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PY-CEI/NRR-1994L

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Perry Nuclear Power Plant
Docket No. 50-440
LER 94-012-01

Gentlemen:

Enclosed is Revision 1 to Licensee Event Report 94-012 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,

GSC:vah

Enclosure: LER 94-012-01

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

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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 (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)

(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 DATE (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	01	11	14	95	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)
Keith R. Jury, Supervisor - Compliance	(216) 280-5594

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
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

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 cause of this event could not be conclusively determined; however, it appears that either the Flow Controls Incorporated (FCI) flow switch or the FCI flow switch calibration device (FCI calibrator) was not functioning properly. Testing by the vendor, the corporate measurement and test equipment laboratory, and by plant personnel failed to conclusively identify the root cause(s) for the AEGTS auto starts.

The AEGTS train A flow switch was replaced with a new flow switch which was calibrated utilizing a different flow switch calibrator. Both trains were then retested for proper operation. The removed FCI flow switch was tested and evaluated by plant personnel and by the vendor; however, no failure mechanisms were identified. The flow switch calibrator was modified and returned to the field. Signs, warning personnel not to use radios, have been posted at the doors to each AEGTS room and at each FCI flow switch. No further occurrences of inadvertent AEGTS initiation have been experienced. This report is submitted in accordance with 10CFR50.73(a)(2)(iv) as an Engineered Safety Features system actuation.

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 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. The flow switch calibrator was modified and returned to the field. Both trains were then retested for proper operation. Following completion of post-maintenance testing both trains were declared operable. No further occurrences of inadvertent AEGTS initiation have been experienced.

III. Cause Analysis

The calibration curve for the train A flow switch was determined to have shifted. This could have been the result of either an interface problem between the flow switch and the flow switch calibrator, or a problem with the flow switch itself. The same calibrator was used on the train B flow switch, and yielded acceptable results.

Onsite evaluation failed to identify any abnormalities or improper operating characteristics with the removed flow switch. The flow switch was then sent to the vendor for additional evaluation. The vendor was also unable to identify any concerns with the flow switch.

The flow switch calibrator was sent to the corporate measurement and test equipment laboratory for evaluation. The calibrator probes are shielded from the probe body by plastic sleeves. One of these plastic sleeves was determined to protrude excessively from the probe body. It was postulated that this could

have led to misalignment problems when connecting the calibrator to the flow switch; however, it could not be conclusively determined that this was the cause of the calibration curve shift.

It was also determined during subsequent troubleshooting, that two-way radio transmissions can induce a fluctuation in the output of the flow switch. It is not known whether radios were in use in the area at the time of this event.

Based upon the evaluations performed, the cause of this event is indeterminate. It appears likely that either the flow switch was functioning improperly, or the flow switch calibrator was not interfacing properly during the calibration. No similar problems have been experienced with this equipment since the changeout and no additional testing or evaluation of this event is planned.

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 AEGTS train A flow switch was replaced with a new flow switch which was calibrated utilizing a different flow switch calibrator. Both trains were then retested for proper operation. The removed FCI flow switch was tested and evaluated by plant personnel and by the vendor; however, no failure mechanisms were identified. The flow switch calibrator was modified and returned to the field. Signs, warning personnel not to use radios, have been posted at the doors to each AEGTS room and at each FCI flow switch. No further occurrences of this problem have been experienced.

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