

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9812220206 DOC. DATE: 98/12/15 NOTARIZED: NO DOCKET #
 FACIL: 50-389 St. Lucie Plant, Unit 2, Florida Power & Light Co. 05000389
 AUTH. NAME AUTHOR AFFILIATION
 FREHAFFER, K.W. Florida Power & Light Co.
 STALL, J.A. Florida Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-008-00: on 981118, missed TS SG U tube insp, was determined. Caused by encoding errors while using remote positioning fixtures. Stand down meetings with eddy current test personnel. With 981215 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 6
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Florida Power & Light Company, 6351 S. Ocean Drive, Jensen Beach, FL 34957

December 15, 1998

L-98-304
10 CFR § 50.73

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

Re: St. Lucie Unit 2
Docket No. 50-389
Reportable Event: 1998-008-00
Date of Event: November 18, 1998
Missed Technical Specification
Steam Generator U Tube Inspection

The attached Licensee Event Report 1998-008 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,

A handwritten signature in black ink, appearing to read 'JAS', enclosed in a circular scribble.

J. A. Stall
Vice President
St. Lucie Nuclear Plant

JAS/EJW/KWF
Attachment

cc: Regional Administrator, USNRC Region II
Senior Resident Inspector, USNRC, St. Lucie Nuclear Plant

9812220206 981215
PDR ADOCK 05000389
S PDR



LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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TITLE (4)
Missed Technical Specification Steam Generator U Tube Inspection

| 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 |
| 11 | 18 | 1998 | 1998 | 008 | 00 | 12 | 15 | 1998 | | |

OPERATING MODE (9) 6

POWER LEVEL (10) 000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

| | | | | |
|--------------------|-------------------|---|------------------|---|
| 20.2201(b) | 20.2203(a)(2)(v) | X | 50.73(a)(2)(i) | 50.73(a)(2)(viii) |
| 20.2203(a)(1) | 20.2203(a)(3)(i) | | 50.73(a)(2)(ii) | 50.73(a)(2)(x) |
| 20.2203(a)(2)(i) | 20.2203(a)(3)(ii) | | 50.73(a)(2)(iii) | 73.71 |
| 20.2203(a)(2)(ii) | 20.2203(a)(4) | | 50.73(a)(2)(iv) | OTHER |
| 20.2203(a)(2)(iii) | 50.36(c)(1) | | 50.73(a)(2)(v) | Specify in Abstract below or in NRC Form 366A |
| 20.2203(a)(2)(iv) | 50.36(c)(2) | | 50.73(a)(2)(vii) | |

LICENSEE CONTACT FOR THIS LER (12)

| | |
|--|---|
| NAME Kenneth W. Frehafer, Licensing Engineer | TELEPHONE NUMBER (include Area Code) (561) 467 - 7748 |
|--|---|

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|--------------|--------------------|-------|--------|-----------|--------------|--------------------|
| D | AB | SG | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - |

SUPPLEMENTAL REPORT EXPECTED (14)

| | | | | | | |
|--|---|-----------|--------------------------------------|-------|-----|------|
| YES (If yes, complete EXPECTED SUBMISSION DATE). | X | NO | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|--|---|-----------|--------------------------------------|-------|-----|------|

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

On November 18, 1998, St. Lucie Unit 2 was in Mode 6 during the cycle 11 (SL2-11) refueling outage. During the steam generator eddy current test examinations, FPL determined that three tubes had not received required surveillance inspections during the previous cycle 10 (SL2-10) refueling outage. The required surveillances were subsequently performed, and the results indicated that the tubes had been operable during the missed surveillance time period.

The cause of the missed eddy current test surveillances was encoding errors while using remote positioning fixtures. A combination of procedural inadequacies and inadequate data review during the previous SL2-10 inspection failed to prevent or detect the errors. The St. Lucie steam generator ECT data analysis and data management processes used for the SL2-11 inspection were instrumental in the identification of the past missed steam generator tube surveillances.

Immediate corrective actions included stand down meetings with eddy current test personnel and a complete review of the SL2-11 and SL2-10 inspection results by the eddy current test analysis group. This review identified no additional position encode errors.

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

Description of Event

On November 18, 1998, St. Lucie Unit 2 was in Mode 6 during the SL2-11 refueling outage. During the steam generator eddy current test (ECT) examinations, FPL determined that three tubes [EIIS:AB:SG] had not received required surveillance inspections during the previous SL2-10 refueling outage due to fixture position encode errors. Surveillance inspections were required during the SL2-10 outage for two of these tubes by Technical Specification section 4.4.5.2.b.1, because they were degraded based on cycle 9 (SL2-9) inspection results. A surveillance inspection was required for the third tube during the SL2-10 outage by Technical Specification Table 4.4-2, because the SL2-10 inspection results required expansion of the inspection to all tubes in each steam generator. These tubes are:

| S/G | Row | Line | SL2-9 | SL2-10 | SL2-11 |
|-----|-----|------|--------------|---------------|--------------|
| 2A | 98 | 28 | degraded | no inspection | degraded |
| 2B | 16 | 106 | degraded | no inspection | degraded |
| 2A | 3 | 123 | not degraded | no inspection | not degraded |

Also during the November 1998 SL2-11 steam generator inspection, row 122 line 60 in steam generator 2B was incorrectly encoded during the acquisition process. The error was identified during the analysis process; however, all tubes tested since the last fixture position verification were re-tested.

The data analysis and data management processes at St. Lucie require that the ECT analysts address flaw indications which have been reported in the prior examination. This requirement has not been formalized, but is discussed in the data analyst indoctrination prior to each inspection. This is currently accomplished by providing the analysts with the results from previous inspections using a Historical Management System software package. As the analyst reviews each tube, a text file is updated on the computer display with previous results for that tube. During the SL2-10 and previous examinations the historical results were provided to the analysts via hardcopy. The St. Lucie Unit 2 Data Analysis Guidelines contain the reporting acronym INF (indication not found). The intent of the INF code is to cause a review of the data to determine why a previously reported indication is not present in the current data. The St. Lucie steam generator ECT data analysis and data management processes were instrumental in the identification of the missed steam generator tube surveillances.

Cause of the Event

Steam generator data acquisition is performed by ABB CENO personnel using FPL NDE Manual Examination Procedure NDE 1.3. Set-up, checkout, and operation of the remote positioning fixture (Genesis Equipment) is governed by ABB procedure STD-NSS-078.

The Genesis manipulator that ABB uses to position the probe is a sophisticated robotics platform that is controlled remotely by a computer. The Genesis robot uses electronic resolvers, which measure the relative angles of the arm and wrist with respect to the leg. This information, along with the length of the ECT guide tube, is used to compute the tube identification. The positional readout on the computer screen shows the tube identification and shows whether the guidetube is exactly under the tube or a fraction of a tube pitch off-center. It is not uncommon for the guidetube to read slightly off-

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Cause of the Event (cont'd)

center as the software computes where the tube should be if the tubesheet were drilled with absolute precision. In reality there is a manufacturing tolerance involved and a stack-up of these tolerances can result in the tube being slightly offset from the predicted location.

For most of the ECT program the manipulator is operated in an automatic mode where the operator identifies the next tube and the robot moves there with no further action required on the part of the operator. In certain areas of the steam generator plenum where freedom of movement is limited, such as the outer and inner peripheries, divider plate, etc., the manipulator may have to be adjusted in a manual mode to center the guidetube under the target tube. The tube identification from the Genesis to the ECT instrument is not updated (changed) in the manual mode. It is therefore possible that in the automatic mode the guidetube is delivered to the target tube, but is centered on the side of the tube. The operator may then enter the manual mode and add an additional offset by as much as 0.4 tube pitches in the wrong direction resulting in a mis-encode. This could be the cause of an adjacent tube being tested, rather than the desired tube. Three of the four mis-encoded tubes were located in areas with limited freedom of movement. However, the existing St. Lucie steam generator ECT data analysis and data management processes were instrumental in the identification of the missed steam generator tube surveillances.

Analysis of the Event

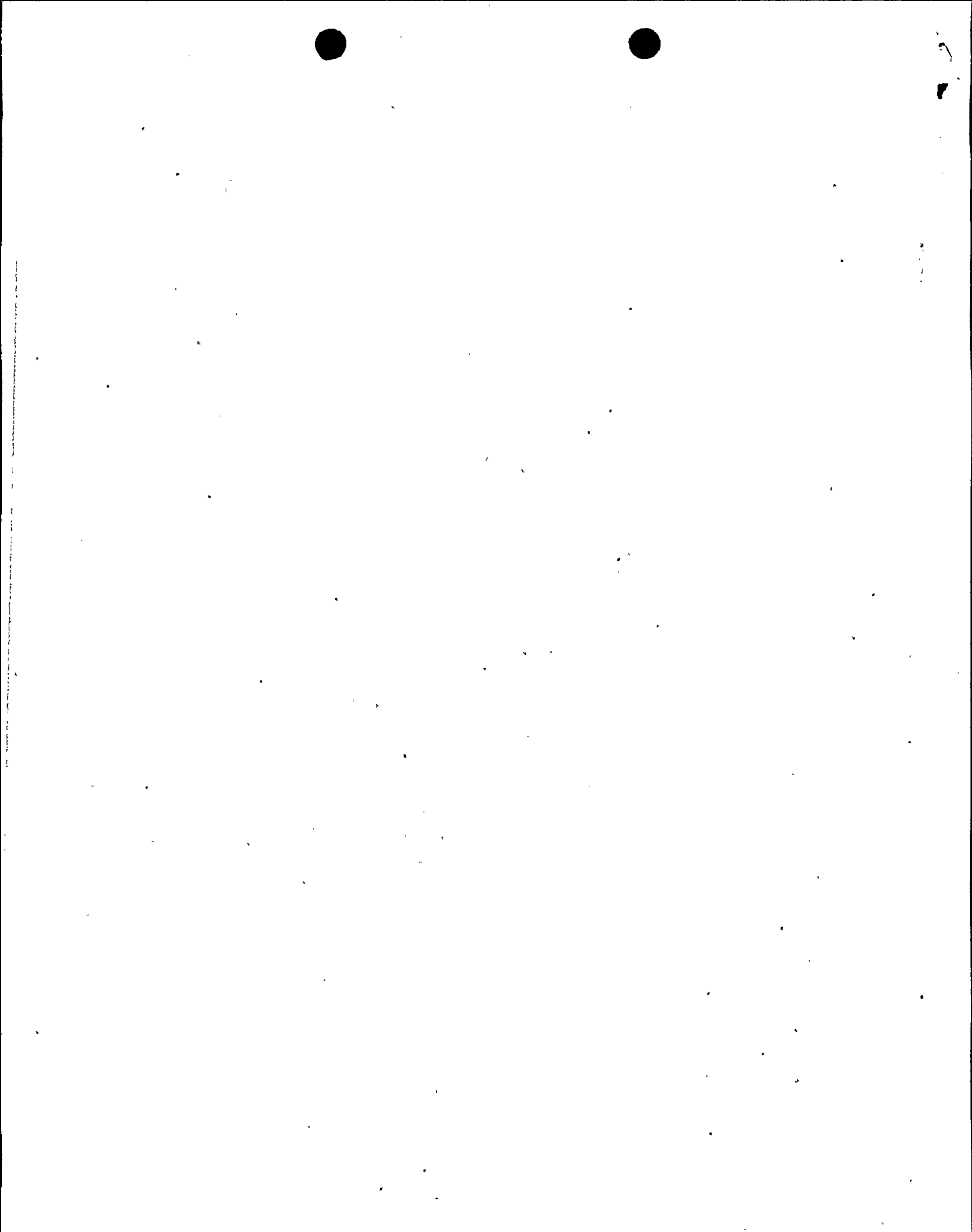
This event is reportable under 10 CFR 50.73(a)(2)(I)(B) as any operation or condition prohibited by the Technical Specifications. Technical Specification 3.4.5 states that each steam generator shall be operable. The applicable ACTION statement states that with one or more steam generators inoperable, restore the inoperable generator(s) to operable status prior to increasing T_{avg} above 200⁰F. Technical Specification Surveillance 4.4.5.0 states that each steam generator shall be demonstrated operable by performance of required augmented inservice inspection program. Contrary to Technical Specifications, St. Lucie Unit 2 exceeded 200⁰F without establishing the operability of the steam generators by surveillance requirements.

Detection of these encode errors resulted from additional process controls which were implemented in the data analysis effort for the SL2-11 inspection.

Analysis of Safety Significance

The missed surveillance inspections for the three tubes during SL2-10 did not constitute an operability issue as, when examined in SL2-9 and SL2-11, the tube degradation was less than 40% through wall and thus acceptable for operation through Cycle 10.

For the three tubes which constituted a missed surveillance inspection, one tube experienced wear damage from a foreign object, and another experienced wear damage due to vibration wear in the u-bend. No degradation was ever reported in the third tube. Although, it is not expected that the wear damage in either case would result in a through-wall defect within one or two cycles of operation, this section evaluates the



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Analysis of Safety Significance (cont'd)

potential effects associated with a through-wall defect and shows that the potential scenario will have no effect on safety. This conclusion is based on the following discussion.

A design basis Steam Generator Tube Rupture (SGTR) accident, as described in Chapter 15 of the St. Lucie Updated Final Safety Analysis Report (UFSAR), is defined as a double-ended guillotine break of a tube that results in initial primary to secondary leak rates in excess 300 GPM. ABB/CE has performed prototypical laboratory testing to empirically determine the leak rate from tube defects that were intended to simulate wear defects produced by tube supports. These tests showed that in virtually all cases a through-wall defect of this type will result in a leak rate less than one GPM and would not suddenly leak in an uncontrolled manner. These test results have been further substantiated by the slow steady leak rate that resulted from a through-wall defect in tube 143-85 of the San Onofre steam generator. Thus, the leak rates that could result from wear defects would be within the current Technical Specification limits of the unit.

As a result, the potential tube defects should not be considered as a possible initiating event of a SGTR accident but, rather, as a potential increase in the normal secondary system radionuclide inventory that is used as an initial condition for other Chapter 15 accident analyses. Secondary system radionuclide inventories assumed in the UFSAR Chapter 15 safety analysis are based on one percent failed fuel and a continuous one GPM primary to secondary leak rate. As discussed above, the most severe leak rates associated with typical through-wall wear defects are typically less than one GPM. In addition, operation with one percent failed fuel is a design basis assumption and not indicative of past or current primary coolant activity levels. Hence, actual secondary system radionuclide inventories will be much less than those assumed in the accident analysis. As a result, the radiological consequences associated with postulated wear-induced tube leakage will be bounded by those accidents currently described in Chapter 15 of the UFSAR.

It should also be noted that operation with a continuous one GPM primary to secondary leak rate is an unrealistic assumption. The St. Lucie 2 Technical Specifications do not permit operation if total primary to secondary leakage exceeds one GPM through all steam generators or if leakage from any one steam generator exceeds 720 gallons per day (0.5 GPM). St. Lucie performs primary system water inventory balances at least every 72 hours, which are capable of detecting leak rates of this magnitude. In addition to the water inventory balances performed on a periodic basis, secondary system radiation monitors are capable of detecting increases in secondary system radiation that would result from primary to secondary leaks. In either case, an orderly reactor shutdown would likely be performed before secondary system radionuclide inventories reached the levels assumed in the accident analysis.

Based on the above discussion, the missed steam generator tube surveillances did not adversely affect the health and safety of the public.

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Corrective Actions

1. All steam generator tubes were surveyed (complete).
2. The ABB acquisition specialists have been briefed in a stand down meeting to assure that they were sensitive to the position verification requirements (complete).
3. The ECT analysis group performed a review of the SL2-11 and SL2-10 inspection results for conditions which may indicate additional errors, and determined that no additional position encode errors are evident (complete).
4. Process control improvements that were implemented during the SL2-11 outage that identified the encode errors, will be formalized via revision of data analysis guidelines and data management procedures. These improvements will be completed prior to the next scheduled steam generator ECT inspection and will provide a defense in depth to assure that required tube inspections are completed.

Other Information

Failed Components Identified

None

Similar Events

None