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FACIL:50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylva 05000388
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SUBJECT: LER 91-005-00:on 910309,unplanned engineered safety actuation occurred when 'A' standby gas treatment fan started unexpectedly.Caused by actuation of filter train outlet sensor.Technical review performed.W/910408 ltr.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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April 8, 1991

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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 91-005-00
FILE R41-2
PLAS -478

Docket No. 50-388
License No. NPF-22

Attached is Licensee Event Report 91-005-00. This report is being made pursuant to 10CFR50.73(a)(2)(iv), in that an unplanned ESF actuation occurred when the 'A' Standby Gas Treatment System fan started unexpectedly while securing the system following purging of the primary containment. The cause of the fan start was actuation of the filter train outlet temperature sensor. The condition automatically reset after a short period of time and system restoration was completed.

H.G. Stanley
Superintendent of Plant - Susquehanna

HL/mjm

cc: Mr. T. T. Martin
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NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92
ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Susquehanna Steam Electric Station - Unit 2	0 5 0 0 0 3 8 8	1 OF 0 5

TITLE (4)

Standby Gas Treatment Fan - Unexpected Start

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 NAMES	DOCKET NUMBER(S)
0 3	0 9	9 1	9 1	0 0 5	0 0	0 4	0 8	9 1		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	3	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 0 0	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 (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		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
Harrison Lloyd, Jr. - Power Production Eng.	AREA CODE 7 1 7 5 4 2 - 3 9 1 7

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 fifteen single space typewritten lines) (16)

On March 9, 1991 with Unit 2 in Condition 3 (Hot Shutdown), the 'A' Standby Gas Treatment System (SGTS) fan started unexpectedly while securing the system following purging the primary containment in preparation for the refueling outage. The fan started due to actuation of the filter train high outlet temperature sensor. The cause of the actuation could not be determined with certainty but the most likely cause was an inaccurate signal from the temperature sensing element to the temperature switch while warm containment air was being introduced into the system. The accuracy of the temperature elements is questionable due to lack of data as to their length. In addition, the temperature sensors exhibit a wide tolerance band and discrepancies in the calibration procedures for the sensors were discovered during the investigation. The temperature condition cleared itself and the system was returned to normal standby alignment. This event was determined to be reportable per 10CFR50.73(a)(2)(iv) in that an unplanned ESF actuation occurred when the 'A' SGTS fan started due to actuation of the filter train outlet temperature switch. There were no safety consequences or compromises to the public health or safety. A review of the system design revealed that the setpoints for the filter inlet and outlet temperature switches were reversed which affected the order in which the cooling mode logic initiated. However, this condition would not have prevented the system from performing its intended function. The setpoints have been corrected and calibration procedures will be revised appropriately. An inspection of the temperature elements will be performed to determine if any physical changes to the elements is necessary.

DESCRIPTION OF EVENT

At 2156 hours on March 9, 1991 with Unit 2 in Condition 3 (Hot Shutdown), the 'A' Standby Gas Treatment System (SGTS; EIIS Code: BH) fan started unexpectedly when the control switch was taken from the 'STOP' position to the 'AUTO-LEAD' position with a charcoal filter outlet sensor detector prealarm condition present. This occurred while securing the system following completion of purging the drywell and suppression chamber in preparation for general entry during the Unit 2 Fourth Refueling Outage. The fan tripped shortly thereafter on low flow since the flowpath had already been secured per the operating procedure. The control switch was then placed in the 'STOP' position. The control switch was then placed in the 'AUTO-STANDBY' position with similar results, only this time the switch was returned to 'STOP' prior to the fan tripping on low flow. An investigation was initiated to determine the cause of the unexpected start.

CAUSE OF EVENT

The cause of the start of the 'A' SGTS fan was actuation of the filter train outlet temperature switch. We do not believe an actual high temperature condition existed and the basis of this assessment is discussed below.

This event involved the SGTS Cooling Mode logic. The cooling mode is designed for post-accident cooling of the charcoal beds to remove heat that may be generated as a result of radioactive decay of gases which have been absorbed by the charcoal. The attached sketch is provided to assist in understanding the normal sequence of events for the cooling mode function. This description assumes the 'A' filter train is idle (fan not running) and has become "loaded" with radioactive gases post accident. As the temperature increases, actuation of the charcoal inlet temperature switch (TSH-07551-A2) causes the cross-tie damper (TD-07560A) and the outside cooling air damper (HD-07555A) to open thus providing a cooling path since the 'B' fan would already be running to maintain secondary containment. Actuation of TSH-07551A2 also annunciates a control room alarm. If the charcoal temperature continues to rise, actuation of the outlet temperature switch (TSH-07551A1) causes the 'A' fan to start, the normal outside makeup air damper (FD-07551A) to open, and the outside cooling air and cross-tie dampers to close. Further temperature increase to a much higher temperature (indicating possible ignition) will actuate the charcoal deluge system.

During the described event, only TSH-07551A1 actuated thus causing the auto start of the 'A' Fan. Since TSH-07551A2 had not actuated, dampers TD-07560A and HD-07555A had not opened so no flow path was available. As a result the, 'A' fan subsequently tripped on low flow. This was proper response of the system to the actuation of TSH-07551A1.

The cause of the actuation of temperature switch TSH-07551A1 could not be positively determined. Instrumentation technicians (utility, non-licensed) checked the condition of TSH-07551A1 and found the switch functioning properly with a setpoint of 224°F. Further investigation revealed information which called into question the accuracy of the signal being generated by the temperature element. The length of the sensors is not positively known thus sensor output at a given temperature may not match desired output. In addition, PP&L received the following information from the supplier of the temperature elements.

1) The tolerance for this type of element is plus or minus 30°F.

2) The data for temperature versus resistance in our calibration procedure is different than that identified in the vendor instruction manual.

We have concluded that these anomalies would affect the signal in the conservative direction (i.e. - system actuation would occur at a lower actual temperature).

The drywell temperature at the beginning of purging was 122°F and the final temperature was 114. Adding the 20°F increase from the SGTS heater, the air entering the charcoal filter should have been no more than 140 - 145°F, well below the 224° setpoint. It is possible that actuation of TSH-077551A1 was caused by an inaccurate signal from the temperature sensing element.

Other possible sources of heat were considered to determine if an actual high temperature condition existed, none of which were determined likely. These items were:

1) SGTS Heater Control malfunction - the SGTS was operated for one hour during the investigation and the heater controls functioned properly.

2) Filter Train Space Heater Operation - two small space heaters are provided to help keep the charcoal dry during periods of extended filter train layup. However, the heater disconnect switch was found to be open which is the normal status.

3) Decay Heat generated in charcoal bed - this is highly unlikely in that drywell air samples indicated there was minimal concentrations of radioactive gases present.

REPORTABILITY/ANALYSIS

This event was determined to be reportable per 10CFR50.73(a)(2)(iv) in that an unplanned Engineered Safety Feature actuation occurred when the 'A' SGTS fan started due to actuation of the SGTS filter charcoal outlet temperature switch. There were no safety consequences as a result of this event. Had an actual high temperature condition existed, the filter train cooling mode would still have functioned. In the event this method did not cool the charcoal, the deluge initiation at 410°F would have actuated.

In accordance with guidance provided in NUREG 1022, Supplement 1, item 14.1 and 10CFR50.4(d); the required submission date for this report was determined to be 4/8/91.

CORRECTIVE ACTION

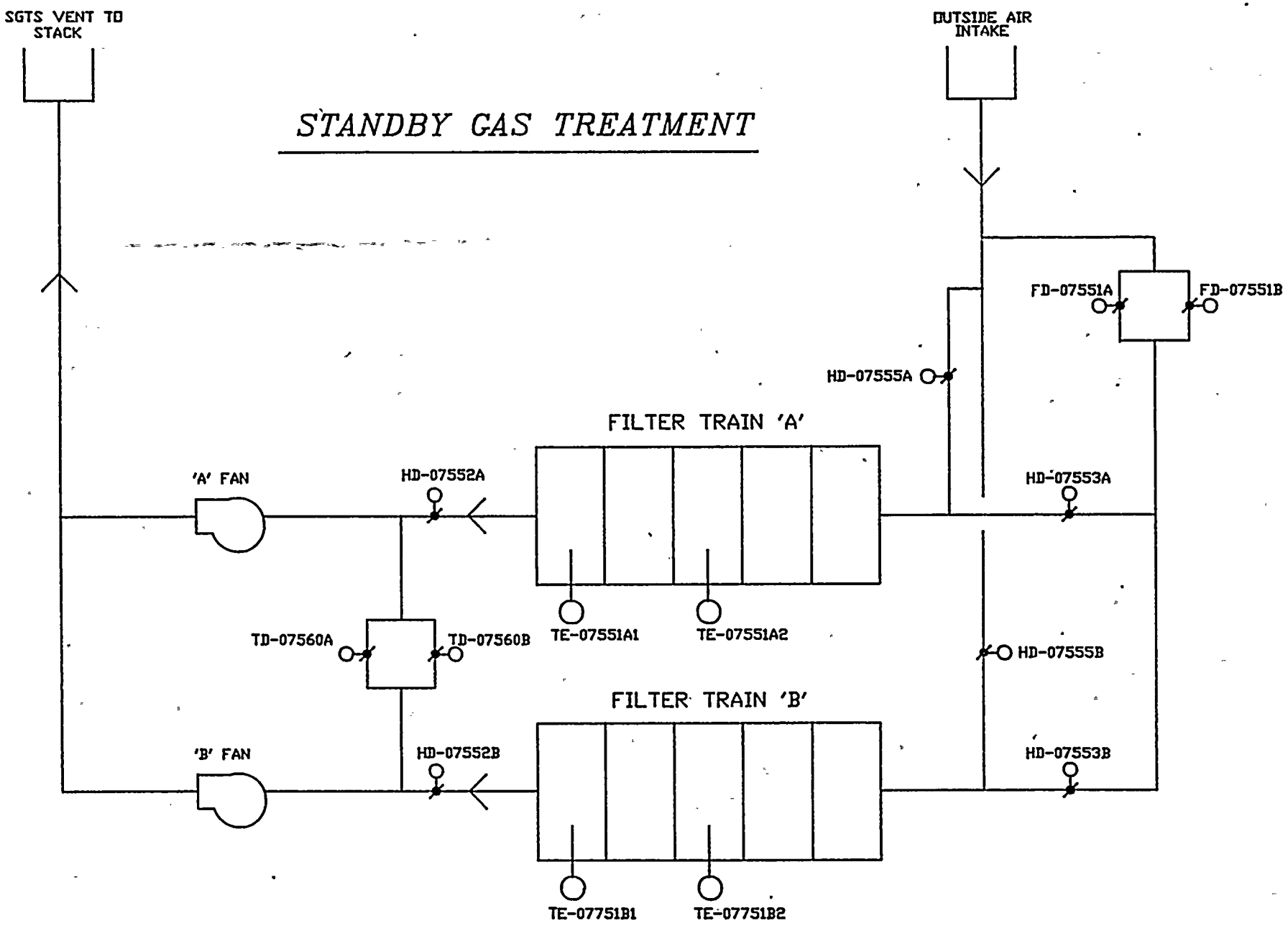
A review of the system design revealed that the charcoal filter inlet and outlet temperature switch setpoints were reversed. As a result, the outlet temperature switch actuated first causing the fan to start rather that the design intended function of damper repositioning. The setpoints were corrected (i.e. - inlet temperature setpoint at 224°F and outlet temperature setpoint at 230°F). This action will ensure proper sequencing of SGTS equipment upon increasing charcoal temperature including a control room alarm for high inlet temperature. In addition, our Engineering department is reviewing the overall design of the Cooling Mode Logic considering the information obtained from this investigation (e.g. - setpoints within 6°F of each other with sensing elements which exhibit a high tolerance band).

The calibration procedure for the temperature elements is undergoing a technical review to correct those discrepancies noted above. In addition, an inspection of the temperature elements will be performed. Information obtained from this inspection will be evaluated to determine if any physical changes to the temperature elements is necessary.

ADDITIONAL INFORMATION

Failed Component Identification: Not Applicable.

Previous Similar Events: None.


SGTS VENT TO STACK
OUTSIDE AIR INTAKE
STANDBY GAS TREATMENT
FD-07551A
FD-07551B
HD-07555A
FILTER TRAIN 'A'
'A' FAN
HD-07552A
HD-07553A
TD-07560A
TD-07560B
TE-07551A1
TE-07551A2
HD-07555B
FILTER TRAIN 'B'
'B' FAN
HD-07552B
HD-07553B
TE-07751B1
TE-07751B2