The review is conducted using Nuclear Station Work Procedure (NSWP) NSWP-A-16, Effectiveness Review, Rev. 1.

All safety related stop check valves have been included in the check valve preventative maintenance program.

Dresden Administrative Procedure (DAP) 11-25, Check Valve Inspection Program, was updated to reflect the current additions to the check valve preventive maintenance program.

HPCI Exhaust HI Pressure Switches 2-2368A & 2-2368B were functionally verified per Dresden Instrument Surveillance (DIS) 2300-09, HPCI Turbine Pressure Switch Surveillance on August 4, 1994.

The HPCI Turbine Drain System was inspected under work request D26905 on August 6, 1994. The exhaust drain check valves were functionally checked successfully during performance of DOS 2300-03 on August 7, 1994.

HPCI Exhaust Rupture Disks were replaced on August 6, 1994, under work request D25294 due to the diaphragms reaching a pressure greater than 80% of their burst pressure value.

The HPCI Gland Seal Drain Pressure HI switch was functionally verified per acceptance criteria. The switch was recalibrated and tested successfully under work request D25704 on August 6, 1994.

The system engineer was counseled to practice the "STAR" (Stop, Think, Act, Review) program and to take the appropriate time in reviewing items such as the SER print out or a verification that the HPCI turbine exhaust is free of water following an alarm.

Dresden Operating Procedure (DOP) 2300-M1/E1, HPCI Valve Checklist, was performed on all valves in the room to insure correct positions on August 7, 1994, prior to the performance of DOS 2300-03.

A cover was installed on the 2-2399-94 valve to prevent the valve from being inadvertently turned in the future.

The 2-2301-45, HPCI Turbine Exhaust Check Valve was disassembled, inspected and a new valve installed under work request D26915. The check valve seats were found to be slightly worn due to seat impacting. This failure did not affect the operation of the HPCI system.

The 2-2301-74, HPCI Turbine Exhaust Check Valve, was disassembled, inspected and repaired under work request D26919. The valve disk was separated from the valve guide piston. Further inspection revealed the tack welds, which prevent the disc from unscrewing from the guide piston, had broken due to fatigue with flow-induced vibration as the likely cause. The valve was reassembled and tested satisfactorily during Unit 2 start-up on November 19, 1994.

The 2301-74 valves are being periodically inspected, per DAP 11-25. The results of these inspections to date show that repairs to 2-2301-74 valve tack welds and new HPCI warmup procedures are effective.

The 3-2301-74, HPCI Turbine Exhaust Check valve, was disassembled and inspected under work request D27123. The valve internals were found to be intact. The valve was reassembled and tested satisfactorily during Unit 3 start-up on November 4, 1994.

A Problem Investigation Report (PIR) was generated to address the potential Part 21 issue for the Edwards/Rockwell model exhaust check valve that failed during this event. The other valves of a similar design to the Unit 2 2301-74 valve by the same vendor were inspected. No tack weld failures were found. No design defect was found; therefore, a 10CFR21 condition did not exist and the PIR was closed.

AO2-2301-28, HPCI Inlet Drain Pot to Suppression Pool valve, was disassembled and inspected under work request D25302 during D2F23. The seat was found to have some minor indications. The valve seat was repaired and a seat contact check was performed satisfactorily. The valve was then successfully tested during Unit 2 start-up on November 19, 1994.

The Core Spray discharge check valve 2-1402-8A was inspected during D2F23. There were no problems noted during the inspection.

F. PREVIOUS OCCURRENCES:

A maintenance history review was performed for the 2-2301-74, HPCI Exhaust Check Valve. The review indicated that there had been no previous maintenance on the valve.

G. COMPONENT FAILURE DATA:

Edwards/Rockwell Stop Check Valve, Model No. 6504Y.

NRC FORM 366A (5-92)

U.S. NUCLEAR REGULATORY COMMISSION

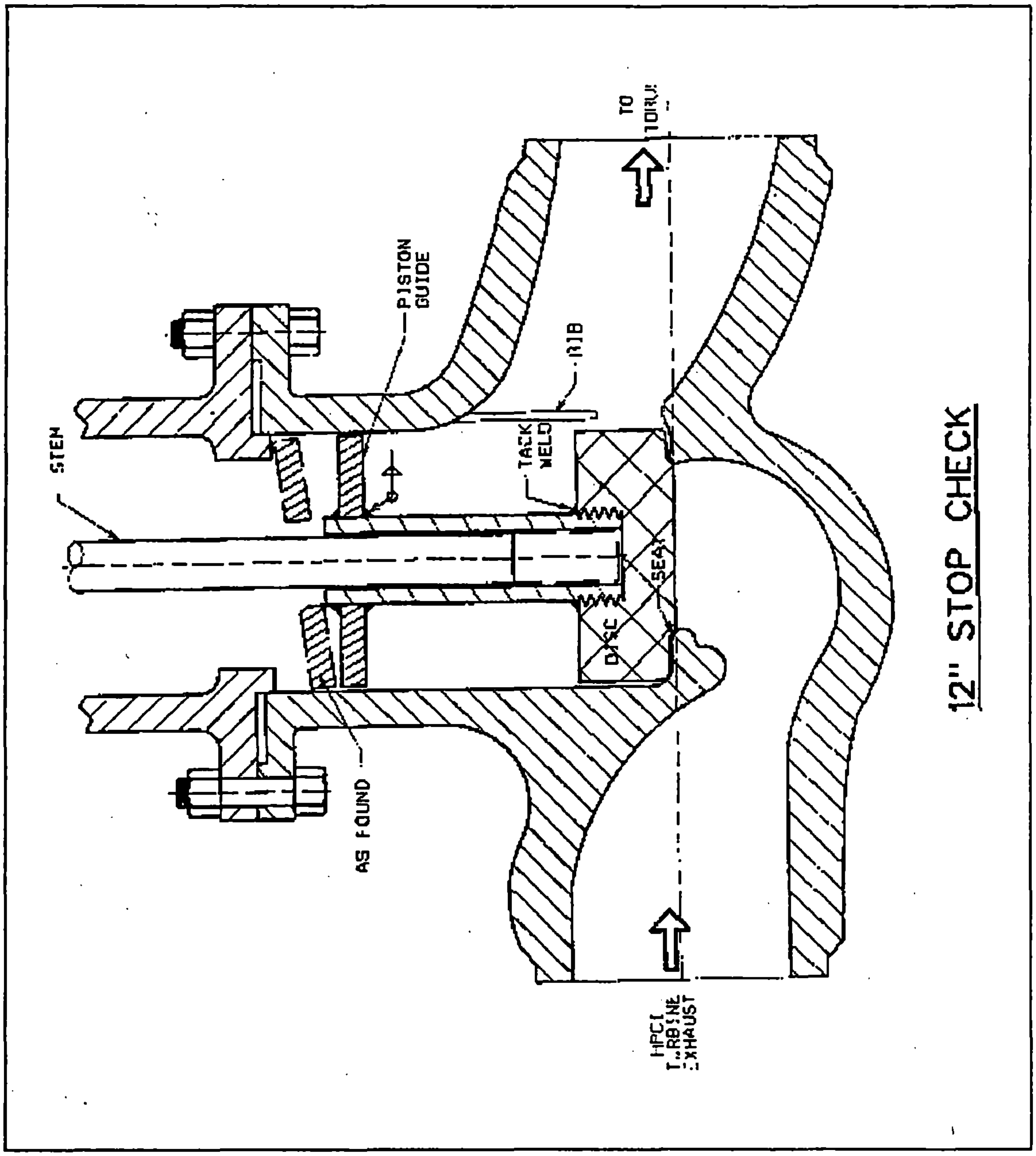
APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Dresden Nuclear Power Station, Unit 2	05000237	94	-- 021 --	02	11 OF 11

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



07/24/97:833