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June 13, 1994
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U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket No. 50-440
LER 94-012-00

Gentlemen:

Enclosed is Licensee Event Report 94-012-00 concerning two unexpected Annulus Exhaust Gas Treatment System (AEGTS) auto starts. The AEGTS is an Engineered Safety Feature system.

If you have questions or require additional information, please contact Mr. James D. Kloosterman, Manager - Regulatory Affairs at (216) 280-5833.

Very truly yours,

RAS:RAL:sc

Enclosure: LER 94-012-00

cc: NRC Project Manager
NRC Resident Inspector Office
NRC Region III

Operating Companies
Cleveland Electric Illuminating
Toledo Edison

IE22
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NRC FORM 366 (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 (M-9B 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)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Perry Nuclear Power Plant, Unit 1	05000 440	1 OF 5

TITLE (4) Equipment Malfunction Leads To Two Unexpected Annulus Exhaust Gas Treatment System Auto Starts

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
05	14	94	94	-- 012 --	00	06	13	94	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
POWER LEVEL (10)	000	20.402(b)	20.405(c)	X	50.73(a)(2)(iv)	73.71(b)	
		20.405(a)(1)(i)	50.36(c)(1)		50.73(a)(2)(v)	73.71(c)	
		20.405(a)(1)(ii)	50.36(c)(2)		50.73(a)(2)(vii)	OTHER	
		20.405(a)(1)(iii)	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
		20.405(a)(1)(v)	50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
R. A. Loeffler, Compliance Engineer	(216) 280-5885

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 DATE (15)	MONTH	DAY	YEAR
X	YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	10	15	94

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

On May 14, 1994, at 2256, during post-maintenance testing, train B of the Annulus Exhaust Gas Treatment System (AEGTS) automatically started twice.

The apparent cause of this event was equipment failure; however, the exact cause of the failure is currently being evaluated. The most probable cause of the AEGTS train B auto starts was a defective Flow Controls Incorporated (FCI) flow switch and/or the flow switch calibration device (FCI calibrator). These flow switches were being installed during the fourth refueling outage. Additional testing will be performed on the FCI flow switch and the FCI calibrator to isolate the root cause.

To prevent potential recurrence of this event, the A flow switch was replaced with an identical new FCI flow switch and recalibrated utilizing different test equipment. Retesting of the AEGTS train B flow switch was also performed as part of troubleshooting. Both trains were then retested for proper operation.

I. Introduction

On May 14, 1994, at 2256, during post-maintenance testing, train B of the Annulus Exhaust Gas Treatment System (AEGTS) [BA] automatically started twice. At the time of this event, the plant was in a refueling outage with all fuel removed from the reactor vessel [RPV]. The reactor vessel head was removed with RPV pressure at atmospheric and water temperature at 80 degrees Fahrenheit. On May 15, 1994, at 0049, a required non-emergency four-hour ENS notification was made to the NRC pursuant to the requirements of 10 CFR 50.72(b)(2)(ii) to report automatic starts of the AEGTS as Engineered Safety Feature actuations. This event is being reported under the requirements of 10 CFR 50.73(a)(2)(iv).

II. Description of the Event

During the current (fourth) refueling outage both trains of the AEGTS were modified to allow direct detection of a low air flow condition. The AEGTS consists of two independent and redundant trains. One train operates during normal plant operation and the standby train automatically initiates in response to a Loss of Coolant Accident (LOCA) signal or when low air flow is sensed in the operating train. The fan in each train is operated by a three-position fan control switch. The three positions are STOP, STANDBY, and ON. The control switch spring returns from STOP to STANDBY. The fan can be started manually by turning the control switch to the ON position. When in the STANDBY position, the fan in the standby train will automatically start if the operating train air flow is low, or if a LOCA signal is present.

Prior to this modification being installed, low air flow in the operating train was sensed indirectly by monitoring for high or low differential pressure across the operating train's exhaust fan. The existing Solon differential pressure switches [PDS] were replaced with Fluid Controls Incorporated (FCI, Model Number FR72-4) thermal dispersion type flow switches [FS]. Replacing the differential pressure switches with flow switches allows a low flow condition to be directly detected based on a measured flow rate through the operating train. Elimination of the differential pressure switches also eliminates their associated setpoint drift, a cause of several Licensee Event Reports (LERs) in the past.

Following installation of this modification, calibration and post-maintenance testing was performed. As part of this testing each train was independently initiated from various states as described in the System Operating Instruction (SOI) [i.e., secured status, standby, etc.]. This testing was conducted per the direction of the work order to verify proper system operation. At 2256 on May 14, 1994, during these system operation verifications, the AEGTS train B automatically started with the AEGTS A train running. This occurred while attempting to place the B fan in standby status. The operator then stopped the B

fan by rotating and holding the fan control switch to the STOP position. When the operator placed the switch to the STANDBY position, the B fan once again restarted.

At 2330 the operator shut down both trains to secured status and troubleshooting commenced. It was concluded that a LOCA signal had not been received, since the receipt of a LOCA initiation would have also energized the associated heater in the filter plenum. The heater remained off during this event. A low flow alarm was not received as would be expected in a low flow condition. (Note that the low flow alarm is provided by an independent switch and set to operate at a flow higher than the low flow start.) During troubleshooting, a low flow condition was verified not to exist on the A fan.

It was determined during troubleshooting that the initiation had occurred due to a problem associated with either the FCI flow switch (1M15-N070A) or the associated test equipment (FCI calibrator) utilized for the calibration process (see Cause Analysis section below).

The A flow switch was replaced and the replacement switch was recalibrated utilizing different test equipment, as described below. Both trains were then retested for proper operation for both automatic start and standby operation conditions. Following completion of post-maintenance testing both trains were then declared operable.

III. Cause Analysis

Subsequent to the auto starts, troubleshooting and retesting were performed to investigate the reasons why the auto starts occurred. The apparent cause of this event was equipment failure; however, the exact cause of the failure is currently being evaluated. The most probable causes for the AEGTS B train automatic starts were a defective FCI flow switch and/or the flow switch calibration device (FCI calibrator). Additional testing will be performed on the FCI flow switch and the FCI calibrator to isolate the root cause.

During troubleshooting it was found that the calibration curve determined for the A flow switch had shifted. This appeared to be caused by either an interface problem in the connection between the A train FCI flow switch and the FCI calibrator or a problem with the A train flow switch itself, which imposed a bias on the signal sent to the calibrator displayed as output. Utilizing the same calibrator on the B train did not shift that train's calibration curve. The A flow switch was then replaced and both trains were then recalibrated/ verified with a spare FCI calibrator, neither train showed the curve shift experienced with use of the original FCI calibrator with the A train.

It was also discovered during the subsequent trouble shooting for this event that two-way radio transmissions can also induce a fluctuation in output of the FCI flow switch. Signs have been posted at the door to each AEGTS room and at each FCI flow switch warning personnel not to use radios.

IV. Safety Analysis

The AEGTS is designed to continuously discharge filtered air from the reactor building [NG] annulus. This system maintains the annulus pressure negative with respect to the shield building and containment [NH]. The negative pressure in the annulus causes leakage through the shield building and containment to flow into the annulus, ensuring that any leakage from the containment vessel will be filtered through the AEGTS. The AEGTS consists of two identical trains, one normally in standby.

The fan of the standby train automatically starts if a low flow condition is experienced by the operating train or in the event of a LOCA. A low flow condition is detected by the flow switch located at the discharge of each fan. The AEGTS operated as designed during this event in response to the low flow initiation signal received. At the time of the event the reactor was defueled with no fuel movement, no core alterations and no operations with a potential to drain the reactor vessel in progress. The AEGTS is not required to be operable under these conditions and it was not operable at the time of the event. Therefore, this event is not considered safety significant.

V. Similar Events

No similar events were identified. Several auto starts of the AEGTS have occurred in the past, as reported in LERs 87-043, 87-069, 89-016, 91-007, and 93-006; however, the FCI flow switch modification was in the process of being implemented to improve the system design. Therefore, the past equipment failures are considered to be unrelated to this event.

VI. Corrective Actions

The apparent cause of this event was equipment failure; however, the exact cause of the failure is currently being evaluated. The most probable cause of the AEGTS train B auto starts was a defective FCI flow switch and/or the flow switch calibration device (FCI calibrator). Additional testing will be performed on the FCI flow switch and the FCI calibrator to isolate the root cause.

To prevent potential recurrence of this event, the A flow switch was replaced with an identical new FCI flow switch and recalibrated utilizing a different FCI calibrator. Retesting of the AEGTS train B flow switch was also performed as part of troubleshooting. Both trains were then retested for proper operation.

Two-way radio transmissions can also induce a fluctuation in output of the FCI flow switch. Signs have been posted at the door to each AEGTS room and at each FCI flow switch warning personnel not to use radios.

A supplement to this LER will be submitted by October 15, 1994 to address the root cause for the equipment failure.

Energy Industry Identification System Codes (EIIS) are identified in the text as [XX].