LICENSEE EVENT REPORT

LER 80-19/1T, Rev. 1

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

Line	Field	Entry
01	Licensee Code (2)	V T V Y S 1
01	License Number (3)	0 0 - 0 0 0 0 0 - 0 0
01	License Type (4)	4 1 1 1 1
01	Cat (5)	
01 CON'T	Report Source (6)	L
01	Docket Number (7)	0 5 0 0 0 2 7 1
01	Event Date (8)	0 5 1 6 8 0
01	Report Date (9)	0 9 0 2 8 0

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 AEOG Rad Monitors 17-150 A & B were made inoperative under controlled conditions while
03 evaluating low AOG recombiner temps. This was contrary to Tech. Spec. Table 3.2.4
04 requirements. Based on Off Gas System samples and Stack Monitors, there were no
05 adverse consequences to the public health or safety. No previous reportable occur-
06 rences of this type have been reported to the Commission.
07
08

Line	System Code (11)	Cause Code (12)	Cause Subcode (13)	Component Code (14)	Comp. Subcode (15)	Valve Subcode (16)
09	M B	X	Z	Z Z Z Z Z Z	Z	Z

(17) LER/RO Report Number	Event Year		Sequential Report No.		Occurrence Code	Report Type		Revision No.
	8 0	—	0 1 9	/	0 1	T	—	1

Action Taken (18)	Future Action (19)	Effect on Plant (20)	Shutdown Method (21)	Hours (22)	Attachment Submitted (23)	NPRD-4 Form Sub. (24)	Prime Comp. Supplier (25)	Component Manufacturer (26)
X	Z	B	Z	0 0 0 0	Y	N	Z	Z 9 9 9

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 Investigation of low recombiner temps. by plant personnel indicated that H_2 recom-
11 bination occurred before AOG recombiner. Closing valve OGS-520 for 10 mins. under
12 controlled conditions helped to evaluate this condition. Opening valve OGS-520 cor-
13 rected AEOG rad. monitor isolation. Opening turbine bypass valves corrected the H_2
14 recombination event.

Line	Facility Status (28)	% Power (29)	Other Status (30)	Method of Discovery (31)	Discovery Description (32)
15	E	1 0 0	NA	Z	NA

Line	Activity Released of Release (33)	Content (34)	Amount of Activity (35)	Location of Release (36)
16	Z	Z	NA	NA

Line	Personnel Exposures Number (37)	Type (38)	Description (39)
17	0 0 0	Z	NA

Line	Personnel Injuries Number (40)	Description (41)
18	0 0 0	NA

Line	Loss of or Damage to Facility Type (42)	Description (43)
19	Z	NA

Line	Publicity Issued	Description (45)	NRC Use Only
20	N (44)	Status Phone	

NAME OF PREPARER Warren P. Murphy PHONE: 802-257-7711

8009050322

Event Description and Probable Consequences

During routine surveillance, control room operators found the following abnormal conditions:

1. "A" recombiner outlet temperature dropped from approximately 500°F to 370°F.

2. AOG radiation recorder 17-150A and B changed from stable signal response of 60 mr/hr to a variable signal response from 100 to 150 mr/hr.

3. AOG radiation recorder 17-154 changed from a stable signal of 18% to a variable signal from 4% to 24%.

A preliminary investigation indicated that a hydrogen detonation had apparently occurred in the SJAE sample system which initiated hydrogen recombination upstream of the AOG recombiners. To ensure AOG system integrity, reactor personnel performed the following checks and observations:

1. SJAE Room Sampling - The SJAE room was sampled for airborne activity and hydrogen. All activity and H_2 levels appeared normal indicating that there were no off gas leaks.

2. Reactor, Turbine, and AOG Activity Monitoring - All reactor, turbine, and AOG building air monitoring systems indicated normal activity levels. These monitors confirmed that the off gas system was not breached.

3. SJAE Sample System - H_2 Sampling - The SJAE sample system was sampled for hydrogen. These samples confirmed that 50% of the H_2 produced was being recombined upstream of the sample point and AOG.

4. SJAE Room Observation - Reactor operating personnel noticed that the air removal header from the main condenser felt warmer than normal. This indicated possible H_2 recombination in the air removal line. All other lines and the condenser hotwell area appeared to be at normal temperature.

Corrective action was initiated after the preliminary checks were completed. Hydrogen recombination was stopped (and recombiner temperature returned to normal), approximately 10 hours later when turbine bypass valve spray was started per OP 4160 at 60% power. Intermediate corrective steps leading to this action (in sequential order) were:

1. Closing OGS Valve 320 - OGS valve 320 was closed for 10 minutes to isolate the SJAE sample system from the main condenser air removal header. This action temporarily removed the most probable

initiating source for H_2 recombination but made AEOG radiation monitors 17-150 A & B inoperative. This was contrary to Tech. Spec. Table 3.2.4 requirements.

This action had no apparent effect on recombiner ΔT's, indicating that the recombination was self sustaining after initiation.

2. Increasing Flow Through OG Valve 516A - This action raised recombiner temperature about 40°F which appeared to improve operation. Subsequent analysis, however, showed that significant H_2 recombination was still occurring upstream of the sample point. The higher recombiner ΔT resulted from more H_2 being withdrawn from the main condenser by higher SJAE flow rates.

3. B Recombiner Train Placed Online - Reactor personnel suspected that false temperature readings could have been caused by a failed recombiner catalyst retainer screen. To ensure recombiner and AOG integrity, the A recombiner train was removed from service and the B recombiner train was put online. B recombiner temperature equaled A recombiner temperature, confirming indications that H_2 recombination had occurred upstream of AOG.

4. Power Reduced - Power was reduced to 60% to a) attempt to lower and stop upstream H_2 recombination by lowering the amount of H_2 generated and b) set up for turbine bypass valve spray and quench. Subsequent sampling and observation of recombiner ΔT's indicated that H_2 recombination rate (H_2 produced / H_2 to AOG) remained about the same after power reduction.

5. Turbine Bypass Valves 1 and 2 Cycled - Turbine bypass valves 1 and 2 were opened momentarily to establish quenching in A & B main condensers. System conditions remained unchanged. Subsequent analysis showed that this action did not provide adequate quenching action.

6. Valve 516A Closed - The 516A valve was closed for 15 minutes in an attempt to isolate potential H_2 recombination in the "A" intercondenser. This action appeared to decrease recombiner ΔT's indicating that recombination was most probably occurring (and possibly spreading) upstream of the SJAE.

7. "B" SJAE Intercondenser, 516 Valves Placed Online - The "B" SJAE intercondenser and 516B valve were placed online and the "A" system taken offline. This action ensured that no H_2 recombination occurred in the "A" intercondenser. Recombiner ΔT's remained low indicating a) that the hydrogen recombination was continuing and possibly spreading, b) the most probable location for recombination was upstream of SJAE.

d. OP-4160 Performed - OP-4160, "Turbine Generator Surveillance - Section C" was performed. This procedure required that all turbine bypass valves be cycled. This action provided spray water (by actuating bypass valves 5, 7, 9 on condenser A and valves 6, 8, 10 on condenser B) that immediately quenched the H_2 recombination. This returned recombiner temperature and H_2 concentration in the off gas to normal (420°F at 60% power, 500°F at 100% power). The SJAE sample system had already been returned to normal about 7 hours before OP-4160 was performed.

The exact mechanism has not been determined. The most probable event sequence for H_2 recombination in the main condenser air removal system is:

1. Moisture droplets developed in the SJAE sample system from system purging.

2. The flowing moisture droplets created a static discharge which caused a detonation in the SJAE sample system.

3. The resulting detonation propogated through the SJAE system and air removal header system which consumed the available H_2 and O_2 and caused an implosion.

4. The resulting implosion had drawn a flammable gas mixture from the main condenser into the four 10" air removal headers.

5. Sufficient energy remained to ignite this combustible mixture in two of the four 10" air removal headers.

6. H_2 recombination continued until the turbine spray was initiated and quenched the air removal headers. Wet conditions inhibited propagation of the flame into the main condenser. Initially consumed H_2 and O_2 (in the 10" air removal headers) prevented forward propagation into the 16" air removal header.

During this event, the main condenser off gas was confined within the SJAE and AOG piping. All fission product gases were properly processed in AOG. Since there were no radiation hazards or equipment failures, there were no adverse effects to public health and safety.

Potential equipment damage could have resulted if the recombination existed for a long period of time (> 1 month). Elevated temperature (that is present with H_2 recombination) can accelerate corrosion activity in steel equipment. Since maximum H_2 recombination time was 15 hours, corrosion damage should not have occurred.

Cause Description and Corrective Actions

Proximate Cause - A hydrogen detonation that occurred in the SJAE sample system, probably initiated hydrogen recombination in two of the four air removal lines in the main condenser. This caused recombiner ΔT's to drop to 50% of normal.

Root Cause - Suspended water droplets, resulting from SJAE sample system purging, created a static discharge which initiated the hydrogen detonation.

Corrective Action

Immediate - Initiation of turbine bypass valve spray per O.P. 4160 quenched the H_2 recombination in the main condenser, and returned the recombiner ΔT's to normal.

Short and Long Term Programs - H_2 recombination in the main condenser can be prevented by controlling SJAE sample system detonations. The following short term program (completed during May, 1980) and long term program (to be completed during the 1980 refuel outage) will achieve these goals.

Short Term - Significant detonation reduction was achieved by limiting suspended moisture in the SJAE sample system tubing. The short term program which reduced this moisture was:

a) Ensured maximum coolant to SJAE sample system heat exchanger,

b) Ensured proper sample system trap operation,

c) Reduced SJAE sample system gas flow.

Long Term - The SJAE sample system return line requires isolation from the air removal headers to ensure zero probability of H_2 detonations from this source. This will be achieved by rerouting the SJAE sample return line to the inlet plenum of the main condenser. In this way, potential SJAE sample system detonations will be extinguished from moist turbine exhaust steam. Sample system requirements of system vacuum and off gas containment will also be maintained.