U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-269, 50-270, 50-287, 72-04
License Nos:	DPR-38, DPR-47, DPR-55, SNM-2503
Report No:	50-269/98-03, 50-270/98-03, 50-287/98-03
Licensee:	Duke Energy Corporation
Facility:	Oconee Nuclear Station, Units 1, 2, and 3
Location:	7812B Rochester Highway Seneca, SC 29672
Dates:	March 2 - 6 and March 16 - 20, 1998
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Enclosure 2

EXECUTIVE SUMMARY

Oconee Nuclear Station, Units 1, 2, and 3
NRC Inspection Report 50-269/98-03,
50-270/98-03, 50-287/98-03

This Safety System Engineering Inspection (SSEI) included a review of the licensee's calculations, analysis, and other engineering documents that were used to support the control room ventilation system (CRVS) and penetration room ventilation system (PRVS) performance during normal and accident or abnormal conditions. It also included a review of material condition, maintenance, surveillance, and quality assurance as related to the CRVS and PRVS equipment. This report covers two weeks of onsite inspection.

Plant Operations

A violation (VIO 50-269,270,287/98-03-01) was identified for untimely reporting of design issues. (Section O1.1)

Maintenance

The majority of design and licensing information was appropriately incorporated into maintenance and surveillance documents. Exceptions included the control room dose calculation assumptions (see Engineering below) and a TS penetration room ventilation system test required to verify system design air flow. (Section M3.1)

A violation (VIO 50-269,270,287/98-03-02) was identified for failure to perform surveillance testing of the penetration room ventilation system air flow using the flow measurement method required by Technical Specifications. (Section M3.1)

Acceptance criteria in maintenance and surveillance procedures were adequately verified in completed maintenance and surveillance activities. (Section M4.1)

A non-cited violation (NCV 50-270/98-03-03) was identified for failure to follow the Measuring and Test Equipment (M&TE) control procedure in that an incomplete evaluation was performed for an out of calibration M&TE. (Section M4.1)

Engineering

An apparent violation (EEI 50-269,270,287/98-03-04) was identified for a 1984 modification to the control room ventilation system that introduced an unreviewed safety question involving a single failure vulnerability of the cable room ventilation. (Section E1.1)

An apparent violation (EEI 50-269,270,287/98-03-05) was identified for a 1997 untimely UFSAR change for the 1984 modification to the control room ventilation system. (Section E1.1)

After recognition of the reportability of the single failure vulnerability of the cable room ventilation, the licensee's actions were timely and comprehensive and demonstrated an effective working relationship between Engineering and Operations. (Section E1.1)

A violation (VIO 269,270,287/98-03-07) was identified for incorrect and nonconservative assumptions in control room operator dose calculations. (Section E1.2)

After the licensee recognized the potential operability concern with control room habitability, they addressed it in a timely manner and demonstrated an effective working relationship among Engineering, Operations, and Maintenance. (Section E1.2)

An unresolved item (URI 269,270,287/98-03-08) was opened for further NRC review of licensing basis issues with control room habitability. (Section E1.3)

An unresolved item (URI 269,270,287/98-03-09) was opened for further NRC review of licensing basis issues with single failure vulnerabilities and quality assurance for non-safety equipment that is required to mitigate a design basis accident. (Section E1.3)

Report Details

Introduction

The primary objective of this SSEI was to assess the adequacy of calculations, analysis, and other engineering documents that were used to support CRVS and PRVS performance during normal and accident or abnormal conditions. A secondary objective was to review material condition, maintenance, surveillance, and quality assurance as related to the CRVS and PRVS equipment.

I. Plant Operations

O1 Conduct of Operation

O1.1 Reporting Timeliness

a. Inspection Scope (93809)

As part of a review of the licensee's actions in response to CRVS issues identified during this inspection, the inspectors reviewed the licensee's operability and reportability process.

b. Observations and Findings

The team noted that licensee procedures for operability and reportability were not consistent with NRC requirements. As described by the Regulatory Compliance Manager and the Engineering Special Projects Manager; the licensee's procedures allowed up to 60 days from the discovery of a condition to issue an LER, if that condition required engineering or management review to determine reportability. First, the procedures allowed up to 30 days from the time of occurrence or discovery of a condition for engineering and management review to determine past operability (and reportability). In practice, a condition potentially adverse to quality could be identified by an employee in a Problem Investigation Process (PIP) report, reviewed by a licensed senior reactor operator (SRO) and determined by the SRO to be potentially reportable, and then sent to engineering to be further evaluated for past operability (reportability). A management determination that the condition was reportable then started the time clock for reportability (e.g. four hours for a 50.72 report or 30 days for an LER). However, 10 CFR 50.72 allows only four hours from the time of occurrence of an event, for making a telephone report of a past unanalyzed condition that significantly compromised plant safety. Also, 10 CFR 50.73 allows only 30 days, from the discovery of a

condition that was outside the design basis of the plant, for issuing an LER. These regulations allow no additional time for engineering or management review of the condition to determine if it is reportable.

Procedure NSD 203.6, Operability, Rev. 9, dated December 16, 1997, stated that the purpose of past operability evaluations was to support reportability determinations under 10 CFR 50.73, "Licensee Event Report System." It further stated that a longer period of time than described for operability evaluations can be allowed for the past-operability evaluation since the situation has already been corrected. This time period may be up to 30 working days. Procedure NSD 202.5, Reportability, Rev. 8, dated June 16, 1997, stated that the event reportability time clock generally starts at the time of the event or the discovery of the condition. NSD 202.5 further stated that, for more complex issues such as design basis questions, the clock should start once appropriate station management makes a decision with respect to the operability of the system or component.

The NRC position on when the reportability time clock starts was published in about 1984 (in supplements to draft NUREG-1022) and again recently in January 1998 (in NUREG-1022, Rev. 1). The staff's position on reportability under 50.73 was also published on February 6, 1998, in Federal Register Volume 63, on page 6273. The NRC stated that the 30-day clock for an LER starts when the condition is identified by licensee personnel and no additional time is allowed for engineering or management review of the condition to determine if it is reportable.

Licensee procedures for timeliness of reporting have been essentially the same for many years. A team review of the licensee's 50.73 and 50.72 reports made during the last three years found many untimely reports. Examples include the following six untimely LERs and five untimely 50.72 reports:

LER Number	LER Title	Condition Identified	Reportability Determined	LER Date
269/97-03	Post LOCA Boron Dilution Design Bases Not Met Due To Deficient Design Analysis	1/21/97	3/17/97*	4/16/97

270/96-07	Low Pressure Injection System Technically Inoperable For Appendix R Scenario	12/5/96	12/19/96*	1/16/97
270/96-01	Post LOCA Boron Dilution Design Basis Not Met Due To Inadequate Work Practices	3/28/96	4/16/96*	5/15/97
269/96-03	Reactor Coolant Pump Makeup System Technically Inoperable For Appendix R Scenario Due To Design Analysis	2/5/96	2/14/96**	3/12/96
269/95-06	Low Pressure Injection System Technically Inoperable Due To Design Deficiencies	6/21/95	7/24/95*	8/23/95
269/95-03	Low Pressure Injection System Technically Inoperable Due To A Design Analysis	12/27/94	1/31/95*	3/2/95

*NOTE: A 50.72 report of the condition was made on this date.
**NOTE: No 50.72 report required.

c. Conclusions

A violation (VIO 50-269,270,287/98-03-01) was identified for untimely reporting of design issues.

II. Maintenance

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Plant Walkdown

a. Inspection Scope (93809)

The team performed a general system walkdown to assess the material condition of the CRVS and PRVS.

b. Observations and Findings

The general material condition of the equipment was good. The equipment spaces were generally clean and uncluttered. There was no apparent physical damage or degradation to piping, ducting, or equipment. The team noted several potential unfiltered air inleakage pathways in the CRVS which was designed to be a zero inleakage system. These pathways were verified by a smoke test performed during the CRVS monthly surveillance test and included open rivet holes in the fan expansion joints and unsealed joints in duct section connections. The impact of this condition is further discussed in the Engineering section of this report. The licensee promptly took action to seal the identified leakage paths and investigate for additional leakage paths in all units.

The team also observed an open gap of approximately one inch between the bottom of the Unit 2 east penetration room door and the floor. This represented an air leakage path between the penetration room and the auxiliary building. The team noted that even though the penetration room ventilation system had passed its surveillance tests, sealing this air gap could improve the effectiveness of the penetration room ventilation system in limiting offsite dose during an accident to as low as reasonably achievable. The team informed the licensee of this opportunity for improvement.

c. Conclusions

General material condition was good in that there was no apparent physical damage or degradation to system equipment. Unfiltered air inleakage pathways were identified in the CRVS which indicated that the system tightness was not maintained to the level assumed in the system design documents (see Section E1.2).

M3 Maintenance Procedures and Documentation

M3.1 Acceptance Criteria in Maintenance and Surveillance Procedures

a. Inspection Scope (93809)

The team reviewed maintenance and surveillance procedures to determine if acceptance criteria were consistent with the design and licensing bases.

b. Observations and Findings

The preventive and corrective maintenance procedures adequately incorporated design and licensing bases information into acceptance criteria and post-maintenance testing.

However, there were several examples identified in which design assumptions in the control room dose calculations were not incorporated into operating and surveillance procedures; for example, control room dose calculation assumptions such as the assumed time for start of the CRVS booster fans on a LOCA and minimum positive pressure in the control room provided by the CRVS. This issue is further discussed in the Engineering section of this report.

The team identified that the refueling outage surveillance requirement to verify the design flow of the PRVS fans was not performed consistent with Technical Specification (TS) requirements. TS 4.5.4.1.b.1 required that the PRVS design flow be tested each outage in accordance with ANSI N510-1975. The ANSI-N510 specified test method is the use of a pitot traverse tube method which detects velocity pressure and converts this to flow rate. The licensee used the same surveillance test procedure for the monthly test (TS 4.5.4.1.a) and the refueling outage test. That surveillance test procedure used installed instrumentation and a method different from that described in ANSI N510-1975. The installed instrumentation was an in-line orifice plate with differential pressure (dp) measurement input which was converted to flow rate.

The licensee stated that the orifice plate method was consistent with the ANSI-N510 requirement through a secondary reference to the American Conference of Governmental Industrial Hygienists (ACGIH) Ventilation Manual. There was no documentation to demonstrate that the alternate method had previously been evaluated as an equivalent method to that specifically defined in ANSI N510-1975. There was no testing performed to demonstrate that the as-installed instrumentation was equivalent to the ANSI N510-1975 described test. The licensee had not requested a change to the TS to allow use of the alternate test method. Section 8.3 of ANSI-N510 states that the pitot tube traverse should be made at a point in the duct where the air velocity is 1000 cfm or greater. An alternate method of flow testing can be used as described in the ACGIH Manual if there is no place where the air flow is greater than 1000 cfm. The design air flow in the PRVS is 1000 cfm and monthly flows have been consistently greater than 1000 cfm since system installation, therefore the above exception does not apply. The inspectors concluded the TS

requirement included the use of the pitot tube traverse method of flow test and the orifice plate dp method did not meet this TS requirement. This is identified as violation 50-269,270,287/98-03-02; Failure to Perform PRVS Surveillance in Accordance with TS.

The team reviewed the alternate flow measurement methods described in the ACGIH manual to determine if the existing in-line method provided a reliable measurement of air flow. Section 9.4 of the manual identified several methods and instruments for field measurement of ventilation air flow. This included pitot tubes; swinging, rotating vanes; and thermal anemometers. The orifice plate dp assembly was not recommended for field measurement of flow. The stated accuracy was +/- five percent under ideal laboratory conditions compared to the stated accuracy of the pitot traverse tube method of +/- four percent at field conditions. Section 9.5 of the manual discusses calibration of field instruments in a calibrated wind tunnel laboratory set up. This set up used an orifice and dp assembly as a metering device in a specific configuration to establish flow conditions in the wind tunnel. The plant configuration with the orifice installation was considerably different from the calibrated wind tunnel configuration. For example, the calibrated wind tunnel had 70 inches of unobstructed flow and a flow straightener while the field condition had the orifice nine inches down stream of the major flow obstruction of a filter bank.

Section 9.5 of the same manual additionally stated that each orifice should be calibrated using a standard pitot tube and manometer prior to use. The PRVS in-line orifice was provided by the vendor as an assembly with the filter banks. The vendor drawing indicated that the orifice should provide a dp of 4 inches water at 1500 cfm, however, there was no documentation to demonstrate this dp/flow relationship was verified. The licensee has calibrated the flow instrument with the assumption that this relationship was valid. The inspectors noted that adequate testing of the orifice was not documented to assure the accuracy of the PRVS flow measurement instrument. However, the safety significance of the flow test and instrument deficiency issues was limited. The periodic tests were adequate to identify performance degradation of the system. Also, a separate surveillance test verified that the PRVS would provide a negative pressure in the penetration room with respect to adjacent areas.

c. Conclusions

The majority of design and licensing information was appropriately incorporated into maintenance and surveillance documents. Exceptions included the control room dose calculation assumptions (see Section E1.2) and a TS PRVS refueling outage test required to verify system design air flow. A violation (VIO 50-269,270,287/98-03-02) was identified for failure to perform the PRVS refueling outage surveillance test using the pitot tube flow measurement method required by the TS.

M4 Maintenance Staff Knowledge and Performance

M4.1 Acceptance Criteria Implementation In Completed Surveillances

a. Inspection Scope (93809)

The team reviewed completed work orders for surveillance test procedures to determine if acceptance criteria were verified and deficiencies were adequately resolved.

b. Observations and Findings

The team identified an example of deficient Engineering performance in which an out-of-tolerance (OOT) condition for an installed measuring and test equipment (M&TE) was not adequately resolved. The calibration of PRVS installed Flow Indicator PR1-F12, on July 29, 1997, identified that the instrument was OOT. The OOT review examined the most recent use of the instrument on a monthly TS surveillance to verify PRVS design fan flow which was performed the previous day. The other surveillance tests previously performed when this instrument was potentially out of calibration were not evaluated. This was inconsistent with the licensee's Measuring and Test Equipment (M&TE) Control Procedure, NSD 406, revision 1. The inspectors reviewed the previous tests and verified that the test results remained valid for the instrument used. The licensee additionally initiated PIP 2-98-1166, dated March 10, 1998, and completed the appropriate reviews. This failure to follow the procedure for control of M&TE constitutes a violation of minor significance and is being treated as a non-cited violation, consistent with Section IV of the NRC Enforcement Policy. This item is identified as NCV 50-270/98-03-03, Failure to Follow M&TE Control Procedure.

c. Conclusions

Acceptance criteria in maintenance and surveillance procedures were adequately verified in completed maintenance and surveillance activities. An NCV (50-270/98-03-03) was identified for an inadequate review of out of tolerance M&TE instrumentation.

II. Engineering

E1 Conduct of Engineering

E1.1 Single Failure Vulnerability of CRVS Ventilation and Air Conditioning

a. Inspection Scope (93809)

The team reviewed an issue involving a single failure vulnerability in the CRVS that could potentially result in the common cause failure of redundant safety-related equipment required for accident mitigation. Documents reviewed included a 50.72 report; a UFSAR Change Package dated November 18, 1997; two Problem Investigation Reports dated June 2, 1997, and June 9, 1997; a draft position paper (White Paper) on the licensing and design basis for CRVS with respect to single failures; and the checklist and 50.59 Safety Evaluations for the 1984 Nuclear Station Modification that separated the combined Units 1 and 2 control room ventilation from the ventilation for the Unit 1 and 2 cable rooms and electrical equipment rooms. The applicable regulatory requirements included 10 CFR 50.59; 10 CFR 50.71(e); 10 CFR 50 Appendix B; and the Oconee Units 1, 2, and 3 UFSAR.

b. Observations and Findings

On March 11, 1998, during the NRC SSEI of the CRVS, the licensee identified, in a 50.72 report, that loss of a single fan in the ventilation system could interrupt cooling to either the Unit 1 or Unit 2 cable rooms, causing redundant safety-related electrical circuit breakers to trip due to normal load current and high ambient temperatures. As a consequence, safety-related equipment and equipment important to safety required to mitigate a design basis accident could be lost, including 125 VDc vital I&C power, 120 VAc vital I&C power, 120 VAc essential power, 208/120 VAc Safety Power, and all Engineered Safeguards (ES) systems.

In response to this condition, the licensee issued PIP 98-1165, assessed operability, entered TS Limiting Condition For Operation Action Statement 3.0 on Units 1 and 2 until compensatory actions were in place, issued a 50.72 report, and issued a procedure for compensatory actions. The team reviewed the 50.59 safety evaluation dated March 12, 1998, for the compensatory measures and found it to be adequate. The team also reviewed the licensee's proceduralized compensatory actions and related engineering analyses, and found them to be adequate. Overall, the team found that after their recognition of the reportability of this issue, the licensee's actions were timely and comprehensive and demonstrated an effective working relationship between Engineering and Operations.

The licensee calculated the temperature versus time for the cable room assuming a total loss of cooling and concluded that in approximately 48 hours the temperature could exceed 122 degrees F. At ambient temperatures of 122 degrees F or higher, the thermal circuit breakers could trip due to normal load currents. However, with compensatory actions being taken within 6 hours, the licensee's analysis showed that the peak temperature in the cable room would be approximately 96 degrees F, which is within the design temperature limits of the equipment in the cable room.

The team found that this event was caused by a modification that was implemented on the CRVS during the 1980's. This Nuclear Station Modification NSM ON-2324 separated and isolated the combined Unit 1 and 2 Control Room HVAC system and redundant air handling units (AHU-11 and AHU-12) from the Unit 1 and 2 equipment rooms and cable rooms, leaving each cable room with only one ventilation fan (AHU 1-34 on Unit 1 and AHU 2-35 on Unit 2) providing cooling in the room. The Nuclear Safety Evaluation Check List for the change dated October 5, 1984, and the 50.59 Safety Evaluations for the Nuclear Station Modification dated June 12 and 22, 1984, all concluded that the change did not involve an unreviewed safety question and could be implemented without prior NRC approval. The Nuclear Safety Evaluation Check List was marked "no" for all seven screening questions related to the determination of whether the change involved an unreviewed safety question.

Section 3.11.4 of the UFSAR stated that redundant air conditioning and ventilation equipment is provided for the control area to assure that no single failure of an active component within these systems will prevent proper control area environmental control. Also, Section 9.4.1.2.1 of the UFSAR stated that the control room zone included the Control Room and the Unit 1 and 2 Electrical Equipment and Cable Rooms.

The licensee's 1984 modification NSM ON-2324 separated the redundant Unit 1 and Unit 2 Control Room ventilation and air conditioning system from the Units 1 and 2 equipment rooms and cable rooms, creating the possibility that a loss of a single fan could result in tripping of multiple safety-related circuit breakers in the cable room due to normal load current and high ambient temperatures. The modification introduced a USQ in that it increased the probability of occurrence of a failure of safety-related equipment and also increased the possibility of a malfunction of equipment important to safety in a manner different than any already evaluated in the UFSAR. (The common mode failure of multiple pieces of safety-related equipment, due to high temperatures in a cable room, had not been previously evaluated in the UFSAR.) 10 CFR 50.59 requires that the licensee submit an application for amendment of its license pursuant to 10 CFR 50.90 prior to making changes which involve a USQ. The failure to identify a potential unreviewed safety question with the implementation of NSM 2324 and the failure to submit an application for a license amendment before making the change is an apparent violation of 10 CFR 50.59. This apparent violation is identified as EEI 50-269, 270/98-03-04; USQ Involving Single Failure Vulnerability Introduced by 1984 CRVS Modification.

The team noted that this single failure concern was discussed in PIP 0-097-1734 dated June 9, 1997, which had been recently updated on February 26, 1998. However, no corrective action had been taken prior to this NRC inspection because the licensee had concluded that the licensing basis did not require that a single failure be postulated for this equipment since it was not considered part of the control room zone. The PIP concluded that the description of the control room zone should be changed in section 9.4.1 of the FSAR and the PIP was still open at the beginning of this inspection. The team assessed that PIP 0-097-1734 was a missed opportunity for the licensee to identify and correct the USQ.

The team noted that the licensee made a change to the UFSAR on November 18, 1997, to revise Figure 9-24, Control Room Area Ventilation and Air Conditioning System drawing, to reflect the 1984 modification NSM ON-2324. This UFSAR change was approved and officially part of the UFSAR during this inspection, but was not yet included in the published UFSAR. The November 1997 UFSAR change relied on the June 22, 1984, safety evaluation for modification ON-2324. The team assessed that the November 1997 UFSAR change was another missed opportunity for the licensee to identify and correct the USQ. The team also noted that this UFSAR change was untimely in that 10 CFR 50.71(e) requires that the

UFSAR be updated within 24 months of making changes to the plant. This untimely UFSAR change is identified as apparent violation EEI 50-269,270/98-03-05; Untimely UFSAR Change for 1984 CRVS Modification.

While reviewing the limiting temperatures for equipment qualification in the cable room, the team noted that there were differences in design information on maximum room temperatures. The UFSAR, Section 3.1.23, Criterion 23, Protection Against Multiple Disability For Protection Systems, stated that the protection systems are designed to extreme ambient conditions. It further stated that the protection systems' instrumentation will operate from 40°F to 140°F and sustain the loss-of-coolant building environmental conditions, including 100 percent relative humidity, without loss of operability. The licensee had a separate analysis to show that all safety equipment in the Cable Rooms could withstand temperatures up to at least 120°F. Also, the Design Basis Document stated that the safety limit for equipment in the control rooms is approximately 120°F. However, the Equipment Qualification Criteria Manual (EQCM), table EP-3, stated that the design basis accident environmental condition includes a temperature range of 60 - 100°F for the Cable Rooms, Equipment Rooms, and Control Rooms. Instrumentation engineers stated that instruments in the control rooms were calibrated such that they would remain within tolerance when the room temperature was between 60 and 85°F. The team noted that instruments were potentially the type of equipment most sensitive to high ambient temperatures. While there were virtually no instruments in the cable rooms, there were many important instruments in the control rooms. To follow up on the design control of room temperatures and the effect on instruments, an inspector followup item will be opened: IFI 50-269,270,287/98-03-06; Design Control of Room Temperatures and Effects on Instruments.

c. Conclusions

An apparent violation of 10 CFR 50.59 (EEI 50-269,270/98-03-04) was identified for a 1984 plant modification to the CRVS that introduced an unreviewed safety question involving a single failure vulnerability of the Unit 1 and Unit 2 cable rooms' ventilation. A second apparent violation (EEI 50-269,270/98-03-05) was identified for a 1997 untimely FSAR change for the 1984 CRVS modification. After their recognition of the reportability of the single failure vulnerability of the cable room ventilation, the licensee's actions were timely and comprehensive and demonstrated an effective working relationship between Engineering and

Operations. An inspector followup item (IFI 50-269,270,287/98-03-06) was opened for NRC review of the design control of room temperatures and the effects on instruments.

E1.2 Excessive Unfiltered Air Inleakage into the Control Room

a. Inspection Scope (93809)

The team reviewed the licensee's calculations for post-accident control room operator dose, noted the assumptions for unfiltered air inleakage into the control room, and compared those assumptions to conditions found in the plant.

b. Observations and Findings

The calculations reviewed were based on a maximum hypothetical accident (MHA) involving a loss of coolant accident with a concurrent loss of offsite power and radioactive release; a steam generator tube rupture; a main steam line break; and a rod ejection accident (see the List of Documents Reviewed at the end of this report). An assumption in each of the calculations was that unfiltered air inleakage into the control room would be 10 cfm, due to opening and closing of control room doors. There was no allowance for any other unfiltered inleakage.

The team noted that the licensee's control room habitability design was zone isolation with filtered incoming air and positive pressure in the control room. The NRC Standard Review Plan, Section 6.4, Control Room Habitability Systems, indicated that this type of system may not be very effective in protecting against iodine. The team noted that the filters for the incoming air were designed to remove approximately 99% of the iodine. Therefore, the largest potential for iodine dose to operators was from unfiltered air inleakage. A review of the equations for calculating operator dose confirmed that this type of control room habitability design (zone isolation) could not accept very much unfiltered air inleakage. The inspectors estimated that unfiltered air inleakage would need to be less than about 100 cfm if other operator dose calculation input assumptions (e.g., containment leak rate) were at their design values. Licensee engineers, who had performed the operator dose calculations, stated that unfiltered air inleakage must be less than about 80 cfm to limit operator post-accident thyroid dose to less than the 50 rem limit of 10 CFR 20, the standard to which the licensee was committed.

The team noted that the incoming air filters and the control room booster fans, which would be started to pressurize the control room, were located outside of the control room envelope. They were in the ventilation equipment room, which was one level above the control room and also was part of the auxiliary building. The large control room ventilation fans, which recirculated and cooled the control room air, were also located in the ventilation equipment room. The team noted that a substantial negative pressure could exist in the ventilation ducting on the suction side of these fans when they were running. Consequently, any leaks in that ventilation ducting could result in unfiltered air inleakage from the ventilation equipment room into the control room. Visual inspection of the ducting revealed many potential leakage sites. By using small smoke generators supplied by the licensee, the team and licensee engineers tested the readily accessible portions of the Unit 3 ducting and found that the actual leakage paths were more extensive than originally suspected. The team calculated, and licensee engineers agreed, that the observed leakage paths represented about 200 cfm of unfiltered inleakage. Licensee management stated that they would consider that the total unfiltered inleakage into ventilation ducting would be no more than 400 cfm. This unfiltered inleakage was clearly in excess of the 10 cfm assumed in the operator dose calculations. The unfiltered air inleakage into the ventilation ducting on the suction side of the control room ventilation and booster fans is identified as the first example of Violation 50-269,270,287/98-03-07; Incorrect and Nonconservative Assumptions in Control Room Operator Dose Calculations.

In addition, the team noted that the control room booster fans did not start automatically - they needed to be manually started by the operators. Any delay in starting the booster fans would be time that the control room was not pressurized. During that time, the control room would be susceptible to large amounts of unfiltered inleakage due to wind forces and other sources of differential pressure between the control room and adjacent areas. By using a method described in SRP 6.4 for calculating inleakage into an unpressurized control room and actual data from licensee control room pressurization tests, the team calculated that unfiltered inleakage into the Unit 3 control room with the booster fans off could be about 1350 cfm.

To estimate the expected time delay for starting the booster fans, the team reviewed licensee procedures and discussed them with operators. Instructions to start the booster fans were included in abnormal procedure AP/1/A/1700/18, Abnormal Release of Radioactivity, which was

to be used by operators in responding to an alarm for high radiation in the control room ventilation ducting. Instructions to start the booster fans were also included in procedure RP/0/B/1000/02, Control Room Emergency Coordinator Procedure. The emergency operating procedures (EOPs) included no instructions for starting the booster fans. In a design bases MHA event, operator performance of EOPs would take priority over responding to high radiation alarms. Because of the relative priorities of procedures and alarms, licensee operations personnel estimated that it would take as long as 90 minutes to get the booster fans started during an MHA. The team assessed that the time delay in starting the booster fans could result in unfiltered inleakage substantially in excess of that assumed in the operator dose calculations. The unfiltered air inleakage due to the time delay in starting the booster fans is identified as the second example of Violation 50-269,270,287/98-03-07; Incorrect and Nonconservative Assumptions in Control Room Operator Dose Calculations.

In response to the team's concerns about unfiltered inleakage in excess of that assumed in the operator dose calculations, the licensee initiated a control room ventilation system operability evaluation on the afternoon of March 5, 1998. The licensee also concurrently initiated maintenance work to promptly seal the ventilation ducting inleakage paths for both the Unit 3 and also the Units 1 and 2 combined control rooms. Also, the licensee initiated immediate changes to the EOPs so that operators would be directed to start the booster fans within 30 minutes. The licensee completed the operability evaluation on the afternoon of March 7th, concluding that the control room ventilation system was currently operable after sealing the ventilation ducting and revising the EOPs. The licensee planned to complete an evaluation of past operability (reportability) within 30 days. The team reviewed the revised EOPs and the revised operator dose calculations, and concluded that after the licensee recognized the potential operability concern associated with this issue, they addressed it in a timely and effective manner. Also, the licensee's response demonstrated an effective working relationship among Engineering, Operations, and Maintenance.

The team reviewed the licensee's current operability evaluation for the control room pressurization system. The related operator dose analysis included an input value for containment leakage of 0.1591%, based on recent ILRT data, which was less than the design value of 0.25%. The dose analysis also included an input value for penetration room bypass fraction of 7.8%, based on recent ILRT and LLRT data, which was less than the design value of 50%. These lower values for containment

leakage and penetration room bypass fraction essentially offset the higher values for control room unfiltered inleakage (an estimated 300 cfm of unfiltered air inleakage on the suction side of the ventilation and booster fans and a 30 minute time delay in starting the booster fans). The resulting calculated operator dose was less than 5 Rem whole body and 50 Rem thyroid.

The licensee's process allowed 30 days for engineering review for past operability. However, the engineer who performed the operator dose calculations estimated that the past operability evaluation (using 400 cfm of unfiltered air inleakage on the suction side of the ventilation and booster fans and a 90 minute time delay in starting the booster fans) would show that the calculated operator dose was still below the limits of 5 Rem whole body and 50 Rem thyroid.

c. Conclusions

A violation (VIO 269, 270, 287/98-03-07) was identified for incorrect and nonconservative assumptions in control room operator dose calculations. After the licensee recognized the potential operability concern with control room habitability, they addressed it in a timely manner and demonstrated an effective working relationship among Engineering, Operations, and Maintenance.

E1.3 Licensing Basis Issues Related To The Control Room Ventilation System

a. Inspection Scope (93809)

The team reviewed the licensing basis for the habitability and ventilation functions of the control room ventilation system and compared it to the licensee's design and procedures.

b. Observations and Findings

The team noted several apparent licensing basis issues:

1) Unfiltered Air Inleakage Due To Control Room Pressure Less Than 1/8 Inch

The team noted that the licensee's operator dose calculations did not account for unfiltered air inleakage that could result from control room pressure being less than 1/8 inch water gauge (w.g.) with both booster fans running. Surveillance procedures required

only a positive pressure. Actual pressure in the Unit 3 control room on March 5, 1998, was tested to be less than 1/8 inch w.g. above outside air pressure. However, TMI action item III.D.3.4, Control Room Habitability, which was imposed on Oconee by an NRC Order, invoked the Standard Review Plan Section 6.4, Control Room Habitability system, which states that a pressurized control room design should pressurize to at least 1/8 inch w.g. relative to all surrounding air spaces. The 1/8 inch w.g. pressure would prevent inleakage of unfiltered air.

In response to this issue, the licensee promptly tightened up the control room boundary (within about one week) so that the pressure in each control room with both booster fans running was greater than 1/8 inch w.g. Also, the licensee stated plans to revise the surveillance test procedure to require a 1/8 inch w.g. positive pressure with a single fan running.

However, the licensee believed that their licensing basis did not require accounting for unfiltered air inleakage, that could result from control room pressure being less than 1/8 inch w.g., in the operator dose calculations. The issue of unfiltered air inleakage due to control room pressure less than 1/8 inch w.g. is identified as the first item in URI 50-269,270,287/98-03-08; Licensing Basis Issues With Control Room Habitability.

2) Unfiltered Air Inleakage Due To Single Failures

The team noted that the licensee's operator dose calculations did not account for unfiltered air inleakage that could result from single failures in the CRVS system. However, the Standard Review Plan Section 6.4 stated that the control room ventilation system must function properly, even with a single failure. The SRP also stated that manual repositioning or repair of a failed component may be allowed, however, certain criteria or their equivalent will be required, including: 1) appropriate control room instrumentation should be provided for a clear indication and annunciation of valve or damper malfunction, and 2) the time for repair used in the computation of control room exposures should be taken as the time necessary to repair the component plus a one-half hour margin, and no manual correction will be credited during the first two hours of the accident.

The team found that the CRVS included many components that were susceptible to single failure. Also, these components did not have indication or annunciation of a malfunction. In addition, the licensee's procedures did not require operators to verify that these components had functioned properly. Also, the licensee had no procedures or standby tools and equipment for prompt repair of these components. The team identified that the following components were susceptible to single failure. Except as specified, the components are for both the Unit 1 & 2 control room and for the Unit 3 control room:

- Two booster fans (50% capacity each)

- Two outside air dampers (one for each booster fan)

- One breaker supplying power to both outside air dampers

- Unit 1 & 2 control room dampers CD-1, CD-2, CD-3, CD-4, and CD-X

- Unit 3 control room dampers CD-9, CD-Y, and CD-12A

The team assessed that, at the end of this inspection (after the licensee tightened the control rooms), a failure of any of the above components would probably result in a positive pressure in the affected control room but less than 1/8 inch w.g. pressure. Two exceptions to that were: 1) CD-4, which the licensee had tested to have virtually no effect on control room pressure if it were failed open; and 2) the breaker supplying power to both outside air dampers, which if it failed open would result in both outside air dampers failing closed and no control room pressurization.

In response to this issue, the licensee wrote a procedure for identifying and repairing a single failure that could occur during an accident. The licensee judged that the worst case single failure, causing both outside air dampers to fail closed, could be identified and corrected within three hours. The engineer who performed the operator dose calculations estimated that, with no control room pressurization for three hours, the resulting post-accident operator dose would probably be slightly under 50 Rem thyroid. Also, the licensee stated plans to install a modification within about two weeks that would eliminate the

potential for a single active failure causing both outside air dampers to fail closed. In addition, the licensee stated plans to continue to tighten the control rooms, including replacing isolation dampers with low leakage dampers, sealing holes in the walls, and sealing ventilation return ducting, with a goal of meeting 1/8 inch w.g. positive pressure even with a worst case single active failure.

In addition, the licensee had a potassium iodide (KI) program in place, including a written procedure on which health physics personnel were trained. The team found that operators were not trained on the use of KI, and the licensee promptly initiated operator training on KI before the end on this inspection. The team noted that the NRC has in the past accepted the use of KI as an interim compensatory measure, to reduce post-accident operator thyroid dose, for a degraded CRVS that would not by itself properly limit post-accident operator thyroid dose.

However, the licensee still believed that their CRVS licensing basis did not require analyzing for potential single failures; designing against single failures; providing control room indication and annunciation of single failures; or accounting for additional unfiltered air inleakage, that could result from single failures, in the operator dose calculations. The issue of unfiltered air inleakage due to single failures is identified as the second item in URI 50-269,270,287/98-03-08; Licensing Basis Issues With Control Room Habitability.

3) Operator Dose Limits

The licensee's operator dose calculations assumed an allowed post-accident dose of 5 Rem whole body and 50 Rem thyroid, in addition to the normal annual dose limits of 10 CFR 20, and the licensee believed that was consistent with their licensing basis. However, TMI action item III.D.3.4 invoked 10 CFR 50, Appendix A, Criterion 19 (GDC 19), which allows an operator post-accident dose of 5 Rem whole body and 30 Rem thyroid, in addition to the normal annual dose limits of 10 CFR 20. The licensee stated in response to III.D.3.4 that they would not use GDC 19, but instead would use the 10 CFR 20 limits of 5 Rem whole body and 50 Rem thyroid. However, the team noted that 10 CFR 20 does not provide any dose limits for emergencies in addition to the normal annual dose limits of 5 Rem whole body and 50 Rem thyroid. The team also

noted that the licensee's emergency plan, which was approved by the NRC, did allow the Emergency Coordinator to approve an additional post-accident dose for personnel of up to 5 Rem whole body and 50 Rem thyroid. However, the Emergency Plan is not part of the licensed design basis of the plant.

The issue of operator dose limits is identified as the third item in URI 50-269,270,287/98-03-08; Licensing Basis Issues With Control Room Habitability.

4) Technical Specifications

The TS for control room pressurization operability and surveillance do not support the operator dose calculation assumptions for unfiltered air inleakage and also do not support the single failure criterion.

a) TS 3.15.2.b requires that, with both outside air booster fans operable, the control room pressurization system shall be capable of maintaining a positive pressure within the control room.

However, the operator dose calculations assume that the control room pressure is greater than 1/8 inch w.g. with booster fans running and therefore there is no additional unfiltered air inleakage. Also, reliance on both booster fans to attain a positive pressure is contrary to the single failure criterion of SRP 6.4.

b) TS 4.12.1 requires that, on a refueling frequency, verify the control room pressurization system maintains the control room at a positive pressure with both outside air booster fans on during system operation.

This surveillance requirement similarly does not support the 1/8 inch w.g. pressure assumed in the operator dose calculations or the single failure criterion of SRP 6.4.

c) There is no TS surveillance requirement to assure that the unfiltered air inleakage into the suction side of the ventilation and booster fans is within the assumptions of the operator dose calculation. As identified during this inspection, this inleakage can easily be substantially above

the assumptions of the operator dose calculation.

d) The TS do not address ventilation and air conditioning for the control rooms, cable rooms, and electrical equipment rooms. However, this equipment is required to mitigate a design basis event.

The above issues with Technical Specifications are identified as the fourth item in URI 50-269,270,287/98-03-08, Licensing Basis Issues With Control Room Habitability.

5) Safety and Quality Classification

The safety and quality classification of the CRVS (pressurization for the control rooms and ventilation/air conditioning for the control rooms, cable spreading rooms, and electrical equipment rooms) is currently non-safety and non-QA. However, this equipment is required to mitigate a design basis LOOP/LOCA. Since this equipment is non-safety and consequently non-QA, it has not received the same attention as safety-related equipment would receive to assure that it will operate when needed. For example, single failure design criteria has not been applied and single failure analysis has not been performed. Also, the 10 CFR 50, Appendix B, quality assurance program has not been applied to it. Oconee also has other equipment, that is relied upon to mitigate design basis accidents, that is classified non-safety and non-QA and may be vulnerable to a single failure. The general issue of QA classifications was recognized and addressed as recently as 1995 in letters between the licensee and the NRC.

The team reviewed recent regulatory history to see if there was a recurring problem with licensee reliance on non-safety equipment to mitigate a design basis accident. The team found that there have been other examples identified in recent years where a single failure of non-safety equipment could result in the failure of multiple pieces of safety-related equipment. The failure of a non-safety letdown storage tank level instrument in 1997 caused the failure of two high pressure injection pumps. The potential for a single failure in the non-safety condenser cooling water control logic to isolate the suction flow path of all safety-related low pressure service water pumps was identified in 1993. The potential for a single failure in the non-safety elevated water storage tank level control system to cause a loss of siphon

flow to the safety-related low pressure service water pumps was identified in 1994. Also, several single failure vulnerabilities of the Keowee emergency electrical power units were identified during 1992 - 1994.

The issue of single failure and quality classification is identified as URI 50-269,270,287/98-03-09, Licensing Basis Issues With Single Failure and QA For Non-Safety Equipment Required To Mitigate An Accident.

c. Conclusions

An unresolved item (URI 269,270,287/98-03-08) was opened for further NRC review of licensing basis issues with control room habitability. Also, an unresolved item (URI 269,270,287/98-03-09) was opened for further NRC review of licensing basis issues with single failure vulnerabilities and quality assurance for non-safety equipment that is required to mitigate a design basis accident.

E3 Engineering Procedures and Documentation

E3.1 Review of PRVS Electrical Design Drawings

a. Inspection Scope (93809)

The inspectors reviewed the instrumentation and controls, annunciators, alarms, and power sources for the Units 1, 2, and 3 PRVS to verify that the system design and installation were in accordance with the licensee's design and licensing basis for the system. The acceptance criteria were the Oconee Units 1, 2, and 3 UFSAR; the licensee's QA Program; 10 CFR 50 Appendix B; and the licensee's drawings, procedures, and other related design basis documents.

b. Observations and Findings

The inspectors found that the power sources and controls were consistent with the design and licensing basis for the system.

c. Conclusions

The electrical design of the components that perform the emergency function of the PRVS supported the design-basis functions of the system.

E3.2 Review of CRVS Design Drawings

a. Inspection Scope (IP 93809)

The team reviewed the instrumentation and controls, annunciators, alarms, and power sources for the Units 1, 2, and 3 CRVS to verify that the system design and installation were in accordance with the licensee's design and licensing basis for the system. The acceptance criteria were the Oconee Units 1, 2, and 3 UFSAR; the licensee's QA Program; 10 CFR 50 Appendix B; and the licensee's drawings, procedures, and other related design basis documents.

b. Observations and Findings

The team noted that a single failure of an electrical damper in the control room pressurization and filtering portion of the CRVS could result in the loss of both filter trains. The electrically operated dampers were powered from the same breaker such that if the breaker tripped to clear a failed damper (e.g., electrical fault) it would also cause the other damper to fail closed, causing a loss of both filter trains and a loss of ability to pressurize the control room. The loss of the pressurization and filtering function of CRVS during a LOCA/LOOP could result in operator doses exceeding design and licensing basis. The licensee had documented this potential problem on a PIP prior to this inspection. At the end of this inspection, the licensee's proposed corrective action was to have each of the two dampers powered from a separate breaker so that failure of one damper would not result in loss of the other outside air booster fan and filter train.

The team noted an apparent minor drawing error. Plant Flow Diagram OFD-116J-1.2 did not show the two ventilation duct heaters downstream of AHU-1-11/12. However, the team observed a breaker for the heaters in the plant and also noted that the heaters are shown on one-line diagram O-703, Rev. 47 and on vendor drawing OM 235.A-0061-001.

c. Conclusions

The control room habitability function of the CRVS was not single failure proof, e.g., a single active failure of an electrical damper in the CRVS could result in loss of both outside air booster fans and filter trains. This issue is further discussed in Section E1.3.

E3.3 Review of Mechanical Design Documents and Technical Evaluations

a. Scope (93809)

The team assessed the quality of licensee design documentation as demonstrated by on-site review of calculations, the design basis documentation (DBD) specifications for the CRVS and PRVS, and technical evaluations to resolve identified deficiencies.

b. Observations and Findings

The quality of mechanical system calculations, which included heat load analysis, equipment sizing calculations, and system model assumptions, was adequate. The quality of operator dose calculations was poor due to incorrect and unverified assumptions which impacted the calculations' conclusions. These deficiencies are discussed in section E1.2 of this report.

Additionally, the inspectors noted a deficiency in the CRVS DBD Specification, OSS-0254.00-00-1021, revision 4, dated October 21, 1995. The DBD incorrectly stated that there was no requirement for the CRVS to withstand single failure. However, FSAR section 3.11.4 stated that the control room, cable, and electrical equipment rooms were designed to prevent a loss of function due to single failure. Since the CRVS maintains the design environment conditions for the electrical equipment in the cable and electrical equipment rooms, the DBD statement was incorrect. This issue is discussed in section E1.1 of this report. The quality of technical evaluations to resolve identified system deficiencies in the CRVS and PRVS was adequate to address design and licensing issues.

c. Conclusion

The quality of design calculations was inconsistent. Although adequate for mechanical calculations, poor quality was noted in dose calculations related to incorrect assumptions related to the CRVS. The CRVS DBD incorrectly specified there was no single failure requirement for the CRVS which was inconsistent with the licensing basis.

E8 Miscellaneous Engineering Issues

E8.1 (Open) Deviation 50-269,270,287/94-24-04, Design Basis Requirement for the Penetration Room Ventilation System (92903)

This issue identified that the licensee was unable to assure the Penetration Room pressure would be maintained negative with respect to the outside and all adjacent spaces as stated in UFSAR section 6.2.4.2. Although a negative pressure relative to the outside could be assured, a negative pressure could not be assured relative to the Auxiliary Building (AB). The non-safety related AB Ventilation System (ABVS) fans were stronger and for some configurations the AB pressure could be lower.

The licensee's response to the deviation, dated October 19, 1994, stated the proposed actions to address this issue. These included an extensiveness review and testing to determine the extent of the ABVS and PRVS interaction. Inspections were performed to identify potential leak paths and action taken to seal these leak paths. The ABVS Operating Procedure, OP/O/A/1104/41, revision 10, dated February 20, 1997, included a revision to minimize the configurations which would result in AB pressure less than penetration room pressure. The inspectors verified that the EOPs provided for establishment of the appropriate ABVS line-up following a Loss of Offsite Power in conjunction with a Loss of Coolant Accident (LOOP/LOCA) scenario. These actions were completed at the end of 1995.

A technical deviation with the UFSAR continues to exist; however, the condition has been improved in that the extent of lower AB pressure conditions has been minimized. The Unit 3 AB room 455 contains three large exhaust fans that produce significant negative pressure which cannot be overcome by the PRVS. Although there are no apparent leakage paths in the solid wall between the fan room and the penetration room, the literal statement in the UFSAR regarding penetration room pressure being negative with respect to all adjacent spaces cannot be achieved. Also, the ABVS system is non-safety related and has a history of random failures. For example, loss of ABVS equipment could occur in cold weather due to design cold weather protection functions. The inspectors verified that the licensee had taken action to identify random failure of the ABVS equipment. The unit operator rounds include verifying the status of the specific equipment which, if it failed, could contribute to the lower AB pressure condition. The operator rounds would assure that a fan failure would be identified within the TS specified 12 hour

limiting condition for operation period. The licensee evaluated the potential off site dose related to this issue and determined that the 10 CFR 100 limits are not exceeded in the maximum hypothetical accident.

Since 1995, the licensee has been evaluating options to resolve this issue. Modifications were proposed; however, they were not determined to be feasible. The licensee resolution in progress involves the revision of statements in the UFSAR and in the PRVS design description in TS section 5.2.3, to require a negative pressure in the penetration room relative to the outside only. This TS and UFSAR change request was submitted to NRR on February 10, 1997, and was being evaluated by the NRC. After this inspection, on April 6, 1998, the licensee withdrew the proposed TS and UFSAR change request. The licensee planned to resubmit the TS and UFSAR change request after resolution of CRVS issues described in this inspection report and after issuance of the Improved Technical Specifications.

In view of the low safety significance of the Unit 3 AB room 455 being at a lower pressure than the Unit 3 penetration room; DEV 50-269, 270, 287/94-24-04 is closed. To follow the completion of the licensee's TS and UFSAR change request, an inspector followup item will be opened: IFI 50-269,270,287/98-03-10, TS and FSAR Change to Resolve Design Statement That Unit 3 Penetration Room Pressure Is Lower Than The Adjacent Auxiliary Building Fan Room Pressure.

IV. Management Meeting

X1 Exit Meeting Summary

The team presented the inspection results to licensee representatives near the conclusion of the inspection, on March 19, 1998. The licensee acknowledged the findings presented, and expressed dissenting comments on two of the issues. The licensee did not agree that their procedures and practices for reportability failed to satisfy NRC requirements for timeliness (see Section O1). Also, the licensee did not agree that their use of the installed PRVS flow orifice to measure air flow failed to satisfy the refueling outage frequency TS surveillance requirement (see Section M4). A telephone re-exit was conducted on April 14, 1998, between K. Landis and R. Schin of the NRC and M. Bailey of the licensee. During that re-exit, one potential violation, for a late UFSAR change, was added to the inspection findings discussed at the March 19 exit.

Partial List of Persons Contacted

Licensee

M. Bailey, Regulatory Compliance Engineer
E. Burchfield, Regulatory Compliance Manager
D. Coyle, Engineering Special Projects Manager
W. Foster, Safety Assurance Manager
L. Hawthorne, Mechanical Systems Engineering Supervisor
J. Heminger, Mechanical Systems Engineer
E. Lampe, Operations Support Engineer
W. McCollum, Oconee Site Vice President
M. Nazar, Engineering Division Manager
J. Osborn, Nuclear Engineer
T. Saville, Nuclear Engineering Manager
J. Smith, Licensing Technician
J. Verbos, Nuclear Engineer

NRC

D. Billings, Resident Inspector
C. Ogle, Branch Chief

INSPECTION PROCEDURES USED

IP 93809, Safety System Engineering Inspection

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Type	Item Number	Status	Description and Reference
VIO	269,270,287/98-03-01	Open	Untimely Reporting of Design Issues (Section O1.1)
VIO	269,270,287/98-03-02	Open	Failure to Perform PRVS Surveillance in Accordance with TS (Section M3)
NCV	270/98-03-03	Closed	Failure to Follow M&TE Control Procedure (Section M4)

EEI	269,270/98-03-04	Open	USQ Involving Single Failure Vulnerability Introduced by 1984 CRVS Modification (Section E1.1)
EEI	269,270/98-03-05	Open	Untimely FSAR Change for 1984 CRVS Modification (Section E1.1)
IFI	269,270,287/98-03-06	Open	Design Control of Room Temperatures and Effects on Instruments (Section E1.1)
VIO	269,270,287/98-03-07	Open	Incorrect and Nonconservative Assumptions in Control Room Operator Dose Calculations (Section E1.2)
URI	269,270,287/98-03-08	Open	Licensing Basis Issues With Control Room Habitability (Section E1.3)
URI	269,270,287/98-03-09	Open	Licensing Basis Issues With Single Failure and QA For Non-Safety Equipment Required To Mitigate An Accident (Section E1.3)
IFI	269,270,287/98-03-10	Open	TS and FSAR Change to Resolve Design Statement That Unit 3 Penetration Room Pressure Is Lower Than Auxiliary Building Fan Room Pressure (Section E8)

Closed

Type	Item Number	Status	Description and Reference
DEV	269,270,287/94-24-04	Closed	Design Basis Requirement for the Penetration Room Ventilation System (Section E8)

Discussed

Type	Item Number	Status	Description and Reference

none

LIST OF DOCUMENTS REVIEWED

Procedures

AP/1/A/1700/11, Loss of Power, Revision 17

AP/2/A/1700/11, Loss of Power, Revision 21

AP/3/A/1700/11, Loss of Power, Revision 18

AP/1/A/1700/18, Abnormal Release of Radioactivity, Change 4, dated March 7, 1995

AP/3/A/1700/22, Loss of Instrument Air, Revision 9

IP/O/B/0110/3A, PRVS Pressure Instrument Calibration, revision 3

MP/O/A/1600/06, Filters - Penetration Room - Removal and Replacement, Revision 7

MP/O/A/1840/040, PRVS Fan PM, Revision 4

MP/O/A/3007/018, Air Handling - Fan - Control Room Booster - Semi-annual Preventive Maintenance, Revision 7

MP/O/A/3007/048, AHU - Operations Control Room Preventive Maintenance Quarterly, Revision 4

OP/O/A/1104/41, ABVS Operating Procedure, Revision 10

OP/O/1106/27, Compressed Air System, (with changes 31 thru 33 incorporated), Dated January 22, 1996

RP/O/B/1000/02, Control Room Emergency Coordinator Procedure, Revision 2, dated July 30, 1997

PT/1&2/A/0170/003, Control Room Pressurization System Test, Revision 4, dated August 19, 1997

PT/3/A/0170/05, Penetration Room Ventilation System (PRVS) Monthly Test, dated, July, 12, 1997

PT/3/A/0110/10, PRVS Vacuum Test, Revision 9, dated, November 6, 1997

PT/2/A/0170/05, PRVS Monthly Test, July 12, 1997

PT/1/A/0110/04, PRVS Filter Test, Revision 25, dated December 3, 1997

PT/3/A/0170/03, Control Room Pressurization Test, dated August 28, 1997

TT/O/A/0110/02, Control Room Pressurization System and Penetration Room Ventilation system Test, dated September 16, 1992

Drawings

OEE-158-13, ONS Unit 1 Elementary Diagram RB Penetration RM Vent & Sample System Pen. RM Fan 1A Discharge Valve 1/208-20/4, Revision 3

OEE-158-14, ONS Unit 1 Elementary Diagram RB Penetration RM Vent & Sample System Pen. RM. Fan 1B Discharge VLV 1/208-20/8, Revision 4

OEE-158-11, ONS Unit 1 Elementary Diagram RB Penetration RM Samp & Vent System RB Penetration RM Exhaust Fan 1A, Revision 7

OEE-158-12, ONS Unit 1 Elementary Diagram RB Penetration RM Sample & Vent System RB Penetration RM Exhaust Fan 1B, Revision 8

OEE-258-11, ONS Unit 2 Elementary Diagram RB Penetration RM Samp & Vent System RB Penetration RM Exhaust Fan 2A, Revision 4

OEE-258-12, ONS Unit 2 Elementary Diagram RB Penetration RM Samp & Vent System RB Penetration RM Exhaust Fan 2B, Revision 4

OEE-258-13, ONS Unit 2 Elementary Diagram RB Penetration RM Samp & Vent System Pen. RM. Fan 2A Discharge VLV 2/20B-20/4, Revision 4

OEE-258-14, ONS Unit 2 Elementary Diagram RB Penetration RM Samp & Vent System Pen. RM. Fan 2B Discharge VLV 2/20B-20/8, Revision 4

OEE-358-11, ONS Unit 2 Elementary Diagram RB Penetration RM Samp & Vent System Pen. RM. Exhaust Fan 3A, Revision 1

OEE-258-15, ONS Unit 2 Elementary Diagram RB Penetration RM. Samp. & Vent System Pressure Alarms, Revision 1

OEE-358-11, ONS Unit 3 Elementary Diagram RB Samp & Vent System RB Penetration RM Exhaust Fan 3A, Revision 1

OEE-358-12, ONS Unit 3 Elementary Diagram RB Samp & Vent System RB Penetration RM Exhaust Fan 3B, Revision 1

OEE-159-15, ONS Unit 1 Elementary Diagram RB Penetration RM. Sample & Ventilation System Pressure Alarms, Revision 4

OEE-158-12A, ONS Unit 1 Elementary Diagram RB Penetration RM. Ventilation System AHU Motors, Revision 0

OEE-158-12B, ONS Unit 1 Elementary Diagram RB Penetration RM. Ventilation System Chilled Water Booster Pump Motor, Revision 0

OEE-358-15, ONS Unit 3 Elementary Diagram RB Penetration RM. Samp & Vent System Pressure Alarms & VLV 3/20B-20/10, Revision 1

OEE-358-14, ONS Unit 3 Elementary Diagram RB Penetration RM Vent & Sample System Pen. RM. Fan 3B Discharge VLV 3/20B-20/8, Revision 3

OEE-358-13, ONS Unit 3 Elementary Diagram RB Penetration RM Vent & Sample System Pen. RM. Fan 3A Discharge VLV 3/20B-20/4, Revision 3

OEE-358-12B, ONS Unit 3 Elementary Diagram RB East Penetration RM Chilled Water Booster Pump Motor, Revision 0

OEE-358-12A, ONS Unit 3 Elementary Diagram RB Penetration RM. Ventilation System AHU Motors, Revision 0

OEE-258-12B, ONS Unit 2 Elementary Diagram RB Penetration RM Ventilation System Chilled Water Booster Pump Motor, Revision 0

OEE-258-12A, ONS Unit 2 Elementary Diagram RB Penetration RM Ventilation System AHU Motors, Revision 0

OEE-131-61, ONS Unit 1 Elementary Diagram Outside Air Booster Fan Motors 1A, Revision 0

OEE-131-66, ONS Unit 1 Elementary Diagram Chlorine Detector, Revision 0

OEE-131-4, ONS Elementary Diagram Chilled Water Pumps Motors A&B, Revision 6

OEE-131-33, ONS Elementary Diagram Air Handling Unit 22, Revision 3

OEE-131-35, ONS Unit 1, Elementary Diagram Chiller Compressor A, Revision 2

OEE-131-36, ONS Unit 1, Elementary Diagram Chiller Compressor B, Revision 3

OEE-331-29, ONS Unit 3, Elementary Diagram HVAC Isolation Damper Control, Revision 1

OEE-331-28, ONS Unit 3, Elementary Diagram HVAC Air Handling Unit AHU-OAC3-1, Revision 1

OEE-331-32, ONS Unit 3, Elementary Diagram Ventilation System Outside Air Booster Fan Motor "B", Revision 0

OEE-331-14, ONS Unit 3, Elementary Diagram Ventilation System Equipment Room Smoke Purge Exhaust Fan & Vent Stack Fan 3A, Revision 5

OEE-331-11, ONS Unit 3, Elementary Diagram Ventilation System Outside Air Booster Fan Motor "A", Revision 3

OEE-131-62, ONS Unit 1, Elementary Diagram Air Handling Unit AHU-34, Rev. 0

OEE-131-A, ONS Elementary Diagram Air Handling Unit 11 & 12 Duct Heaters A & B, Revision 2

OEE-131-1, ONS Unit 1, Elementary Diagram Outside Air Booster Fan Motor "1B", Revision 3

OEE-131-61, ONS Unit 1, Elementary Diagram HVAC Isolation Damper Control, Revision 1

OEE-131, ONS Elementary Diagram Air Handling Units 11 & 12 Fan Motors, Revision 1

0-2703-C, ONS Unit 3, One Line Diagram Station Auxiliary Circuits 600/208V, Revision 31

0-2703-E, ONS Unit 3, One Line Diagram Station Auxiliary Circuits 600/208V, Revision 29

0-2703-D, ONS Unit 3, One Line Diagram Station Auxiliary Circuits 600/208V, Revision 38

0-2704, ONS Unit 3, One Line Diagram Station Auxiliary Circuits 208/120 VAC, Revision 61

0-703-F, ONS Unit 1, One Line Diagram Station Auxiliary Circuits 600V, Revision 47

0-703-E, ONS Unit 1, One Line Diagram Station Auxiliary Circuits 600V, Revision 41

0-703, ONS Unit 1, One Line Diagram Station Auxiliary Circuits 600V, Revision 54

0-704-A, ONS Unit 1, One Line Diagram Station Auxiliary Circuits 208Y/120 VAC, Revision 26

0-704, ONS Unit 1, One Line Diagram 208Y/120 VAC, Revision 77

Calculations

OSC-6600, Control Room Operator Dose Due to Infiltration of Contaminated Air, Revision 1, dated January 27, 1998

OSC-6810, Steam Generator Tube Rupture Accident Dose Analysis, Revision 0, dated August 27, 1997

OSC-6922, Main Steam Line Break Analysis, Revision 0, dated July 31, 1997

OSC-6811, Rod Ejection Accident Dose Analysis, revision 0, dated December 9, 1997

OSC-7141, Loss of Cooling to Electrical Equipment and Cable Rooms, Dated March 18, 1998

OSC-4478, Steam Generator Emergency Range Level Uncertainty and EFW Low Level Actuation Setpoint, Revision 1, Dated August 22, 1991

OSC-6679 "Penetration Room Allowable Leakage", Revision 0, dated November 26, 1996

OCS-2147 "Penetration Room Pressurization Analysis", Revision 1, dated July 7, 1986

OSC-7141, "Loss of Cooling to Electrical Equipment and cable Rooms (PIP-98-1165)", Revision 0, dated March 18, 1998

OSC-4024 "Operability Evaluation for PIR 4-090-0057; PRVS In-operability Due to PR-13, PR-17 and PR-20", Revision 1, dated November 26, 1991

OSC-2790 "HVAC Calculations for Chillers A&B", Revision 0, dated March 26, 1996

OSC-6667, "Auxiliary and Turbine Building Loss of Cooling/Ventilation Analysis", Revision 1, dated August 4, 1997

Other Engineering Documents

Equipment Qualification Criteria Manual, Volume 1, Revision 12, dated February 28, 1996

DC-2.01, LOAD Assignments - Control Power Systems, Revision 1, dated September 10, 1981

RE-3.03, Relaying - Motor Control Center Breaker and Overload Heater, Revision 1

DC-3.13, Oconee Nuclear Station Cable and Control Board Separation, Revision 1

OSS-0254.00.00-1021, Design Basis Specification for the Control Room Ventilation System, Revision 4

OSS-0254.00-00-1023, Design Basis Specification for the Penetration Room Ventilation System, Revision 5

OSS-0254.00-00-4013, Design Basis Document For Single Failure Criterion

LIST OF ACRONYMS

AB	Auxiliary Building
ABVS	Auxiliary Building Ventilation System
ACGIH	American Conference of Governmental Industrial Hygenists
AHU	Air Handling Unit
ANSI	American National Standard
cfm	Cubic Feet Per Minute
CFR	Code of Federal Regulations
CRVS	Control Room Ventilation System
DBD	Design Basis Document
DEV	Deviation
EEI	Escalated Enforcement Item
EOP	Emergency Operating Procedure
EQCM	Equipment Qualification Criteria Manual
ES	Engineered Safeguards
F	Fahrenheit
GDC	General Design Criteria (of 10 CFR 50, Appendix A)
HVAC	Heating, Ventilation, and Air Conditioning
IFI	Inspector Followup Item
ILRT	Integrated Leak Rate Test
KI	Potassium Iodide
LLRT	Local Leak Rate Test
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
M&TE	Measuring and Test Equipment
MHA	Maximum Hypothetical Accident
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
NSM	Nuclear Shift Manager
OOT	Out of Tolerance
PIP	Problem Investigation Process (Report)
PRVS	Penetration Room Ventilation System
QA	Quality Assurance
SRO	Senior Reactor Operator
SRP	Standard Review Plan
SSEI	Safety System Engineering Inspection
TMI	Three Mile Island

TS	Technical Specifications
UFSAR	Updated Final Safety Evaluation Report
URI	Unresolved Item
USQ	Unreviewed Safety Question
VAc	Volts Alternating Current
VDc	Volts Direct Current
VIO	Violation
w.g.	Water Gauge

or non-supervisory employee), the significance of any underlying violation, the intent of the violator (i.e., careless disregard or deliberateness), and the economic or other advantage, if any, gained as a result of the violation. The relative weight given to each of these factors in arriving at the appropriate severity level will be dependent on the circumstances of the violation. However, if a licensee refuses to correct a minor violation within a reasonable time such that it willfully continues, the violation should be categorized at least at a Severity Level IV.

D. Violations of Reporting Requirements

The NRC expects licensees to provide complete, accurate, and timely information and reports. Accordingly, unless otherwise categorized in the Supplements, the severity level of a violation involving the failure to make a required report to the NRC will be based upon the significance of and the circumstances surrounding the matter that should have been reported. However, the severity level of an untimely report, in contrast to no report, may be reduced depending on the circumstances surrounding the matter. A licensee will not normally be cited for a failure to report a condition or event unless the licensee was actually aware of the condition or event that it failed to report. A licensee will, on the other hand, normally be cited for a failure to report a condition or event if the licensee knew of the information to be reported, but did not recognize that it was required to make a report.

V. PREDECISIONAL ENFORCEMENT CONFERENCES

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ganizational structure and the ividual's responsibilities relative to the oversight of licensed activities and to the use of licensed material.

Whenever the NRC has learned of the existence of a potential violation for which escalated enforcement action appears to be warranted, or recurring nonconformance on the part of a vendor, the NRC may provide an opportunity for a predecisional enforcement conference with the licensee, vendor, or other person before taking enforcement action. The purpose of the conference is to obtain information that will assist the NRC in determining the appropriate enforcement action, such as: (1) a common understanding of facts, root causes and missed opportunities associated with the apparent violations, (2) a common understanding of corrective actions taken or planned, and (3) a common understanding of the significance of issues and the need for lasting comprehensive corrective action.

If the NRC concludes that it has sufficient information to make an informed enforcement decision, a conference will not normally be held unless the licensee requests it. However, an opportunity for a conference will normally be provided before issuing an order based on a violation of the rule on Deliberate Misconduct or a civil penalty to an unlicensed person. If a conference is not held, the licensee will normally be requested to provide a written response to an inspection report, if issued, as to the licensee's views on the apparent violations and their root causes and a description of planned or implemented corrective actions.

During the predecisional enforcement conference, the licensee, vendor, or other persons will be given an opportunity to provide information consistent with the purpose of the conference, including an explanation to the NRC of the immediate corrective actions (if any) that were taken following identification of the potential violation or nonconformance and the long-term comprehensive actions that were taken or will be taken to prevent recurrence. Licensees, vendors, or other persons will be told when a meeting is a predecisional enforcement conference.

A predecisional enforcement conference is a meeting between the NRC and the licensee. Conferences are normally held in the regional offices and are normally open to public observation. Conferences will not normally be open to the public if the enforcement action being contemplated:

(1) Would be taken against an individual, or if the action, though not taken against an individual, turns on whether an individual has committed wrongdoing;

(2) Involves significant personnel failures where the NRC has requested that the individual(s) involved be present at the conference;

(3) Is based on the findings of an NRC Office of Investigations report that has not been publicly disclosed; or

(4) Involves safeguards information, Privacy Act information, or information which could be considered proprietary;

In addition, conferences will not normally be open to the public if:

(5) The conference involves medical misadministrations or overexposures and the conference cannot be conducted without disclosing the exposed individual's name; or

(6) The conference will be conducted by telephone or the conference will be conducted at a relatively small licensee's facility.

Notwithstanding meeting any of these criteria, a conference may still be open if the conference involves issues related to an ongoing adjudicatory proceeding with one or more intervenors or where the evidentiary basis for the conference is a matter of public record, such as an adjudicatory decision by the Department of Labor. In addition, notwithstanding the above normal criteria for opening or closing conferences, with the approval of the Executive Director for Operations, conferences may either be open or closed to the public after balancing the benefit of the public's observation against the potential impact on the agency's decision-making process in a particular case.

The NRC will notify the licensee that

The conference will be open to public observation. Consistent with the agency's policy on open meetings, "Staff Meetings Open to Public," published September 20, 1994 (59 FR 48340), the NRC intends to announce open conferences normally at least 10 working days in advance of conferences through (1) notices posted in the Public Document Room, (2) a toll-free telephone recording at 800-952-9674, (3) a toll-free electronic bulletin board at 800-952-9676, and on the World Wide Web at the NRC Office of Enforcement homepage (www.nrc.gov/OE). In addition, the NRC will also issue a press release and notify appropriate State liaison officers that a predecisional enforcement conference has been scheduled and that it is open to public observation.

The public attending open conferences may observe but may not participate in the conference. It is noted that the purpose of conducting open conferences is not to maximize public attendance, but rather to provide the public with opportunities to be informed of NRC activities consistent with the NRC's ability to exercise its regulatory and safety responsibilities. Therefore, members of the public will be allowed access to the NRC regional offices to attend open enforcement conferences in accordance with the "Standard Operating Procedures for Providing Security Support For NRC Hearings and Meetings," published November 1, 1991 (56 FR 56251). These procedures provide that visitors may be subject to personnel screening, that signs, banners, posters, etc., not larger than 18" be permitted, and that disruptive persons may be removed. The open conference will be terminated if disruption interferes with a successful conference. NRC's Predecisional Enforcement Conferences (whether open or closed) normally will be held at the NRC's regional offices or in NRC Headquarters Offices and not in the vicinity of the licensee's facility.

For a case in which an NRC Office of Investigations (OI) report finds that discrimination as defined under 10 CFR 50.7 (or similar provisions in Parts 30, 40, 60, 70, or 72) has occurred, the OI report may be made public, subject to withholding certain information (i.e., after appropriate redaction), in which case the associated predecisional enforcement conference will normally be open to public observation. In a conference where a particular individual is being considered potentially responsible for the discrimination, the conference will remain closed. In either case (i.e., whether the conference is open or closed), the employee or former employee who was the subject of the alleged discrimination (hereafter referred to as "complainant") will normally be provided an opportunity to participate in the predecisional enforcement conference with the licensee/employer. This participation will normally be in the form of a complainant statement and comment on the licensee's presentation, followed in turn by an opportunity for the licensee to respond to the complainant's presentation. In cases where the complainant is unable to attend in person, arrangements will be made for the complainant's participation by telephone or an opportunity given for the complainant to submit a written response to the licensee's presentation. If the licensee chooses to forego an enforcement conference and, instead, responds to the NRC's findings in writing, the complainant will be provided the opportunity to submit written comments on the licensee's response. For cases involving potential discrimination by a contractor or vendor to the licensee, any associated predecisional enforcement conference with the contractor or vendor would be handled similarly. These arrangements for complainant participation in the predecisional enforcement conference are not to be conducted or viewed in any respect as an adjudicatory hearing. The purpose of the complainant's participation is to provide information to the NRC to assist it in its enforcement deliberations.

A predecisional enforcement conference may not need to be held in cases where there is a full adjudicatory record before the Department of Labor. If a conference is held in such cases, generally the conference will focus on the licensee's corrective action. As with discrimination cases based on OI investigations, the complainant may be allowed to participate.

Members of the public attending open conferences will be reminded that (1) the apparent violations discussed at predecisional enforcement conferences are subject to further review and may be subject to change prior to any resulting enforcement action and (2) the statements of views or expressions of opinion made by NRC employees at predecisional enforcement conferences, or the lack thereof, are not intended to represent final determinations or beliefs.

When needed to protect the public health and safety or common defense and security, escalated enforcement action, such as the issuance of an immediately effective order, will be taken before the conference. In these cases, a conference may be held after the escalated enforcement action is taken.

VI. ENFORCEMENT ACTIONS

This section describes the enforcement sanctions available to the NRC and specifies the conditions under which each may be used. The basic enforcement sanctions are Notices of Violation, civil penalties, and orders of various types. As discussed further in Section VI.D, related administrative actions such as Notices of Nonconformance, Notices of Deviation, Confirmatory Action Letters, Letters of Reprimand, and Demands for Information are used to supplement the enforcement program. In selecting the enforcement sanctions or administrative actions, the NRC will consider enforcement actions taken by other Federal or State regulatory bodies having concurrent jurisdiction,