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IES UTILITIES

May 24, 1996
NG-96-1199

Mr. Hubert J. Miller
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Licensee Event Report #96-001, Rev. 1
File: A-118a

Gentlemen:

Please find attached a copy of the subject Licensee Event Report (LER). This revision includes information about the scope and frequency of alternative testing the Duane Arnold Energy Center (DAEC) will implement to monitor the degradation in the response times in the currently installed scram solenoid pilot valves (SSPVs). In addition, this revision discusses the conditions by which the DAEC will perform individual control rod scram time testing to confirm the correlation between control rod notch 46 scram insertion times and the response times of the "118" SSPVs . This letter makes no new committments.

Sincerely,

Gary Van Middlesworth

Gary Van Middlesworth
Plant Manager - Nuclear

040022

cc: Director of Nuclear Reactor Regulation
Document Control Desk
U. S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D. C. 20555-0001

NRC Resident Inspector - DAEC

IE22

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)
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TITLE (4)
Core Average Control Rod Scram Time to Notch Position 46 Exceeding Technical Specification Limit

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
										05000-331
03	25	96	96	-- 001 --	01	05	24	96	FACILITY NAME	DOCKET NUMBER
										05000-331

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	60	20.2201(b)	20.2203(a)(2)(v)	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 voluntary report
		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)
Leonard Sueper, Principal Licensing Engineer	(319) 851-7365

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION	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 0230 on March 25, 1996, with the plant at 60% power, scram time testing was completed on all (89) control rods which indicated that the core average scram insertion time to rod position 46 had exceeded the Technical Specification limit of 0.35 seconds. In addition, the average scram insertion times to notch 46 for the three fastest control rods in any two-by-two (2X2) array also exceeded the Technical Specification limit of 0.37 seconds. The average scram insertion time requirements, both for the core average and the average of the three fastest control rods in any 2X2 array, were met for rod positions 38, 26, and 06. No individual control rod scram insertion time exceeded the Technical Specification limit of 7.00 seconds to rod position 04.

The testing was performed in response to industry operating experience which indicated possible degradation over time of the scram insertion times of control rods equipped with Viton scram solenoid pilot valve (SSPV) diaphragms. The Viton SSPV exhaust diaphragms were replaced with new Viton diaphragms on 87 control rods and post maintenance scram time testing was performed. The as-left core average scram insertion time to notch position 46 was 0.32 seconds. The plant will perform periodic testing to monitor degradation of the currently installed Viton diaphragms. There was no effect on the safe operation of the plant.

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

Description of Event:

In April of 1995, Viton scram solenoid pilot valve (SSPV) diaphragms were installed in all 89 control rods at the Duane Arnold Energy Center (DAEC) as a replacement for Buna-n diaphragms because of their expected increased qualified life. Beginning in late 1995, the industry began to report increased 5% (approximately equal to rod position 46 at the DAEC) scram insertion times during periodic testing. The DAEC does not have Technical Specification requirements to perform periodic testing.

On March 18, 1996, the DAEC initiated scram insertion time testing on all (89) control rods in response to industry operating experience indicating that control rods with Viton SSPV diaphragms may experience degraded performance over time. Each control rod was individually scrammed and its Viton SSPV exhaust diaphragm ('118' valve) was replaced if the scram insertion time to rod position 46 exceeded 0.35 seconds. Those control rods that had new diaphragms installed received as-left scram insertion time testing. After the testing on all 89 control rods was complete on March 25, it was determined that the as-found core average scram insertion time to rod position 46 was 0.393 seconds which exceeded the Technical Specification 3.3.D.1 limit of 0.35 seconds. This represented a 0.063 second increase over the core average rod position 46 scram insertion time testing performed approximately one year earlier. In addition, it was determined that the Technical Specification 3.3.D.2 limit of 0.37 seconds for the average insertion time to rod position 46 for the three fastest control rods in any 2X2 array had also been exceeded.

The average scram insertion time Technical Specification requirements, both for the core average and the average of the three fastest control rods in any 2X2 array, were met for rod positions 38, 26, and 06.

The maximum as-found scram insertion time to rod position 46 was 0.450 seconds. The minimum as-found scram insertion time to rod position 46 was 0.320 seconds. The as-left core average scram insertion time was 0.324 seconds.

Cause of Event:

The degradation in the scram insertion times appears to be attributable to adhesion between the Viton SSPV diaphragm, primarily '118' exhaust valve diaphragm, and the SSPV seat.

Analysis of Event:

The Technical Specification 3.3.D.1 limit on the core average scram insertion time to rod position 46 provides an indicator of the performance of the control rod (i.e. beginning of rod motion). However, the amount of negative reactivity inserted into the reactor at rod position 46 is not significant and is not an input into any plant transient or accident analysis. Generic analysis performed for BWR/2-5 reactors has shown that core average scram insertion times to rod position 46 as high as 0.490 seconds does not result in unacceptable consequences as long as the core average scram insertion times for the other Technical Specification rod positions (i.e. 38, 26, and 06) are met. The as-found core average insertion times for these Technical Specification required rod positions were all within the specified limits. The DAEC's plant specific analysis is based on control rod insertion to rod position 38 within specified times. Therefore the plant was within analyzed conditions at all times.

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

Corrective Actions:

The Viton diaphragms which were installed to replace those that had degraded over time are themselves susceptible to degradation over time. Therefore, the following additional corrective actions are being taken:

- The DAEC is participating in the Boiling Water Reactor Owners' Group (BWROG) SSPV Committee and is cooperating with General Electric to develop a long term solution.

- Additional SSPV testing will be performed as necessary to meet the intent of the BWROG Regulatory Response Group (RRG) recommendations. Specifically, alternative testing (see discussion on "Puff" testing in Additional Information below) shall be performed in lieu of the individual control rod scram testing referenced in the RRG recommendations. This testing, which measures the performance of the SSPV '118' solenoid directly, shall be performed with a sope and frequency that meets or exceeds the RRG recommendations. In addition, individual control rods shall be scram insertion time tested as appropriate to confirm the correlation between notch position 46 scram insertion times and puff test times if trending indicates that the degradation rate of the installed SSPVs exceeds the predicted degradation rate.

- The SSPV diaphragms will be replaced as needed.

Additional Information:

Non-invasive ("Puff") testing was performed on five of the control rods concurrent with their as-found and as-left scram insertion time testing. The testing was performed to determine its usefulness as a diagnostic tool for trending SSPV degradation without actually scramming individual control rods. The test involved the use of a clamp-on ammeter attached to the SSPV '118' solenoid power leads to detect the loss of current to the SSPV when deenergized (such as during a scram) and a plastic flap attached to a rheostat which detected the air released by the SSPV when it repositioned. The difference in time from when the SSPV valve is deenergized to when air is released from the SSPV was measured by a data acquisition unit.

A. Previous Similar Events:

No LERs had been written concerning degradation of the Viton diaphragms since their installation.

B. IEES System and Component Codes:

Control Rod Drive---AA
Hydraulic Control Unit---HCU
Scram Solenoid Pilot Valve---FSV

C. The SSPVs are dual-type ASCO solenoid valves (GE part number 107E6022P001).

This event is being reported voluntarily.