



FPL

Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

July 11, 2008

L-2008-161
10 CFR 50.90

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

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Proposed License Amendment
Request for Additional Information Response
Alternative Source Term Amendment – TAC Nos. MD6173 and MD6202

On July 16, 2007, Florida Power and Light Company (FPL) submitted the St. Lucie Unit 1 and 2 Alternative Source Term (AST) license amendment requests via FPL letters L-2007-085 and L-2007-087. FPL provided responses for additional information on the control room outside air intake (CROAI) radiation monitor matters via FPL letters L-2008-022 and L-2008-121 dated February 14, 2008 and June 2, 2008, respectively. Additional teleconferences between FPL and the Staff were held on June 16, 2008 and June 26, 2008 associated with the design, function, operation and control of the Unit 1 CROAI radiation monitoring system. This letter responds to the verbal requests for information.

Attachment 1 provides the response. Attachment 2 provides a description of the existing Unit 1 CROAI radiation monitor system. Attachment 3 provides a simplified drawing of the proposed Unit 1 CROAI radiation monitor system. Attachment 4 provides a failure modes and effects analysis for the proposed Unit 1 CROAI radiation monitor system. Attachment 5 provided TS markups. Attachment 6 provides commitments made by this letter. The previously submitted no significant hazard analyses remain bounding.

In accordance with the FPL Quality Assurance Topical Report, this RAI followup response was reviewed by the St. Lucie Onsite Review Group. In accordance with 10 CFR 50.91(b)(1), a copy of the proposed amendment was forwarded to the State Designee for the State of Florida.

Based on the increased scope of the proposed modifications to improve the reliability of the Unit 1 CROAI radiation monitoring scheme, FPL requests that implementation of the Unit 1 and Unit 2 AST amendments be changed from the originally requested 90 days to 180 days after NRC approval of the AST amendments. Additionally, implementation of the proposed TS change associated with the Units 1 and 2 CR Habitability TSTF submittal (FPL letter L-2007-084 dated July 16, 2008) needs to be coordinated with the implementation of the AST TSs.

Please contact Ken Frehafer at 772-467-7748 if there are any questions about this submittal.

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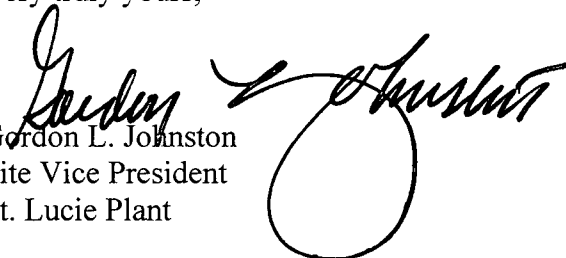
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I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 11th day of July 2008.

Very truly yours,


Gordon L. Johnston
Site Vice President
St. Lucie Plant

GLJ/KWF

Attachment

cc: Mr. William A. Passetti, Florida Department of Health

**Units 1 Control Room Outside Air Intake (CROAI)
Radiation Monitoring System
Design and Proposed Modifications**

Background:

Based on teleconferences between NRR and FPL held on June 16, 2008 and June 26, 2008, FPL is providing additional information concerning the proposed design modifications associated with the St. Lucie Unit 1 control room outside air intake (CROAI) radiation monitoring system.

Current Radiation Monitoring System Design and Proposed Modifications:

The Unit 1 control room outside air intake (CROAI) radiation monitors (RE-26-46 / RIS-26-46 and RE-26-47 / RIS-26-47) are designed to monitor intake air for the protection of control room personnel. RE-26-46 / RIS-26-46 and its associated controls are powered from an A train source. RE-26-47 / RIS-26-47 and its associated controls are powered from a B train source. These power sources are for non-essential loads and as such, are not automatically energized by the emergency diesel generators (EDGs) following loss of power. The sample pumps for both monitors are powered from an AB train source, which is automatically backed by the EDG to which the AB bus is aligned. The sample isolation valves are powered from B train DC power. Attachment 2 provides a simplified description and diagram of the Unit 1 CROAI radiation monitoring system taken from the operator training program (for information purposes only).

The current Unit 1 CROAI design does not meet single failure criteria. However, the CROAI radiation monitors are important to safety (classified as Quality Related). FPL letter L-2008-081 to the NRC (Ref. 3) described the control circuit for Unit 1 CROAI radiation monitors as being modified to ensure the circuit fails safe under loss of power conditions. FPL proposes to supersede the modification proposed by FPL letter L-2008-081 to the NRC with the following modifications to improve the reliability of the CROAI monitors for the performance of control room isolation function.

- a) "High Radiation" detected by either CROAI radiation monitor will actuate both trains of control room ventilation system isolation/recirculation. Currently, the CROAI radiation monitor in service will only actuate its associated control room ventilation system train (i.e. RIS-26-46 actuates the A train ventilation components and RIS-26-47 actuates the B train ventilation components).
- b) Additional tubing will be provided to enable both sample pumps to be operated simultaneously and exhausted to the outside atmosphere. This allows both CROAI radiation monitors to be operated simultaneously. Currently, only one of the two CROAI radiation monitors can be operated at any time.
- c) The sample pumps will be reconfigured to be powered from a respective A train and B train emergency diesel generator (EDG) backed source. Currently, the sample pumps are powered from an AB train source.
- d) CROAI radiation monitor electronics will be powered from the same power source as its associated sample pump. Currently, the CROAI radiation monitor electronics are

- powered from non-essential power panels that require manual action to connect them to their associated EDG.
- e) The sample isolation valves will be reconfigured to be powered from a respective A train and B train DC source. Currently, the sample valves are powered from a B train DC source only.
 - f) A reactor turbine generator board (RTGB) annunciator window will be added for “CROAI Monitor Failure” and “Low Sample Flow.” Currently, a common control room alarm exists for all radiation monitors in the plant. The flow fault circuit will be modified to provide control room annunciation. Currently, sample flow is provided by the single sample pump in service. Sample flow failure currently provides local indication via an amber flow fault light on the respective pump control panel.
 - g) Two channel bypass switches will be installed to facilitate radiation monitor surveillance testing without initiating control room isolation. The channel bypass switches will cause an alarm on the RTGB annunciator window when a channel is placed in bypass.

Attachment 3 provides a simplified diagram of the Unit 1 CROAI radiation monitoring system after these proposed modifications are implemented.

A failure modes and effects analysis (FMEA) of credible failures that reflects the modified CROAI radiation monitoring system is provided by Attachment 4. In summary, the FMEA conclusions show that the control room ventilation system will be automatically isolated and placed in the recirculation mode of operation as assumed in the AST analyses. Additionally, one CROAI radiation monitor is always available to check the outside air intakes prior to placing the control room ventilation system in the pressurization mode.

FPL provides the following responses to the questions the NRC staff had with respect to the proposed modification.

Responses to NRC Request for Additional Information:

NRC Question 1:

How would the operators detect a monitor failure? Is the failure annunciated? What would the operators do upon monitor failure?

FPL Response:

The CROAI radiation monitor system will be operated with both of the radiation monitors in service simultaneously. A high radiation alarm from either radiation monitor will automatically close both trains of outside air intake isolation valves and start both trains of emergency fans to place the control room ventilation system in recirculation.

A proposed modification will add a RTGB annunciator window for “CROAI Monitor Failure” and “Low Sample Flow.” Upon annunciation of CROAI monitor failure or low sample flow in the control room, the operators would declare the channel inoperable, take the action prescribed

by Action 17 of Technical Specification Table 3.3-6, and initiate corrective actions while the other CROAI monitor continues to operate. During accident conditions, control room operators would use the remaining CROAI monitor to assess the north and south outside air intake ducts to determine which intake has lower radiation levels. For a comprehensive review of the effects of failures, please refer to Attachment 4.

NRC Question 2:

Can the monitors credibly fail as-is?

FPL Response:

The radiation detectors are considered fail “as is” upon a loss of sample flow. With the proposed modifications, the flow fault circuit will be modified to provide control room annunciation via an added RTGB annunciator window. The sample pumps will be reconfigured to be powered from a respective EDG backed A train source and B train source. Currently, the sample pumps are powered from an AB train source. In the unlikely event a radiation monitor fails “as-is,” this modification supports the likelihood that at least one radiation monitor will remain in service to ensure monitoring for protection of control room personnel.

NRC Question 3:

Describe the differences between the CLB and the new licensing bases with respect to the new important to safety function being performed.

FPL Response:

As described in Section 9.4.1 of the St. Lucie Unit 1 UFSAR, the design basis of the control room ventilations system is, in part, to limit control room doses due to airborne activity to within GDC 19 limits. On receipt of a containment isolation signal (CIS) from either Unit 1 or 2 or a high radiation signal from the in-service Unit 1 outside air intake radiation monitor, outside air is isolated by redundant dampers located in the outside air makeup ducts. The control room air is recirculated through HEPA filters and charcoal adsorbers.

Although the control room is isolated on a CIS or high radiation signal, isolation on high radiation is not credited in the current Unit 1 accident analyses to limit control room doses due to airborne activity to within the limits of GDC 19. With adoption of the Alternative Source Term (AST), the Unit 1 accident analyses will credit control room isolation on high radiation to limit control room doses due to airborne activity to within the limits of 10 CFR 50.67, Accident Source Term for all non-LOCA events.

By FPL letter L-2007-085 to the NRC (Ref. 1), FPL proposed to revise Tables 3.3-6 and 4.4-3 of the Unit 1 Technical Specifications (TSs) to add the control room Isolation Radiation Monitors to the applicability of TS 3/4.3.3.1, Radiation Monitoring. FPL letter L-2008-121 to the NRC (Ref. 2) provided a revised radiation monitor isolation setpoint as well as a proposed TS surveillance that will provide verification that the control room Isolation channel response time is within the assumptions of the AST accident analyses.

NRC Question 4:

Based on the new functional requirements placed on the monitors, discuss how the pedigree of the monitors is appropriate and that the safety function would be met.

FPL Response:

As described in FPL L-2008-081 letter to the NRC (Ref. 3), the Unit 1 control room Outside Air Intake (CROAI) radiation monitors are powered from power panels fed from the non-essential section of a safety related motor control center. The radiation monitors were designed and installed as Quality Related components.

The Construction Permit for St. Lucie Unit 1 was issued on July 1, 1970 and preceded the publication of the (AEC) General Design Criteria, as well as the NUREG-0800 Standard Review Plans. SRP 3.2.2, System Quality Group Classification, provides the current NRC requirements for quality group classification of systems and components important to safety. SRP 3.2.2 identifies control room ventilation systems as fluid systems important to safety for PWR plants. Per SRP 3.2.2, meeting the relevant requirements of 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 1 and 10 CFR Part 50.55a, as they relate to structures, systems, and components important to safety being designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety function to be performed, is acceptable to satisfy the requirements of SRP 3.2.2.

GDC 1, Quality Standards and Records, states in part: "Structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed." "A quality assurance program shall be established and implemented in order to provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety functions."

10 CFR 50.55a, Codes and Standards, states, in part, "Structures, systems, and components must be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed."

Per SRP 3.2.2, Regulatory Guide (RG) 1.26, Quality Group Classification and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants, is used to meet the requirements of GDC 1 and 10 CFR 50.55a.

RG 1.26 states that emergency and normal ventilation systems, "should be designed, fabricated, erected, and tested to quality standards commensurate with the safety function to be performed."

The changes to the design of the Unit 1 CROAI radiation monitoring system proposed herein provide reasonable assurance that the control room ventilation system will be automatically isolated and placed in the recirculation mode of operation as assumed in the AST analyses. The new Surveillance Requirement (SR) proposed in the Reference 2 letter to NRC will provide verification that the control room Isolation channel response time is within the assumptions of the AST accident analyses. The combination of the proposed design changes and the proposed SR will provide adequate assurance that the safety function of the radiation monitors to isolate the control room on high radiation will be satisfactorily performed under all credible postulated

failure modes. As such, the proposed design changes and SR will ensure that control room doses are maintained within the limits of 10 CFR 50.67. Therefore, the proposed design and current safety classification of the CROAI radiation monitors are adequate to satisfy the applicable intent of SRP 3.2.2, as well as GDC 1 and 10 CFR Part 50.55a.

NRC Question 5:

Discuss the allowed outage times associated with less than the minimum number of rad monitors for the Unit 1 CROAI monitors.

FPL Response:

FPL proposed a new ACTION 17 in TS Table 3.3-6 for the Unit 1 CROAI radiation monitors. ACTION 17 states:

"With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, within 1 hour initiate and maintain operation of the control room emergency ventilation system in the recirculation mode of operation."

As discussed earlier, the Unit 1 CROAIs share a skid mounted radiation monitoring system that contains two radiation monitors, with one in operation and lined up to one of the CROAIs, and the other in a standby alignment. The modification proposed by FPL will:

- ensure that upon any credible failure of a CROAI radiation monitor, the failure will be annunciated in the control room via an added RTGB annunciator window while the other CROAI will continue to provide protection to automatically isolate and place the control room ventilation system in the emergency recirculation mode of operation due to high radiation;
- repower the radiation monitor sample pumps and sample isolation valves to eliminate a common cause failure mode;
- repower the radiation monitor electronics to ensure continued operation without any operator action and;
- annunciate CROAI radiation monitor sample pump trouble in the control room via an added RTGB annunciator window.

The proposed ACTION time of one hour allows the operators a short time to restore the inoperable radiation monitor to Operable status and/or prepare to place the control room ventilation system in the emergency isolation/recirculation mode if that action is proved necessary. If the control room ventilation system is unable to be placed in the emergency isolation/recirculation mode then the generic TS 3.0.3 requirements become applicable.

References:

1. FPL Letter L-2007-085 to the NRC, St. Lucie Unit 1 Proposed License Amendment Alternative Source Term and Conforming Amendment, dated July 16, 2007.
2. FPL letter L-2008-121 to the NRC, St. Lucie Units 1 and 2 Proposed License Amendment Request for Additional Information Response, Alternative Source Term Amendment – TAC Nos. MD6173 and MD6202, dated June 2, 2008.
3. FPL letter L-2008-081 to the NRC, St. Lucie Units 1 and 2 Proposed License Amendment Request for Additional Information Response, Alternative Source Term Amendment – TAC Nos. MD6173 and MD6202, dated April 14, 2008.

**Units 1 Control Room Outside Air Intake (CROAI)
Radiation Monitoring System Description**

The Control Room OAI monitors (Channels 46 and 47) are designed to monitor intake air for the protection of Control Room personnel. A high radiation alarm from either of these monitors will close the Control Room Ventilation Outside Air Intake valves and place the Control Room Ventilation System on recirculation.

These monitors are Victoreen monitors similar to those already discussed but equipped with sample pumps and solenoid valves for obtaining a sample stream. Each monitor is capable of sampling the North or South Control Room OAI ducts. Only one monitor is in service at a time. Each monitor unit is equipped with its own detector and sample pump system. Controls and indication for each monitor unit are provided on the Radiation Monitoring Panel in the Control Room and also locally at the monitor unit itself (Refer to Figure).

The detectors are beta scintillation detectors with photomultipliers. Output is supplied to a Log Ratemeter and is recorded on the multi-point process radiation recorder.

The pumping system motor can be started from the pump or locally. The pumping system air flow rate is adjustable via a bleed air valve located at the pump inlet.

The Control Room controls consist of an OAI Inlet Panel, OAI System Select Control Panel, 'A' OAI Pump Control Panel, 'A' Outside Air Intake Log Ratemeter, 'B' OAI Pump Control Panel, and 'B' Outside Air Intake Log Ratemeter. Refer to Figure.

These panels are used to select the operating mode of this system. For example, the operator can choose to use the 'A' OAI Radiation Monitor (which requires the 'A' OAI Sample Pump) or the 'B' OAI Radiation Monitor (which requires the 'B' OAI Sample Pump). Either sample train can be selected. In addition, the operator can select to sample air from the north OAI or the south OAI. Refer to Figure.

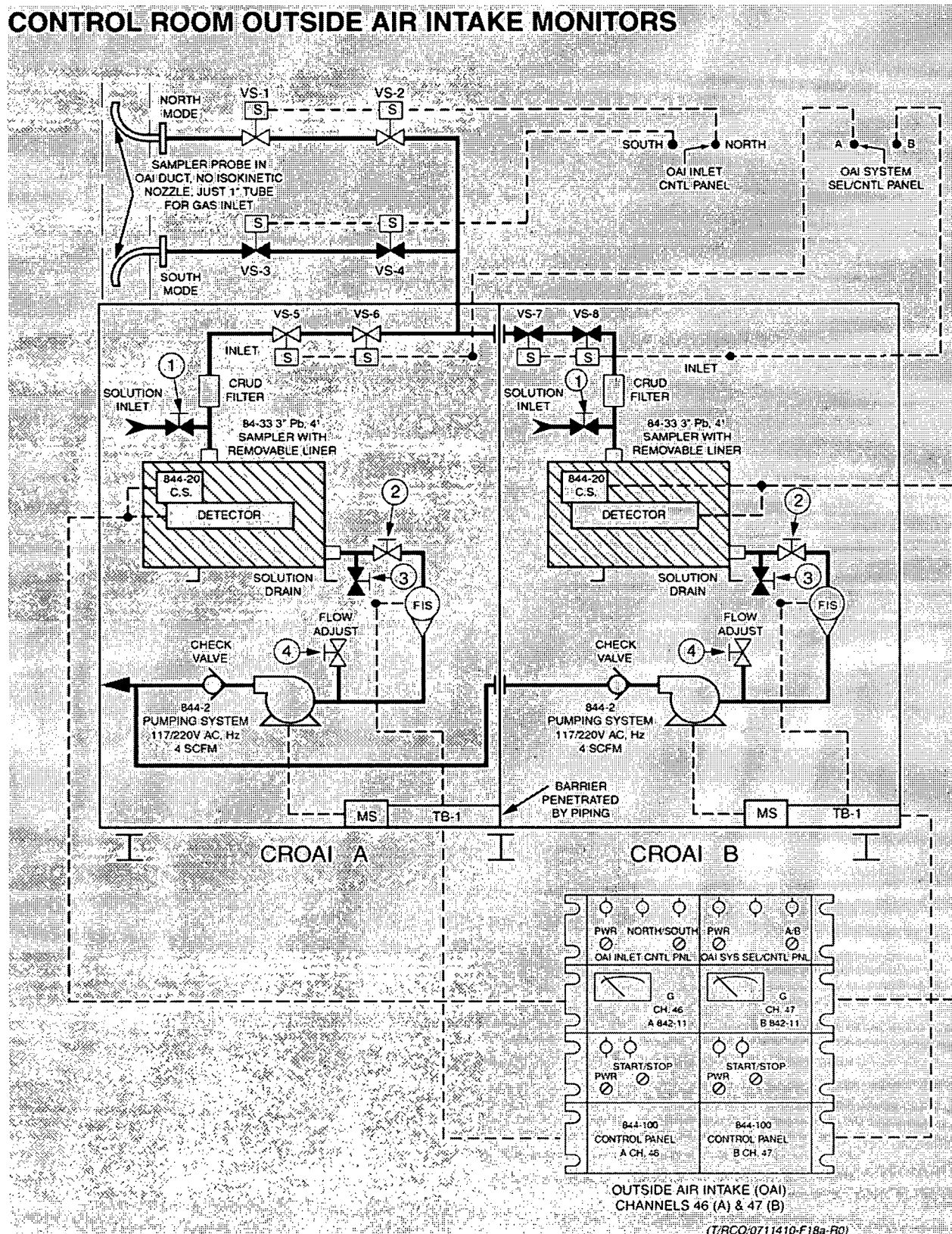
Selection of which OAI ventilation ductwork to sample is made by using the OAI Inlet Panel. The operator can choose NORTH or SOUTH using the selector switch. Choosing NORTH

opens solenoid valves VS-1 and VS-2. Choosing SOUTH opens VS-3 and VS-4. Indicating lights and power ON/OFF switch is also provided. The north OAI is the normal recommended sample point. 1-NOP-26.01, "Process Radiation Monitors," provides guidance for all system alignments.

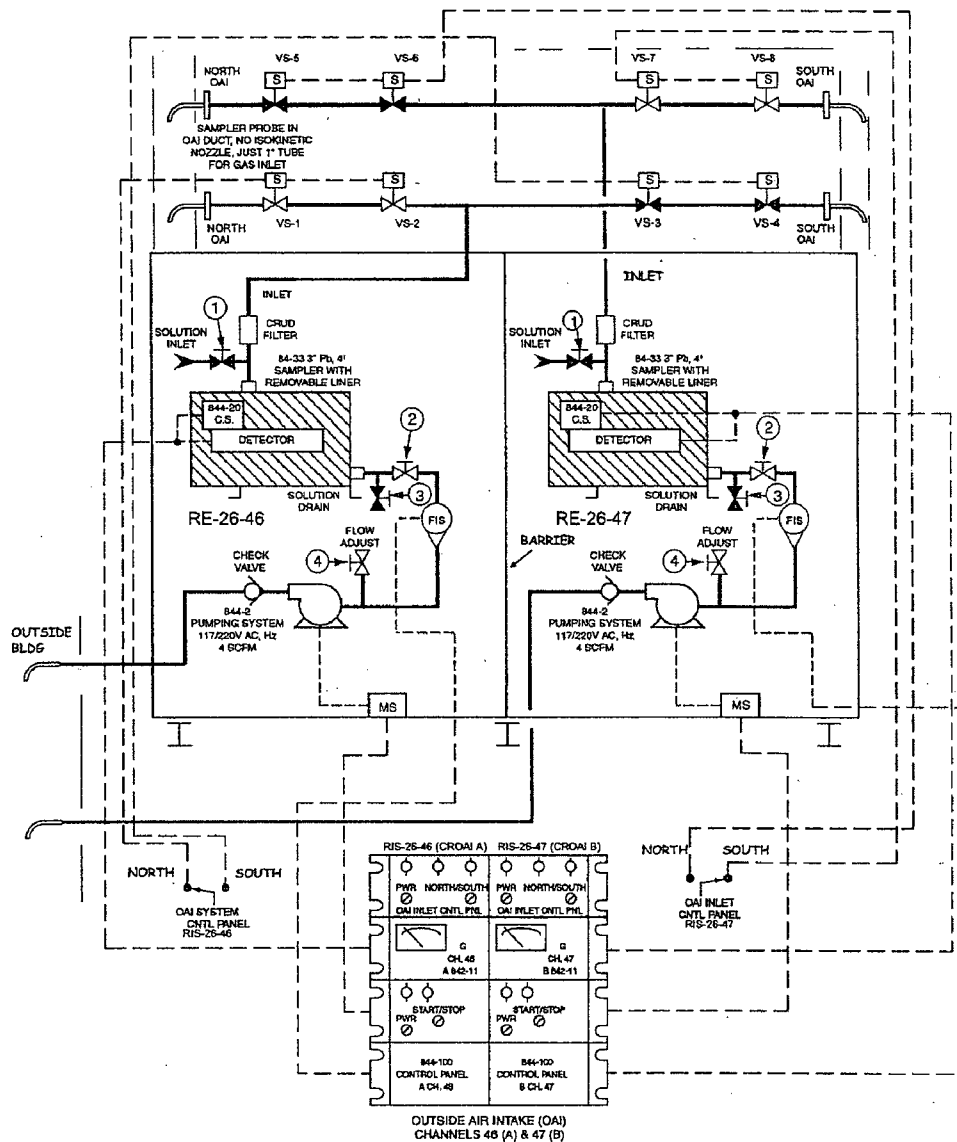
Selection of which OAI Radiation Monitor (and pump) to choose is performed on the OAI System Select Control Panel. A two position selector switch allows for selecting either 'A' OAI or 'B' OAI. This nomenclature refers to Sampling Systems, not to the north or south OAIs. A pushbutton is also provided to allow the use of both systems. The two position switch must be in the 'B' OAI position in order for the "Both" function to work. Selection of "OAI A" will open solenoid valves VS-5 and VS-6. Selection of "OAI B" will open solenoid valves VS-7 and VS-8. The 'A' side valves must be used with the 'A' pump and the 'B' side valves must be used with the 'B' pump. Indicating lights and power ON/OFF switch are also provided.

The sample pumps are started with the associated pump control panel. Panel indication includes a white power ON, a red PUMP ON light, and an amber FLOW FAULT light. The flow alarm will be actuated if either a high flow or a low flow condition should occur.

CONTROL ROOM OUTSIDE AIR INTAKE MONITORS



CONTROL ROOM OUTSIDE AIR INTAKE (CROAI) MONITORS (Post Modification)



| Control Room Isolation - Radiation Monitoring Components | | | | | | |
|---|---|--|--|--|---|---|
| Component | Failure Mode | Possible Cause(s) | Method of detection | Inherent Compensating Provision | Effect on Event Mitigation | Remarks and Other Effects |
| RE-26-46/RIS-26-46 (Train A - normally monitoring the North OAI) | Unable to Detect High Radiation | Detector Failure, Electronics Failure, Loss of sample pump, Degraded HV Power Supply | Control Room Annunciator for monitor failure and low sample flow, Channel Check (RE-26-46 vs. RE-26-47), Surveillance Testing | RE-26-47 (Train B - normally monitoring the South OAI) is unaffected and available to detect high radiation. | Control Room Isolation initiated on both trains by RE-26-47 upon detection of high radiation. | RE-26-47 (Train B) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-46/RIS-26-46 (Train A - normally monitoring the North OAI) | False High Radiation Reading, False Actuation | Electronics Failure | Control Room Isolation Initiated and Emergency Fans Started. Event Data on Sequence of Events, ERDADS and recorder RR-26-1C1. | RE-26-47 (Train B - normally monitoring the South OAI) is unaffected and available to detect high radiation. | None. Control Room Isolation considered to be the Fail-Safe mode. | A Channel Bypass Switch is available to bypass the channel while it is out of service for surveillance to prevent unnecessary Control Room Isolation. Channel Bypass is alarmed. |
| RE-26-46/Sample Isolation Valves (SV-1, SV-2) | Single Sample Isolation Valve (SV-1 or SV-2) at the North OAI Fails Open | Solenoid failure (Valves energized to close, fail open) | Surveillance Testing | Second Sample Isolation Valve in Series | Control Room Isolation initiated on both trains by RE-26-46 or RE-26-47 upon detection of high radiation | The operation of RE-26-46 (Train A) is unaffected by a single valve failing open. |
| RE-26-46/Sample Isolation Valves (SV-1, SV-2) | Both Sample Isolation Valves (SV-1 and SV-2) at the North OAI Fail Open | Common Mode failure (Fuse or Wiring Failure) | Surveillance Testing. | RE-26-47 (Train B - normally monitoring the South OAI) is unaffected and available to detect high radiation. | Control Room Isolation initiated on both trains by RE-26-46 or RE-26-47 upon detection of high radiation | RE-26-46 cannot be aligned to monitor the South OAI as simultaneous sampling of the North and South OAI will occur. RE-26-47 (Train B) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-46/Sample Isolation Valves (SV-3, SV-4) | Single Sample Isolation (SV-3 or SV-4) at the South OAI Valve Fails Open | Solenoid failure (Valves energized to close, fail open) | Surveillance Testing | Second Sample Isolation Valve in Series | Control Room Isolation initiated on both trains by RE-26-46 or RE-26-47 upon detection of high radiation | The operation of RE-26-46 (Train A) is unaffected by a single valve failing open. |
| RE-26-46/Sample Isolation Valves (SV-3, SV-4) | Both Valves (SV-3 and SV-4) at the South OAI Fail Open (results in simultaneous sampling of North and South Intakes). | Common Mode failure (Fuse or Wiring Failure) | Surveillance Testing. | RE-26-47 (Train B - normally monitoring the South OAI) is unaffected and available to detect high radiation. | Control Room Isolation can be initiated on both trains by RE-26-47 upon detection of high radiation. RE-26-46 simultaneous sampling of North and South intake may reduce monitor accuracy/response time due to mixed samples/reduced sample velocities. | RE-26-47 (Train B) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-46/Sample Isolation Valves (SV-3, SV-4) | Sample Isolation Valve (SV-3 or SV-4) Fails to open on demand | Blockage, Solenoid Valve Spring Failure (Valves energized to close, fail open) | Control Room Annunciator Low Flow Annunciator. Amber Indicating Light on RIS-26-46. | RE-26-47 (Train B - normally monitoring the South OAI) is unaffected and available to detect high radiation. | No Effect on Control Room Isolation. Control Room Isolation can be initiated on both trains by RE-26-46 while aligned to the North OAI. Control Room Isolation can be initiated on both trains by RE-26-47. | RE-26-46 cannot be used to sample the South OAI. RE-26-47 (Train B) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-46/A Train DC Power | Voltage lost or insufficient (results in simultaneous sampling of North and South Intakes) | Failure of DC Bus, Circuit Breaker, Fuse, Wiring or Battery | Multiple loss of power alarms may be received depending on the DC failure | RE-26-47 (Train B - normally monitoring the South OAI) is unaffected and available to detect high radiation. | Control Room Isolation will be initiated on both trains by RE-26-47 on detection of High Radiation. RE-26-46 simultaneous sampling of North and South intake may reduce monitor accuracy/response time due to mixed samples/reduced sample velocities. | RE-26-47 (Train B) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-46/A Train AC Power | Voltage lost or insufficient (results in loss of sample pumps and/or monitor electronics) | Failure of Circuit Breaker, Fuse, Wiring or EDG | Multiple loss of power alarms may be received depending on the AC failure. Low sample flow alarm will occur if AC power only lost to sample pump. Monitor Failure alarm will occur if power lost at RIS-26-46. | RE-26-47 (Train B - normally monitoring the South OAI) is unaffected and available to detect high radiation. | Control Room Isolation initiated on both trains by RE-26-47 upon detection of high radiation | RE-26-47 (Train B) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |

| Control Room Isolation - Radiation Monitoring Components | | | | | | |
|---|---|--|--|--|---|---|
| Component | Failure Mode | Possible Cause(s) | Method of detection | Inherent Compensating Provision | Effect on Event Mitigation | Remarks and Other Effects |
| RE-26-47/RIS-26-47 (Train B - normally monitoring the South OAI) | Unable to Detect High Radiation | Detector Failure, Electronics Failure, Loss of sample pump, Degraded HV Power Supply | Control Room Annunciator for monitor failure and low sample flow, Channel Check (RE-26-47 vs. RE-26-46), Surveillance Testing | RE-26-46 (Train A - normally monitoring the North OAI) is unaffected and available to detect high radiation. | Control Room Isolation initiated on both trains by RE-26-46 upon detection of high radiation | RE-26-46 (Train A) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-47/RIS-26-47 (Train B - normally monitoring the South OAI) | False High Radiation Reading, False Actuation | Electronics Failure | Control Room Isolation Initiated and Emergency Fans Started. Event Data on Sequence of Events, ERDADS and recorder RR-26-1C1. | RE-26-46 (Train A - normally monitoring the North OAI) is unaffected and available to detect high radiation. | None. Control Room Isolation considered to be the Fail-Safe mode. | A Channel Bypass Switch is available to bypass the channel while it is out of service for surveillance to prevent unnecessary Control Room Isolation. Channel Bypass is alarmed. |
| RE-26-47/Sample Isolation Valves (SV-7, SV-8) | Single Sample Isolation Valve (SV-7 or SV-8) at the South OAI Fails Open | Solenoid failure (Valves energized to close, fail open) | Surveillance Testing | Second Sample Isolation Valve in Series | Control Room Isolation initiated on both trains by RE-26-46 or RE-26-47 upon detection of high radiation | The operation of RE-26-47 (Train B) is unaffected by a single valve failing open. |
| RE-26-47/Sample Isolation Valves (SV-7, SV-8) | Both Sample Isolation Valves (SV-7 and SV-8) at the South OAI Fail Open | Common Mode failure (Fuse or Wiring Failure) | Surveillance Testing. | RE-26-46 (Train A - normally monitoring the North OAI) is unaffected and available to detect high radiation. | Control Room Isolation initiated on both trains by RE-26-46 or RE-26-47 upon detection of high radiation | RE-26-47 cannot be aligned to monitor the North OAI as simultaneous sampling of the North and South OAI will occur. RE-26-46 (Train A) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-47/Sample Isolation Valves (SV-5, SV-6) | Single Sample Isolation (SV-5 or SV-6) at the North OAI Valve Fails Open | Solenoid failure (Valves energized to close, fail open) | Surveillance Testing | Second Sample Isolation Valve in Series | Control Room Isolation initiated on both trains by RE-26-46 or RE-26-47 upon detection of high radiation | The operation of RE-26-47 (Train B) is unaffected by a single valve failing open. |
| RE-26-47/Sample Isolation Valves (SV-5, SV-6) | Both Valves (SV-5 and SV-6) at the North OAI Fail Open (results in simultaneous sampling of North and South Intakes). | Common Mode failure (Fuse or Wiring Failure) | Surveillance Testing. | RE-26-46 (Train A - normally monitoring the North OAI) is unaffected and available to detect high radiation. | Control Room Isolation can be initiated on both trains by RE-26-46 on detection of High Radiation. RE-26-47 simultaneous sampling of North and South intake may reduce monitor accuracy/response time due to mixed samples/reduced sample velocities. | RE-26-46 (Train A) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-47/Sample Isolation Valves (SV-5, SV-6) | Sample Isolation Valve (SV-5 or SV-6) at the North OAI Fails to open on demand | Blockage, Solenoid Valve Spring Failure (Valves energized to close, fail open) | Control Room Annunciator Low Flow Annunciator. Amber Indicating Light on RIS-26-47. | RE-26-46 (Train A - normally monitoring the North OAI) is unaffected and available to detect high radiation. | Control Room Isolation can be initiated on both trains by RE-26-46 upon detection of high radiation. Control Room Isolation can be initiated on both trains by RE-26-47 while aligned to the South OAI. | RE-26-47 cannot be used to sample the North OAI. RE-26-46 (Train A) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-47 / B Train DC Power | Voltage lost or insufficient (results in simultaneous sampling of North and South Intakes) | Failure of DC Bus, Circuit Breaker, Fuse, Wiring or Battery | Multiple loss of power alarms may be received depending on the DC failure | RE-26-46 (Train A - normally monitoring the North OAI) is unaffected and available to detect high radiation. | Control Room Isolation will be initiated on both trains by RE-26-46 on High Radiation. RE-26-47 simultaneous sampling of North and South intake may reduce monitor accuracy/response time due to mixed samples/reduced sample velocities. | RE-26-46 (Train A) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |
| RE-26-47/B Train AC Power | Voltage lost or insufficient (results in loss of sample pumps and/or monitor electronics) | Failure of Circuit Breaker, Fuse, Wiring or EDG | Multiple loss of power alarms may be received depending on the AC failure. Low sample flow alarm will occur if AC power only lost to sample pump. Monitor Failure alarm will occur if power lost at RIS-26-47. | RE-26-46 (Train A - normally monitoring the North OAI) is unaffected and available to detect high radiation. | Control Room Isolation will be initiated on both trains by RE-26-46 on High Radiation. | RE-26-46 (Train A) can be aligned to either the North or South intake to determine most suitable to open for pressurization mode. |

| Control Room Isolation - Radiation Monitoring Components | | | | | | |
|--|---|--|--|---|---|-----------------------------------|
| Component | Failure Mode | Possible Cause(s) | Method of detection | Inherent Compensating Provision | Effect on Event Mitigation | Remarks and Other Effects |
| Isolation Relay 3-1 (Non-Safety to Safety A Train Isolation) | Relay Fails to Actuate on High Radiation Signal from RIS-26-46 / RIS-26-47 | Relay Coil failure (Relay energizes to actuate Control Room Isolation) | Surveillance Testing | Isolation Relay 3-2 (Non-Safety to Safety B Train Isolation) is unaffected and available to initiate Control Room Isolation / Recirculation on High Radiation Signal from RIS-26-46 / RIS-26-47 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. Actuation via relay 3-2. | Train B components actuated only. |
| Isolation Relay 3-1 (Non-Safety to Safety A Train Isolation) | Loss of power to relay | Fuse or wiring failure (Relay energizes to actuate Control Room Isolation) | Surveillance Testing. Control Room Annunciator Monitor Failure | Isolation Relay 3-2 (Non-Safety to Safety B Train Isolation) is unaffected and available to initiate Control Room Isolation / Recirculation on High Radiation Signal from RIS-26-46 / RIS-26-47 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. Actuation via relay 3-2. | Train B components actuated only. |
| Isolation Relay 3-2 (Non-Safety to Safety B Train Isolation) | Relay Fails to Actuate on High Radiation Signal from RIS-26-46 / RIS-26-47 | Relay Coil failure (Relay energizes to actuate Control Room Isolation) | Surveillance Testing | Isolation Relay 3-1 (Non-Safety to Safety B Train Isolation) is unaffected and available to initiate Control Room Isolation/Recirculation on High Radiation Signal from RIS-26-46 / RIS-26-47 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. Actuation via relay 3-1. | Train A components actuated only. |
| Isolation Relay 3-2 (Non-Safety to Safety B Train Isolation) | Loss of power to relay | Fuse or wiring failure (Relay energizes to actuate Control Room Isolation) | Surveillance Testing. Control Room Annunciator Monitor Failure | Isolation Relay 3-1 (Non-Safety to Safety A Train Isolation) is unaffected and available to initiate Control Room Isolation/Recirculation on High Radiation Signal from RIS-26-46 / RIS-26-47 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. Actuation via relay 3-1. | Train A components actuated only. |
| Actuation Relays 3, 3-1, 3-2 (Safety Train A) | Relays Fail to Actuate on signal from Isolation Relay | Power or Wiring failure (Relays energize to actuate Control Room Isolation) | Surveillance Testing | Actuation Relays 3-3, 3-4, 3-5 (Safety Train A) are unaffected and available to initiate Control Room Isolation/Recirculation signal from Isolation relay 3-1 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. | |
| Actuation Relays 3-3, 3-4, 3-5 (Safety Train A) | Relays Fail to Actuate on signal from Isolation Relay | Power or wiring failure (Relays energize to actuate Control Room Isolation) | Surveillance Testing | Actuation Relays 3, 3-1, 3-2 (Safety Train A) are unaffected and available to initiate Control Room Isolation/Recirculation signal from Isolation relay 3-1 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. | |
| Actuation Relays 3, 3-1, 3-2 3-3, 3-4, 3-5 (Safety Train A) | All Train A Actuation relays Fail to Actuate on signal from Isolation Relay | Common Mode failure (Circuit breaker or wiring failure) | Surveillance Testing | Actuation Relays 3-6, 3-7, 3-8, 3-9, 3-10, 3-11 (Safety Train B) are unaffected and available to initiate Control Room Isolation/Recirculation signal from Isolation relay 3-2 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. Actuation via Train B actuation Relays. | Train B components actuated only. |
| Actuation Relays 3-6, 3-7, 3-8 (Safety Train B) | Relays Fail to Actuate on signal from Isolation Relay | Power or Wiring failure (Relays energize to actuate Control Room Isolation) | Surveillance Testing | Actuation Relays 3-9, 3-10, 3-11 (Safety Train B) are unaffected and available to initiate Control Room Isolation/Recirculation signal from Isolation relay 3-2 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. | |
| Actuation Relays 3-9, 3-10, 3-11 (Safety Train B) | Relay Fails to Actuate on signal from Isolation Relay | Power or wiring failure (Relays energize to actuate Control Room Isolation) | Surveillance Testing | Actuation Relays 3-6, 3-7, 3-8 (Safety Train B) are unaffected and available to initiate Control Room Isolation/Recirculation signal from Isolation relay 3-2 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. | |
| Actuation Relays 3-6, 3-7, 3-8, 3-9, 3-10, 3-11 (Safety Train B) | All Train B Actuation relays Fail to Actuate on signal from Isolation Relay | Common Mode failure (Circuit breaker or wiring failure) | Surveillance Testing | Actuation Relays 3, 3-1, 3-2, 3-3, 3-4, 3-5 (Safety Train A) are unaffected and available to initiate Control Room Isolation/Recirculation signal from Isolation relay 3-1 | No Effect on Control Room Isolation upon detection of high radiation by RE-26-46 or RE-26-47. Actuation via Train A actuation Relays. | Train A components actuated only. |

TS Markups

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TABLE 3.3-6 (Continued)
RADIATION MONITORING INSTRUMENTATION

| <u>INSTRUMENT</u> | <u>MINIMUM CHANNELS OPERABLE</u> | <u>APPLICABLE MODES</u> | <u>ALARM SETPOINT</u> | <u>MEASUREMENT RANGE</u> | <u>ACTION</u> |
|--|--|-----------------------------|---------------------------|-------------------------------------|---------------|
| 2. PROCESS MONITORS (Continued) | | | | | |
| c. Noble Gas Effluent Monitors | | | | | |
| i. Radwaste Building Exhaust System (Plant Vent Exhaust Monitor) | 1 | 1, 2, 3 & 4 | *** | $10^{-7} - 10^5 \mu\text{Ci/cc}$ | 15 |
| ii. Steam Generator Blowdown Treatment Facility Building Exhaust System | 1 | 1, 2, 3 & 4 | *** | $10^{-7} - 10^{-2} \mu\text{Ci/cc}$ | 15 |
| iii. Steam Safety Valve Discharge | 1/Header | 1, 2, 3 & 4 | *** | $10^{-1} - 10^3 \mu\text{Ci/cc}$ | 15 |
| iv. ECCS Exhaust | 1/Train | 1, 2, 3 & 4 | *** | $10^{-7} - 10^5 \mu\text{Ci/cc}$ | 15 |
| <u>d. Control Room Isolation</u> | 1 per intake | ALL MODES | $\leq 320 \text{ cpm}$ | $10 - 10^6 \text{ cpm}$ | 17 |

*** The Alarm Setpoints are determined and set in accordance with requirements of the Offsite Dose Calculation Manual.

LIST OF COMMITMENTS

FPL requested that the AST TS amendment be effective upon NRC approval and implementation within the next 180 days. FPL will implement a plant modification for the Unit 1 CROAI radiation monitoring system that is representative of the FMEA contained in Attachment 4 prior to implementation of the AST TS amendment.