Commonwealth Edison Company
Dresden Generating Station
6500 North Dresden Road
Morris, IL 60450
Tel 815-942-2920

ComEd

March 29, 1995

TPJLTR 95-0039

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

Licensee Event Report 95-011, Docket 50-237 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10CFR50.73(a)(2)(i).

Sincerely,

Thomas P. Joyce
Site Vice President

TPJ/DE:pt

Enclosure

cc: J. Martin, Regional Administrator, Region III
NRC Resident Inspector's Office
File/NRC
File/Numerical

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NRC FORM 366 (5-92) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Units 2 and 3	05000237	1 OF 8

TITLE (4): Unit 2 and Unit 3 Nitrogen Make-up Flow Found Not to Meet Technical Specifications Due to Not Clearly Establishing the Design of the Nitrogen Make-up System.

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
03	03	95	95	-- 011 --	00	03	31	95	Unit 3	05000249
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	096

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)		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)	X	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)
Douglas J. Evans, Plant Engineering Engineer Ext. 2626	(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
E	LK	FCV	F130	No						
B	LK	PCV	C162	No						

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)

At 1116 on February 24, 1995, during the calibration check of the Drywell to Torus differential pressure transmitter on Unit 3, Operations personnel believed the normal path nitrogen make-up flow was lower than normal. Upon investigating this issue, it was discovered that the maximum normal make-up nitrogen flow for Units 2 and 3 was less than that implied by the Technical Specifications because of material problems with each Unit's Pressure Control Valve (PCV) (2(3)-8527). Further investigation discovered nitrogen flow through the PCVs (2(3)-8527) was further restricted because of upstream Pressure Regulating Valves (PRVs)(2-8589-521 and 3-8599-625). These PRVs (2-8589-521 and 3-8599-625) were found to be set at a pressure that would have precluded the implied Technical Specification Nitrogen flow even if the PCVs (2(3)-8527) had been functioning properly. The cause of the problems identified was due to not clearly establishing the design of the normal nitrogen make-up paths. The modification program has since been upgraded and system walk-downs are being performed, in part, to identify any other modification problems. This event had minimal effect on plant or public safety.

PLANT AND SYSTEM IDENTIFICATION:

General Electric - boiling water reactor - 2527 MWt rated core thermal power. Nitrogen Supply System [LK].

EVENT IDENTIFICATION:

Unit 2 and Unit 3 Nitrogen Make-up Flow Found Not to Meet Technical Specifications Due to Not Clearly Establishing the Design of the Nitrogen Make-up System.

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit(s): 2(3) Event Date: March 3, 1995 Event Time: 1545

Reactor Mode(s): N(N) Mode Name(s): Run(Run) Power Level(s): 96%(99%)

Reactor Coolant System Pressure(s): 983(1003) psig

No system or component was known to be inoperable at the beginning of the event.

B. DESCRIPTION OF EVENT:

Each Unit (2 and 3) has a separate nitrogen make-up and inerting system [LK] which is supplied from the same regulated external nitrogen supply. The purpose of the normal nitrogen make-up flow path is to replace nitrogen lost from the containment during normal operations, maintain Drywell to Torus differential pressure and, along with the nitrogen inerting flow path, provide nitrogen to the containment for post Loss of Coolant Accident (LOCA) Casualty response. The normal nitrogen make-up path includes the regulated external nitrogen supply which passes through a Pressure Regulating Valve (PRV) (2-8589-521 and 3-8599-625), venturi (2(3)-8541-2), Pressure Control Valve (PCV) (2(3)-8527) and into the Drywell. The PCVs (2(3)-8527) are controlled by a manual/automatic Pressure Indicating Controller (PIC) (2(3)-8540-1) located in the Main Control Room (MCR). This controller positions the PCV to maintain Drywell pressure at approximately 1.1 psig. The flow signal from the venturi is sent to a recorder (2(3)-8540-2/4) in the MCR. The Unit 2 and Unit 3 Operators primarily use the recorder indications to monitor normal nitrogen make-up flow for containment leakage trending purposes.

At 1041 on February 24, 1995, during the Unit 3 performance of Dresden Instrument Surveillance (DIS) 1600-15, Drywell-Torus Pumpback Differential Pressure, nitrogen flow indication was thought by the Operators to be low. The calibration check required the Operators to take remote manual control of nitrogen make-up and venting to maintain the required differential pressure between the Drywell and Torus in accordance with Dresden Operations Procedure (DOP) 1600-05, Primary Containment Inerting and Atmosphere Control During Operation. While making-up nitrogen and venting in this fashion, pressure in the Drywell and Torus was noted to be decreasing together. This response was thought by the Operators to be due to abnormally low nitrogen flow. The calibration check (DIS 1600-15) was stopped at 1116 on February 24, 1995, and

the system returned to normal. The Drywell and Torus pressure lowering together was later attributed to the Torus to Drywell isolation valve (3-1601-58), being left in its normal open position. However, the Torus to Drywell isolation valve (3-1601-58) should be closed when manually controlling Torus and Drywell pressure, but no instructions for doing this were contained in DOP 1600-05.

The make-up flow indication for Unit 3 during the surveillance, DIS 1600-15, as read on the recorder (3-8540-2/4), was about 46 standard cubic feet per hour (SCFH) when the PCV (3-8527) was fully opened manually from the PIC (3-8540-1). In comparison, the Unit 2 flow indication with its PCV (2-8527) fully open from its respective recorder (3-8540-2/4) was off scale high. The maximum reading on both recorders is 90 SCFH. Plant Engineering was tasked to determine what the design flow rate should be for normal nitrogen make-up flow. This issue was not recognized by Station personnel as a potential violation of Technical Specification requirements. Accordingly, no significant action was taken until February 27, 1995.

On February 27, 1995, the past recorder paper charts for the Unit 3 recorder (3-8540-2/4) were reviewed by Plant Engineering. The data indicated that with the PCV (3-8527) apparently fully open from the MCR, maximum normal make-up nitrogen flow had been about 88 SCFH for the last half of 1992 and the first half of 1993. The data indicated that on about July 5, 1993, the PCV (3-8527) began to fail, as a prompt decrease to 70 SCFH was noted. This interpretation of the data is the most likely one, but cannot be determined for certain because neither the recorder (3-8540-2/4), nor the PIC (3-8540-1) indicate the actual position of the PCV (3-8527).

The data following July 1993 indicated a steady apparent decrease in the maximum normal nitrogen make-up flow to the level indicated on February 24, 1995 (about 46 SCFH). The Unit 3 PCV (3-8527), which is contained in a high radiation area, was cycled remotely with Plant Engineering personnel monitoring it locally. It was found to have an audible air leak from its operator and the air leak was limiting the full open stroke of the valve to 60 percent open. Unit 3 entered a 7 day Limiting Condition for Operation (LCO), on February 27, 1995, based on Technical Specification 3.7.6.a, repaired the PCV (3-8527) within the 7 day LCO window and exited the LCO. Investigations continued to determine why Unit 3 maximum normal path nitrogen make-up (now about 82 SCFH) was a different value than Unit 2's maximum normal path nitrogen make-up (pegged high on a 90 SCFH scale).

Technical Specification 4.7.6 requires the valves in the nitrogen make-up system be actuated to determine operability once per month. The intent of this surveillance requirement is to ensure the requirements of Technical Specification 3.7.6.a, Containment Atmospheric Dilution and Purge, are met. Technical Specification 3.7.6.a states "whenever the reactor is in a power operation the normal containment make-up inerting system is required to be operable and capable of supplying nitrogen to containment for atmosphere dilution if required by post Loss Of Coolant Accident (LOCA) conditions."

Dresden Operating Surveillance (DOS) 1600-11, Containment Nitrogen Make-Up System Valve Operability Verification, tests the operability of the normal path

nitrogen make-up PCVs (2(3)-8547) monthly. The normal nitrogen make-up path is the only path checked by surveillance to meet the requirements of Technical Specification 3.7.6.a and 4.7.6. The scope of the surveillance does not verify the PCVs (2(3)-8547) fully open and close, as there is no remote open or closed indication provided for these valves. The surveillance checks that the PCVs operate with the manual feature on the PIC (2(3)-8540-1, and noting the nitrogen flow increase on the recorders (2(3)-8540-2/4). The surveillance as written, would not have caught the fact that the Unit 3 PCV (3-8527) had been in a degraded state for more than a year and a half as the magnitude of maximum flow is not given in the surveillance or required to be noted or recorded. Later investigations, as discussed below, determined that if the system is operating as designed, the recorders (2-(3)-8540-2/4) indication would have pegged out high for nitrogen flows through the fully open PCVs (2(3)-8527).

On February 28, 1995, Plant Engineering identified the Unit 2 and 3 flow transmitters for the normal path nitrogen make-up flow recorders (2(3)-8540-2/4) were not correctly matched to their respective venturis (2(3)-8541-2). The flow transmitters were not part of the original design of the normal path nitrogen make-up system. The Unit 2 flow transmitter range is 0-25 inches of water differential pressure (" H_2O d/p) and the Unit 3 transmitter range is 0-150" H_2O d/p. The originally installed flow transmitters did match the flow venturis but were changed out due to apparent failures over the life of the Units. The replacement transmitters ranges were apparently widened due to recorder and transmitter failures caused by frequent overranging. The flow venturis (2(3)-8541-3) are rated for an maximum output of 0-8" H_2O d/p which corresponds to a flow rate of 0-90 SCFH and are designed to measure accurate flow in the laminar (i.e., low flow) region. Normal nitrogen supply to the PCVs (2(3)-8527) is about 125 psig. To pass about 20 standard cubic feet per minute (SCFM) of nitrogen, the PCVs must be supplied with a minimum of 105 psig of nitrogen per vendor information. This flow rate is important because about 20 SCFM nitrogen flow was later determined to be an inferred Technical Specification requirement (described later). The recorders (2(3)-8540-2/4) per design, are intended to be accurate at the low flow rates expected for normal nitrogen make-up and for containment leakage trending. The application of the instruments was not adequately reviewed when the various modifications were installed.

On March 2, 1995, Station personnel met to discuss the Unit 2 and Unit 3 nitrogen make-up systems' problems. The Unit 2 PCV (2-8527) had been temporarily repaired in December 1994, because it had been failing to fully close. Nitrogen leakage though it had caused the Unit 2 Drywell to be vented frequently. As a result of the operational concern of frequent venting, the PCV's (2-8527) spring tension was adjusted so the valve would fully close. Upon completion of the temporary repair of the PCV (2-8527), permanent repairs were scheduled for the next refueling outage. The increase in spring tension also had the effect of restricting the PCV's (2-8527) stroke to about 80 percent open. With the PCV (2-8527) unable to fully open, the nitrogen make-up system could not meet the Technical Specification requirements. The non-compliance with Technical Specifications was not discovered until March 3, 1995. Thus, the Unit 2 nitrogen make-up system was in a degraded state for approximately three months because the nitrogen make-up flow rate was not recognized as a Technical Specification requirement.

The purpose of the pressure reducing valves (PRVs) (2-8589-521 and 3-8599-625) upstream of each respective PCV (2(3)-8527) was reviewed. They were found to serve no procedural function and their settings were not known. Work instructions were written to check the PRVs' (2-8589-521 and 3-8599-625) settings and to reset them to 125 psig, as any setting less than 105 psig would restrict flow unnecessarily. In parallel, Site Engineering began a review of the design basis of the normal path nitrogen make-up system. Station personnel determined on March 2, 1995, that entering a 7 day LCO for Unit 2 or Unit 3 for these issues based on Technical Specification 3.7.6.a was not yet appropriate because of the in-progress design basis review.

On March 3, 1995, Plant Engineering and Operations personnel connected temporary calibrated pressure indicators downstream of the PRVs (2-8589-521 and 3-8599-625). The Unit 2 PRV (2-8589-521) was found to be set at 50 psig. The Unit 3 PRV (3-8599-625) was found to be set at 60 psig. They had both been set low for an undetermined amount of time, as they have apparently not been controlled in the life of Unit 2 or Unit 3. Both PRVs (2-8589-521 and 3-8599-625) were, upon discovery, reset to 125 psig. The Unit 3 PRV (3-8599-625) had been reset and the Unit 3 nitrogen make-up system was capable of passing greater than 20 SCFM of nitrogen through the PCV (3-8527) prior to the completion of the design review.

The results of the design basis review were completed at 1545 on March 3, 1995, while the Unit 2 PRV (2-8589-521) was being checked and adjusted. It was decided that although the Technical Specifications does not specify a minimum nitrogen flow rate, it does specify a minimum of 200,000 cubic feet supply of nitrogen be maintained on hand for each Unit. This amount is also specified as a seven day supply. An average flow rate of about 20 SCFM is required to deliver the 200,000 cubic feet supply of nitrogen over a seven day period. Though the nitrogen inerting system as a whole provides two methods of delivering this rate of nitrogen, the only path that is surveilled each month is the normal path nitrogen make-up supply.

Unit 2 Operating personnel were informed at 1545 on March 3, 1995, by Design and Plant Engineering that Unit 2 was operating outside of Technical Specifications because the Unit's normal path nitrogen make-up path was degraded. Engineering suspected that the PRV (2-8589-521) was set below the needed 105 psig and the PCV (2-8527) could not open fully due to the temporary repair. The Unit 2 nitrogen make-up path was therefore not capable of meeting the implied Technical Specification of about 20 SCFM flow of nitrogen. The Unit 2 Operating personnel immediately entered a 7 day LCO. The PCV (2-8527) was repaired within the 7 day LCO window and the LCO was cleared. The Unit 2 nitrogen make-up systems are now capable of supplying the implied make-up flow of the Technical Specifications. Unit 3 did not enter an LCO because its nitrogen make-up system had been repaired and met the implied flow rate of the Technical Specifications determined by the design review.

The Unit 2 and Unit 3 nitrogen make-up paths have apparently been degraded and not met the implied Technical Specification flow rate since about 1976 when the PRVs (3-8599-625 and 2-8589-521) were installed. Unit 2 and Unit 3 nitrogen make-up systems currently meet the implied Technical Specification for flow

rate. The Nitrogen Make-up System design does not include a means to measure this rate of flow. A nitrogen supply pressure of 105 psig is required to deliver approximately 20 SCFM. Nitrogen supply pressure is normally maintained at 125 psig. Therefore, the inferred Technical Specification requirements of approximately 20 SCFM of Nitrogen is easily met.

Modifications to install the Nitrogen Containment Atmospheric Dilution (NCAD) System in Units 2 and 3 are being finalized and will be installed in both Units in the near future. This modification includes instrumentation to measure nitrogen flow rate and makes the normal path nitrogen make-up paths obsolescent for combustible gas control.

C. CAUSE OF EVENT:

This LER is submitted in accordance with 10CFR50.73(a)(2)(i)(B), which requires that within 30 days of discovery of any operation or condition prohibited by the plant's Technical Specification, the licensee shall provide a written report to the NRC.

Root Cause:

1. The design of the normal nitrogen make-up paths was not clearly established. The design was not maintained or sufficiently verified as a succession of corrective maintenance items and modifications were completed which affected the system.

Contributing Cause:

1. The Technical Specifications and Updated Final Safety Analysis Report (UFSAR) are not clear concerning the requirements for combustible gas control.

D. SAFETY ANALYSIS:

This event had minimal effect on plant or public safety because the required 7 day supply of nitrogen could have been supplied through the nitrogen make-up or inerting paths. This action, however, would have required some local manual valve operations.

E. CORRECTIVE ACTIONS:

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

1. The site's modification process has been significantly upgraded since 1987 and will preclude further inappropriate design modifications. Significant improvements to the design process include:

   a. Required cross department involvement in modification scope identification and design requirements.

   b. Have significantly improved the configuration management of modifications by addressing the scope of the implementation of administrative, operation and maintenance procedures, drawing changes, and calculations at the initiation of the modification.

   The effectiveness of the new modification process has been validated, and continues to be validated, by a sampling review of modifications conducted by the Corporate Chief Engineer.

2. System walk-downs scheduled to be completed March 31, 1995, are intended, in part, to identify similar existing plant modification problems. (237-100-94-01501CR-01)

3. The Station Manager was provided clarification for the design basis requirements of the interim post-LOCA combustible gas control in CHRON letter, 0307059, dated, March 17, 1995. The guidance contained in this letter will be included in a Technical Specifications Interpretation (237-180-95-01101). The Technical Specification will be revised to include clarification of the design basis requirements. (237-180-95-01102)

4. Initiate Action Requests to return the flow transmitters and recorders to correct design configuration. The current plant configuration for nitrogen make-up and inerting meets all Technical Specifications, but has inappropriately been modified in the past. (237-180-95-01103)

5. Process a document change request to indicate the current PRV setpoints. (237-180-95-01104)

6. Review revised nitrogen make-up system design and clarified design basis requirements of the interim post-LOCA combustible gas control for changes to the site's training materials. Submit proposed changes to Operations Training Program review committee for training scheduling. (237-180-95-01105)

7. Brief Operators on the clarification for the design basis requirements of the interim post-LOCA combustible gas control documented in CHRON letter 0307059, dated, March 17, 1995. (237-180-95-01106)

8. Update the design basis UFSAR description for nitrogen inerting and make-up, Atmosphere Containment Atmospheric Dilution (ACAD), Nitrogen Containment Atmospheric Dilution (NCAD) systems. (237-180-95-01107)

9. The monthly surveillance DOP 1600-11 will be updated to include a local verification that the PCVs (2(3)-8527) cycle full stroke until the NCAD system is installed for Units 2 AND 3 (237-180-95-01108) and DOP 1600-05 will be updated to provide proper instructions for manually controlling the Torus to Drywell differential pressure (237-180-95-01109) prior to conducting the next monthly surveillance.

10. The NCAD Modifications will be installed by the end of D3R14. (237-104-84-00903) (249-104-84-00901)

F. PREVIOUS OCCURRENCES:

None.

G. COMPONENT FAILURE DATA:

None. No component failed.