

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9611270145 DOC. DATE: 96/11/21 NOTARIZED: NO DOCKET #
FACIL: 50-335 St. Lucie Plant, Unit 1, Florida Power & Light Co. 05000335
AUTH. NAME AUTHOR AFFILIATION
BENKEN, E.J. Florida Power & Light Co.
STALL, J.A. Florida Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 96-011-01: on 960817, discovered failure of oxygen analyzer. Caused by degraded sensor membrane in oxygen detector. Calibr, tested & returned oxygen analyzer to service & replaced sensor membrane. W/961121 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 6
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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Florida Power & Light Company, P.O. Box 128, Fort Pierce, FL 34954-0128

November 21, 1996

L-96-294
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: St. Lucie Unit 1
Docket No. 50-335
Reportable Event: 96-011 - Revision 1
Date of Event: August 17, 1996
Operation Prohibited by Technical Specifications
Due to Failure of Oxygen Analyzer

The attached Licensee Event Report is being revised pursuant to the requirements of 10 CFR 50.73 to provide an update on the subject event.

Very truly yours,

A handwritten signature in cursive script, appearing to read 'JAS'.

J. A. Stall
Vice President
St. Lucie Plant

JAS/EJB

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, USNRC Region II
Senior Resident Inspector, USNRC, St. Lucie Plant

9611270145 961121
PDR ADDCK 05000335
S PDR

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TITLE (4)
Operation Prohibited by Technical Specifications due to Failure of Oxygen Analyzer

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
08	17	96	96	011	01	11	21	96	N/A	
									N/A	

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 73.71						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iv)	OTHER Specify in Abstract below or in NRC Form 366A						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)							
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)								

LICENSEE CONTACT FOR THIS LER (12)

NAME Edwin J. Benken, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (561) 467 - 7156
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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
X	WE	AA	O115	N					

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 August 17, 1996, St. Lucie Unit 1 was operating in Mode 1 at 100 percent reactor power when it was discovered that the in-service waste gas oxygen analyzer had failed. A subsequent evaluation revealed that the analyzer had discontinued updating oxygen concentration information approximately 6 days before, on August 11, 1996. The failure mode was such that the monitor continued to display an apparently valid reading and a high oxygen concentration alarm was inhibited. Oxygen concentration in the in-service gas decay tank increased to above Technical Specification requirements during the period the monitor was inoperable. The inoperability of the oxygen monitor for this period of time without additional sampling being performed is a condition prohibited by Technical Specifications. The monitor was subsequently returned to service following minor recalibration and functional testing.

The cause of the oxygen analyzer's failure was a degraded sensor membrane in the oxygen detector. Preventive maintenance for the sensor was not adequate to preclude the failure. The increase in oxygen concentration in the gas decay tank was attributed to a degraded drain trap o-ring which is used to isolate service air from the waste gas decay system and an air actuated discharge valve on the same drain trap which did not fully close when required.

Corrective actions include: 1) The oxygen analyzer was calibrated, tested and returned to service. The oxygen analyzer sensor membrane was replaced and a preventive maintenance program change was implemented to replace this component at an increased frequency. 2) Surveillance requirements were enhanced to improve early detection of a system malfunction. 3) The drain trap was repaired. 4) FPL is evaluating options for providing analyzer redundancy. 5) Operator training was performed.

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		96 --	011 --	01	

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

DESCRIPTION OF THE EVENT

On August 17, 1996, St. Lucie Unit 1 was operating in Mode 1 at 100 percent reactor power. The 1A waste gas decay tank (GDT) (EIS:WE) was in service and aligned to the discharge of the waste gas compressor (EIS:WE). The gaseous concentration in the 1A GDT was being monitored by a continuous flow oxygen analyzer (O2Y - 6601) (EIS:WE). A redundant oxygen analyzer (O2Y - 6602) was out of service at the time of this event.

At approximately 0000 hours, while obtaining the equipment log reading for the in-service oxygen analyzer, a utility non-licensed operator observed that the indicated value had not changed from the previous midnight shift reading and the analyzer did not appear to be properly updating sample information. The log reading for this equipment is required to be obtained only once every 24 hours. The operator continued with his log readings, and then returned to re-verify the status of the oxygen analyzer reading. Noting that the reading had still not changed, the non-licensed operator promptly notified the Assistant Nuclear Plant Supervisor (ANPS) to assist in assessing the operability of the oxygen analyzer.

At 0230, the ANPS attempted to reset the oxygen analyzer by turning it off and then back on. This was initially successful, and the indicated analyzer reading for the 1A GDT was observed to be 12.9 percent oxygen. This value exceeded the 2 percent alarm set point resulting in the receipt of control room annunciator (EIS:IB) N-34, "Gas Analyzer Trouble." At 0235 operators added nitrogen to the 1A GDT to reduce the oxygen concentration, and the Chemistry Department was contacted to sample the tank contents.

At 0310, Chemistry reported that the oxygen concentration in the 1A GDT was 9 percent, and the hydrogen concentration was 5 percent. The oxygen concentration exceeded the Technical Specification (TS 3.11.2.5) Limiting Condition for Operation (LCO), which requires that the concentration of oxygen in the waste gas decay tanks be limited to less than or equal to 2 percent by volume whenever the hydrogen concentration exceeds 4 percent by volume. In accordance with the required action of TS 3.11.2.5, and Off Normal Operating Procedure ONOP 1-0530030, "Waste Gas System," operators immediately aligned the waste gas discharge to the plant vent and filled the 1A GDT with nitrogen to reduce the concentration of oxygen in the tank. At 0355, the oxygen analyzer again failed to update sample information, and was declared out of service.

A controlled gas release was initiated for the 1A GDT at 0533 and secured at 0847. Following this, the 1A GDT was refilled with nitrogen and again released, with this evolution being completed at 1356. A chemistry sample was again taken for the 1A GDT at approximately 1500, which showed that the oxygen concentration had been reduced to 0.63 percent. Operators then exited the Off Normal Operating Procedure (ONOP 1-0530030). The waste gas system remained aligned to the plant vent pending inspection and repair of the oxygen analyzer.

A subsequent investigation indicated that the oxygen analyzer (O2Y-6601) aligned to the 1A GDT, had not properly updated sample information for oxygen concentration since August 11, 1996. The failure mode of the analyzer was such that an apparently valid reading continued to be displayed at the gas analyzer cabinet. Additionally, the high oxygen concentration alarm in the control room (N-34) was

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DESCRIPTION OF THE EVENT Continued

prevented from functioning, as indicated oxygen concentration remained below the alarm setpoint of 2 percent. Since the analyzer failed to properly update the system oxygen concentration for approximately six days, it is concluded that O2Y - 6601 was not operable during that period.

St. Lucie Unit 1 TS 3.3.3.10 requires that a waste gas decay tank oxygen monitor be in service when the waste gas system is in operation. With this requirement not met, the TS allows for continued system operation for up to 30 days provided samples of oxygen are analyzed by the lab gas partitioner at least once per 24 hours. In this case, it was determined that the oxygen monitor for the 1A GDT was inoperable for approximately 6 days during which time the additional, required gas samples were not obtained. This condition is prohibited by Technical Specifications.

CAUSE OF THE EVENT

Failure of the oxygen analyzer to update sample information was caused by a degraded sensor membrane in the oxygen detector. The sensor membrane had been in service for approximately eight months and was found in a deteriorated condition. The preventive maintenance requirements for the periodic replacement of the sensor membrane were not adequate to preclude failure of the component.

The cause of the increased oxygen in-leakage into the waste gas system was determined to have originated from two sources: a degraded drain trap o-ring used to isolate service air from the waste gas system, and an air actuated discharge valve located on the same waste gas system drain trap (T-6911), which was not closing fully when required.

The failure associated with the oxygen analyzer during this event was such that the analyzer continued to display a reading which was apparently valid and within expected parameters. The failure mode also resulted in the loss of an alarm function which would normally alert operators to increasing oxygen concentration in the waste gas system. This condition, and the lack of a thorough understanding by operators regarding this failure characteristic of the gas analyzer, contributed to a delay in detecting the failed component.

ANALYSIS OF THE EVENT

This event is reportable under 10 CFR 50.73 (a) (2) (i) (B), as "any operation or condition prohibited by the plant's Technical Specifications..." Technical Specification 3.3.3.10 requires that the explosive gas monitoring instrumentation shown in TS Table 3.3-13 shall be operable with the alarm/trip set points set to ensure that the limits of Specification 3.11.2.5 are not exceeded. Specification 3.11.2.5 requires that the concentration of oxygen in the waste gas decay tanks be limited to less than or equal to 2 percent by volume whenever the hydrogen concentration exceeds 4 percent by volume. With the oxygen analyzer (O2Y-6601) inoperable, continued operation of the waste gas system is allowed by TS if 24 hour gas samples are obtained and analyzed. During this event, the in-service oxygen analyzer failed to update sample information for a period of approximately six days without the required gas samples being obtained.

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ANALYSIS OF THE EVENT Continued

The waste gas system processes vent gases from various systems which interface with the reactor coolant system (RCS). This includes hydrogenated gas from various source components. Since the content in this system is expected to contain hydrogen, the gas is frequently sampled by a gas analyzer for oxygen concentration. The TS basis for the gas monitoring instrumentation ensures that the concentration of potentially explosive gas mixtures in the waste gas holdup system is continuously monitored.

The limits placed on the concentrations of gases in these tanks assure that potentially explosive gas mixtures contained in the system are maintained below the flammability limits for hydrogen and oxygen and provide assurance that releases of radioactive materials will be controlled as required by General Design Criterion 60 of Appendix A to 10 CFR Part 50.

The requirements of TS 3.11.2.5 state that "With the concentration of oxygen in the waste gas decay tank greater than 4 percent by volume and the hydrogen concentration greater than 2 percent by volume, immediately suspend all additions of waste gases to the system and immediately commence reduction of the concentration of oxygen to less than or equal to 2 percent by volume."

Following the identification of the failed monitor, and the determination of the 1A GDT concentration, operators immediately suspended gas additions to the waste gas system and took prompt action to return the oxygen level in the 1A GDT to less than 2 percent.

The St. Lucie Unit 1 Updated Final Safety Analysis Report (UFSAR), Section 15.4.2, contains analyses which consider the potential rupture of a waste gas decay tank and subsequent release of the fission gas volume.

The contents of the 1A GDT at the time of this event were well below the assumed concentrations for Xenon 133 and Iodine 131, as described in the UFSAR accident analyses and the potential failure of a waste gas decay tank for this event is bounded by the analysis in UFSAR section 15.4.2.

Damage did not occur to any waste gas system component and this event did not result in any unmonitored or uncontrolled gas release. Therefore, the health and safety of the public were not adversely affected.

CORRECTIVE ACTIONS

1. The failed sensor membrane in the oxygen analyzer was replaced, and a preventive maintenance program change was implemented to facilitate the replacement of this component at an interval frequency of every six months.
2. Oxygen Analyzer O2Y-6601 was returned to service on August 20, 1996, following inspection, minor calibration and functional testing. Additional chemistry samples were obtained following the system's return to service to verify proper operation.

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CORRECTIVE ACTIONS Continued

3. Drain trap T-6911 was repaired and returned to service. The drain trap was monitored following replacement for a period of time sufficient to ensure its proper operation. Additionally, preventive maintenance requirements for this component were developed to ensure the inspection and cleaning of the drain trap on a periodic basis.
4. FPL is reviewing the requirements necessary to restore the redundant oxygen analyzer to service and is evaluating additional options available for providing redundancy with regard to this indication.
5. This event and the unique failure mode associated with the oxygen analyzer was reviewed with operators on shift by the St. Lucie Real Time Training Coach (RTTC). Additionally, the event will be incorporated into operator requalification training for non-licensed operators.
6. The Data Logger system, used to obtain operator periodic log readings, was improved by providing an additional check to be performed when taking gas analyzer readings to enhance the early identification of system malfunctions. Additionally, the frequency at which the waste gas system oxygen concentration is obtained was increased from 24 hours to once every 8 hours.

ADDITIONAL INFORMATION

Failed Component Identification

Manufacturer: Orbisphere Labs

Model Number: Model 27411

Device: Waste Gas Decay Tanks Oxygen Analyzer

Previous Similar Events

None