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ACCESSION NBR:9804100066 DOC.DATE: 98/03/30 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287

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SUBJECT: Provides info to support NRC timely review of CRVS open items focused on design,testing & operation of CRVS.Meeting to provide further info on progress of CRVS requirements will be requested in near future.

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W. R. McCollum, Jr.
Vice President

March 30, 1998

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

Subject: Duke Power Company
Oconee Nuclear Site
Docket Nos. 50-269, -270, -287
CRVS Engineering Inspection Open Items

During March 1998, NRC Region II conducted a Safety System Engineering Inspection (SSEI) on the Control Room Ventilation System (CRVS) and the Penetration Room Ventilation System (PRVS) at Oconee (ONS). Duke Energy Corporation (Duke) found this inspection beneficial in that it highlighted differences between the Oconee design and the criteria specified in the Standard Review Plan. The SSEI, along with Duke's ongoing program of performing Self Initiated Technical Audits (SITAs) of systems important to plant safety, provide a mechanism to further improve design margins at the station. The SSEI inspection and also Duke's ongoing review identified several open issues focused on the design, testing, and operation of the CRVS.

Duke recognizes that aspects of this NUREG-0737 issue have not come to closure within acceptable time frames. Duke is committed to proactively working with the NRC staff to assure that an acceptable solution can be arrived at within an appropriate time frame. Accordingly, the purpose of this letter is to provide information to support the NRC staff's timely review of the CRVS open items. In the near future, Duke will be requesting a meeting with the staff to provide further information on the progress of the CRVS improvements.

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A number of activities are already completed or are in progress to increase the design margin of the CRVS filtration, pressurization, and cooling functions. In addition, the cable and equipment room cooling system (C&ERCS) design margin will be improved by appropriate modifications and procedural enhancements.

Duke has also completed detailed operability assessments for certain issues related to the CRVS and C&ERCS. As a result of these assessments, Duke has concluded, under realistic analytical assumptions, that these systems can protect the operators and provide sufficient vital equipment cooling during all design basis accidents.

Duke believes it is important to assure that the licensing basis clearly reflects the design of the plant. Therefore, as part of the enhancements to CRVS and C&ERCS, Duke will take appropriate measures to assure that the Technical Specifications, UFSAR, and all Design Basis Documents address these systems in a consistent and complete manner.

Attachment 1 contains a description of ONS plans and commitments to improve the current design, testing, and operation of the CRVS and C&ERCS. Please note that the only commitments in this submittal are in Attachment 1. Attachment 2 includes a brief historical perspective of the CRVS licensing basis. Attachment 3 contains a summary of Oconee's understanding of the CRVS licensing basis, and Attachment 4 contains a detailed historical perspective of the CRVS licensing basis. Attachment 5 contains a comprehensive list of supporting references.

As described in Attachment 1, based on probabilistic risk assessment insights, Duke believes the proposed schedule for enhancement to the CRVS design margin is commensurate with public health and safety considerations. Duke will continue to provide further updates on the CRVS enhancement efforts, as necessary, to the staff.

If additional information is needed to support the staff's review, you may contact D. A. Nix at (864) 885-3634 or J. E. Burchfield, Jr., at (864) 885-3292.

Very truly yours,

W. R. McCollum, Jr.,
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ATTACHMENT 1

ONS PLANS TO IMPROVE CRVS AND C&ERCS

Duke is taking or has taken a number of steps to improve the CRVS and C&ERCS. In addition, Duke self-identified and assessed an operability issue associated with the C&ERCS. To gain a better understanding of the available design margin of the CRVS, Duke conservatively assessed the operability of this system assuming a single active failure. As a result of these assessments, Duke has concluded that the CRVS and C&ERCS are capable of performing their intended functions under realistic conditions.

However, Duke believes, notwithstanding the licensing basis of the systems, that the design margin of these two systems can be improved by a number of measures. Although the completion dates provided below are tentative and for information only, Duke is committed to completing all of the stated actions below within a reasonable time frame. These efforts are:

COMPLETED ACTIONS

1) Oconee has established a goal of meeting a 1/8" positive pressure assuming a worst case single active failure in the CRVS. As part of achieving this goal, smoke testing and sealing of all penetrations into the control room has been completed.

2) The use of potassium iodide tablets is an integral part of the Oconee Emergency Plan. Operator awareness training on the use and availability of potassium iodide tablets has been completed for all Operations shifts.

3) An operability assessment of the C&ERCS capability to cool vital equipment in the cable and equipment rooms has been completed. This assessment assumed the worst case single active failure. The results of this assessment concluded that sufficient cooling is provided to the Unit 3 cable and equipment rooms and the Units 1 and 2 equipment rooms. The results of this assessment also indicated that compensatory actions were necessary, via

procedural enhancements, to assure that sufficient cooling is provided to the Units 1 and 2 cable rooms. These compensatory actions have been completed to assure that the system can perform its vital equipment cooling function.

4) An operability assessment of the CRVS capability to pressurize the control room has been completed. This assessment assumed a worst case single active failure, and used realistic analytical assumptions. The realistic analytical assumptions included such items as; 1) assuming that reactor building leakage is through penetrations and not through the concrete wall, 2) assuming that 8% of the source term bypasses containment instead of 50%, 3) assuming iodine filter efficiency is ~99% instead of ~90%, 4) assuming that the source term is predominantly particulate as opposed to elemental, 5) assuming that the source term was not released instantaneously, but rather over a certain period, and 6) assuming more realistic control room occupancy factors. Although these realistic assumptions do not fully conform to the assumptions prescribed by SRP 6.4 for control room dose calculations, they are conservatively reflective of actual conditions at Oconee. The results of this operability assessment indicate that the control room dose to the operators would be less than 10CFR20 limits in the event of a design basis accident.

5) Using realistic analytical assumptions for calculating operator dose, control room actions can be maintained. Duke has also performed a review of the CRVS from a PRA/risk perspective. A review of the Oconee PRA indicates that the CRVS is not a significant contributor to core melt frequency. As a result, Duke has concluded that the schedule for enhancing CRVS design margin is commensurate with public health and safety considerations.

PLANNED ACTIONS

1) The potential failure of the common booster fan damper power supply breaker will be eliminated by performing the

appropriate modification. This modification is scheduled to be completed by April 1998.

2) To meet the 1/8" positive pressure assuming a worst case single active failure in the CRVS, sealing of all supply duct joints, and removal of sheet rock to seal all control room walls are scheduled to be completed by May 1998.

3) Duke will more accurately determine filtration bypass air in-leakage into the CRVS supply ducting by performing tracer gas testing. The results of this testing will be appropriately incorporated into the control room dose calculation. The tracer gas testing is scheduled to be completed by November 1998.

4) The CRVS and C&ERCS Systems will be reviewed to determine which 10CFR50 Appendix B quality assurance criteria should be applied. This review will be performed as part of the Oconee Safety Related Designation Clarification (OSRDC) Project.

5) As a result of the operability evaluation associated with the C&ERCS cable and equipment room cooling function, Duke concluded that a nonconformance exists with UFSAR Section 3.11.4. This UFSAR nonconformance is scheduled to be resolved by October 1998, by performing appropriate plant modifications.

6) A single failure modes and affects analysis of the CRVS and C&ERCS is scheduled to be completed by May, 1998. This analysis will assume the worst case <u>active</u> single failure, and will assume power restoration to load shed components.

7) Upon completion of the above activities, Duke will revise the Technical Specifications, UFSAR, and all appropriate supporting design documents to appropriately reflect the proposed enhancements to the CRVS design margin and assure consistency among these documents.

ATTACHMENT 2

CONDENSED HISTORICAL PERSPECTIVE OF
CRVS LICENSING AND DESIGN

The following description provides a brief historical overview of the licensing and design of the Oconee Control Room Ventilation System (CRVS). A detailed description of this history is provided in Attachment 4.

The original design of the CRVS consisted of a cooling and recirculating ventilation system portion (cooling fans) and an outside intake and filtration portion (booster fans). The cooling fans supplied the control room, cable room, and equipment room under all operating conditions. The booster fans were started in the event of an accident which could jeopardize habitability of the control room.

The cooling fans discharged air into the control room. This air flow then progressed to the cable room, equipment room, and back to the suction of the cooling fans. Therefore, the original licensing basis included air communication between the control room, cable room, and equipment room, for each unit. Control room, cable room, and equipment room cooling, and control room filtration were addressed, but control room pressurization was not addressed in the original licensing basis of Oconee.

After the Three Mile Island Unit 2 (TMI-2) event in early 1979, the NRC issued NUREG-0737. NUREG-0737 provided the nuclear industry a series of long term corrective actions based on lessons learned from the TMI-2 event. NUREG-0737, Section III.D.3.4 addressed the CRVS. Section III.D.3.4 referenced 10CFR50 Appendix A General Design Criterion (GDC) 19 for design limits, and NUREG-0800 Standard Review Plan (SRP) Section 6.4 for design standards. NUREG-0737, Section III.D.3.4 requested that licensees provide a description of their CRVS design, and any proposed modifications, to the NRC staff for review.

As a result of interactions with the NRC staff on the CRVS design, Duke recognized the need to enhance the capability of the CRVS to pressurize the control room. Therefore, in the early 1980's, several modifications were performed to

separate the control room atmosphere from the cable and equipment rooms on each unit, and to install separate fans to serve the cable and equipment rooms, as appropriate. In addition, efforts were undertaken to increase the air tightness of the control rooms.

After a number of interactions with the staff regarding the CRVS design and operation, in 1986, the NRC issued a safety evaluation report (SER) on the Oconee CRVS. The 1986 SER closed most of the CRVS open items. However, the 1986 SER concluded that the positive pressures which were measured in the Oconee control rooms did not appear to contain sufficient margin to assure iodine doses to the operators could be minimized over the life of the plant. Also, the staff concluded that the control room intakes should be relocated. Moving the control room intakes would provide greater atmospheric dispersion for the purposes of calculating doses to the skin and whole body. As a result, after some 1987 studies, Duke agreed to relocate the control room intakes. Duke requested NRC staff review of the proposed control room intake modifications.

In 1988, Duke submitted a proposed CRVS technical specification which contained limiting conditions for operation and the appropriate surveillance testing. The technical specification surveillance testing criterion required that two trains of CRVS operate to maintain a positive pressure in the control room.

In 1989, the NRC issued an SER approving the proposed CRVS technical specifications. In addition, a letter was issued which closed NUREG-0737 Item III.D.3.4 for Oconee, deferred review of the iodine dose calculation methodology, and stated that "the NRC staff is in the process of developing a new criteria and methodology for evaluating control room habitability issues which may lead to the conclusion that the proposed relocation of the control room intake is unnecessary".

In 1996, a proposed technical specification amendment for the Penetration Room Ventilation System (PRVS) was submitted to the NRC staff. Due to the potential impact of the PRVS on the CRVS, both the NRC staff and Duke realized the need to revisit the Oconee control room dose calculation methodology. As a result, Oconee has incorporated some of

the new methodology as recommended by the staff, and has continued to interface with the staff on the CRVS and control room dose calculations.

ATTACHMENT 3

ONS UNDERSTANDING OF
CRVS LICENSING BASIS

1) Control room pressurization was not considered a single failure design acceptance criterion in the original licensing of Oconee's CRVS. The issue of control room pressurization at Oconee was raised as a result of the TMI-2 event.

2) The CRVS was not designed or licensed to maintain a positive pressure in the control room assuming a single failure.

3) The CRVS is required to maintain a positive pressure in the control room assuming no single failure. This requirement is verified by technical specifications. A goal of 1/8" W.G. was specified by the NRC staff. However, achieving this level of control room pressurization was not a requirement.

4) If the CRVS is not licensed or designed to take a single failure, then a single failure should not be assumed in the control room dose analysis. Failures which are not within the licensing basis are generally not assumed in plant analyses and calculations.

5) The control room, equipment room, and cable room ventilation and cooling systems are required to maintain adequate cooling to the vital equipment in these areas assuming a single active failure. This position is based on the Oconee UFSAR, Section 3.11.4.

6) The CRVS System is presently not in Oconee's 10CFR50 Appendix B QA program (QA-1) as described in the Oconee UFSAR, Section 3.1.1, and as further supported by Reference (13).

7) GDC 19 does not not apply to Oconee, since its construction permit was issued prior to the effective date of the General Design Criteria. Oconee's CRVS is designed and licensed to meet 10CFR20 limits as described in UFSAR Section 3.1.11.

ATTACHMENT 4

DETAILED HISTORICAL PERSPECTIVE OF CRVS LICENSING AND DESIGN

The Control Room Ventilation System (CRVS) is briefly addressed in the Oconee licensing basis prior to the Three Mile Island Unit 2 (TMI-2) event. In the 1972 NRC Safety Evaluation Report (SER) for the Oconee High Energy Line Break analysis (Ref. 1), Item #12 states that "Assurance should be provided that the control room will be habitable and its equipment functional after a steam line or feedwater line break."

The original Oconee FSAR (Ref. 29) contains a brief description of the CRVS in Sections 1A.11, 7.1.1.7, and 9.8.2.2. These FSAR sections do not address the CRVS single failure requirements from a pressurization standpoint. The following FSAR statement may imply some type of single failure design:

> "the control room is served by two separate 100 percent capacity low pressure fan-duct systems shown in Figure 9-13, composed of outside air filter unit, roughing filters, chilled water coil, fan, electric heater and duct system."

However, there is evidence, based on the differences between the original Technical Specification 4.12 (Ref. 32) and the 1989 version of Technical Specification 4.12 (Ref. 33), that the "100 percent capacity" was intended to apply only to the control room filtration capability, and not to the control room pressurization capability. The original (pre-TMI-2) version of Specification 4.12 is only applicable to control room "filtration" requirements, whereas the 1989 version of Specification 4.12 was applicable to both "filtration and pressurization." Accordingly, the statement in the Bases was changed from "100 percent capacity" to "50 percent capacity" in reference to the CRVS trains.

Therefore, after TMI-2, when control room pressurization became an issue, Duke realized that the

trains could no longer be considered 100 percent capacity trains. The early licensing basis indicates that control room pressurization capability was not considered in the original design of the CRVS. Therefore, the original licensing basis (established prior to TMI-2) provides some evidence that the CRVS was intended to be single failure proof with respect to control room filtration and cooling, but not with respect to control room pressurization.

After the TMI-2 event in 1979, the NRC issued NUREG-0578, Short Term Corrective Actions from TMI-2 Event (Ref. 2). NUREG-0578 required, in part, that:

> "The licensee should provide protection for technical support center personnel from radiological hazards including direct radiation and airborne contaminants as per General Design Criterion (GDC) 19 and Standard Review Plan (SRP) 6.4." (Ref. 34)

The Duke Response #1 (Ref. 3) to NUREG-0578 addresses control room habitability. In this 1979 response, Duke states that "A review is in progress to determine post-accident radiation levels throughout the station." This response further states in part that Duke will implement appropriate changes based on the results of this review.

As a result of the review described in Duke Response #1 to NUREG-0578, Duke determined, under the conservative assumptions for calculating control room dose per SRP 6.4, that GDC 19 thyroid dose limits would be exceeded. This event was reported to the NRC in Reportable Occurrence Report (RO) 269/80-1 (Ref. 4). RO-269/80-1 noted, however, that under "more realistic assumptions," the GDC 19 limits would not be exceeded. RO-269/80-1 also stated that "the design of Oconee Nuclear Station pre-dates General Design Criterion 19".

NUREG-0737 was issued in November 1980. It contained the long-term, more detailed corrective actions as a result of the TMI-2 event. NUREG-0737, Section III.D.3.4 provides a detailed NRC position on the requirements for control room habitability. All licensees were required to respond to this NRC staff position. Section III.D.3.4 recognized that

licensees fell into three categories of conformance: 1) licensees who were licensed to both SRP 6.4 and GDC-19, 2) licensees who were licensed to GDC-19 but not to SRP 6.4, and 3) licensees who were not licensed to GDC-19 or SRP 6.4. Oconee fell under the third category because Oconee construction and licensing pre-dated SRP 6.4. GDC 19 does not not apply to Oconee, since its construction permit was issued prior to the effective date of the General Design Criteria.

For plants in the third category as described in NUREG-0737, the NRC required that the "licensee should submit sufficient information needed for an independent evaluation (by the NRC staff) of the adequacy of the habitability systems."

Duke's January 1981 response (Ref. 6) to NUREG-0737, Section III.D.3.4 does not address the ability to cope with a single failure. However, one statement in Duke's response strongly suggests that the system is not single failure proof: "There are two 50% capacity filter trains." It is also stated that "The CRVS was designed and installed in accordance with HVAC industry standards and practice for commercial and industrial type systems." Duke Response #1 also acknowledged that significant unfiltered bypass inleakage, i.e., greater than 2700 cfm, existed to the control room. Response #1 also identifies a corrective action regarding control room pressurization as follows:

> "The first step in resolving problems associated with the Control Room HVAC Systems is to modify the system and Control Room to maintain a positive pressure in the area with respect to adjacent areas. The positive pressure would be maintained when the outside air filter trai<u>ns</u> are started... Also, an extensive effort will be made to identify and seal leak paths from the Control Room to adjacent areas."

The NRC replied to Duke Response #1 to NUREG-0737 in a February 1981 Request for Additional Information (RAI) #1 (Ref. 7). In RAI #1, the NRC staff stated that Duke did not

provide sufficient information in Duke Response #1 on several aspects of the CRVS to support completion of the independent review. RAI #1 stated in part that inadequate information was provided with respect to SRP Section 6.4. SRP Section 6.4, Part II.2, required that "a single failure of an active component should not result in the loss of the (ventilation) system's functional performance." This NRC staff position redefined "functional performance" for the Oconee CRVS as the ability to filter and pressurize the control room.

In the April 1982 Duke response to NRC RAI #1 (Ref. 8), Duke stated in part that the NRC required a response to NUREG-0737 regardless of conformance to SRP 6.4, and, accordingly, Duke had provided this response as requested. Duke further asserted that sufficient information was provided as requested by NUREG-0737. However, Duke requested in the response to RAI #1 that "specific areas be identified" to assist Duke in providing the information necessary for the NRC staff to complete its review of control room habitability.

In a November 1982 report, Duke provided the NRC staff with a status of the modifications associated with in-leakage reduction, toxic gas detection, and lead shielding (Ref. 9), but did not address the CRVS single failure issue.

In March 1983, the NRC issued an Order (Ref. 36) to Oconee regarding NUREG-0737 activities. This NRC Order was issued "confirming (the licensee's) commitments" for each NUREG-0737 activity. NUREG-0737 Section III.D.3.4, Control Room Habitability, is addressed as follows:

> "As a result of the licensee's review, three areas were identified for possible modifications: air in-leakage, lead shielding and chlorine and toxic gas detection. Further tests and evaluations now indicate that total isolation and sealing to prevent all in-leakage is neither practical or necessary. The installation of lead shielding is complete. The need for toxic gas detection is being reevaluated and appropriate modifications, if any,

> will be identified and a schedule for installation will be provided."

In addition, Attachment 2 of the NRC Order states that the schedule for Item III.D.3.4 is "to be determined by the licensee," and the requirement is "modify the facility as identified by licensee study." The status of the item schedule is listed as "complete." The NRC Order does not specifically address SRP 6.4, GDC-19, or single failure requirements.

In late 1983, Duke addressed several NRC staff concerns regarding the ongoing review of Oconee's CRVS (Ref. 10). One of the concerns was:

> "The Unit 1 and 2 control room was not able to achieve a positive pressure. The Unit 3 control room, as stated in previous correspondence, has the capability of achieving a slight positive pressure. Testing of the Unit 1 & 2 control room showed that after adjustment of some penetrations leading from the control room, the pressure of the room can be raised from -.06 to -.01 psig. Other tests and inspections resulted in the conclusion that there was no single point of gross leakage. This is not surprising realizing the fact that the control room was not originally built to be airtight and subsequent modifications due to security, safety, habitability, or other requirements lessened the possibility of obtaining positive pressure. While studying this situation, several modifications are planned."

As a result, Duke agreed to perform further sealing modifications on the Oconee control rooms by mid-March, 1984. In addition, Duke agreed to perform a design review to determine if fan capacities or damper replacements might enhance the ability to achieve a positive pressure in the control rooms. The ability to withstand a single failure as a design requirement was again not described in this late 1983 letter.

In late 1983, Generic Letter (GL) 83-37 (Ref. 11) was issued to all licensees. This GL required licensees to submit technical specifications to cover the systems addressed by NUREG-0737. The CRVS was one of these systems which required a technical specification. The sample technical specification provided in GL 83-37 does not specifically address the control room pressurization issue, nor does it provide any information regarding CRVS single failure requirements.

In early 1984, via RAI #2 on Item III.D.3.4 of NUREG-0737 (Ref. 12), the NRC staff provided specific questions to Duke on the Oconee CRVS. Question #1 of this RAI requested:

> "Justification for all active components of the proposed control room emergency ventilation system (such as fans, isolation dampers, chillers, and radiation monitors) that will not be redundant and/or single failure proof following the proposed modifications."

Question #5 of this RAI requested that Duke:

> "Provide an analysis of control room operator doses following postulated design basis accidents. It may be necessary to look at DBAs other than a LOCA if the radiation release point is closer than that for LOCA to the control room air intake. The analysis should include a detailed listing of date and assumptions used, as well as the results."

In the April 1984 Duke response to NRC RAI #2 (Ref. 13), Question #1, Duke states that the redundancy of the CRVS will continue to meet FSAR Section 9.4.1. FSAR Section 9.4.1 addresses CRVS redundancy as follows:

> "Since outside air is introduced to the control room from the single outside air intakes through two 50 percent capacity outside air filter trains, failure of a

> single filter train would result in a reduced capacity to maintain control room pressurization. Dose control for this case depends upon occupancy and respirator use."

In the Duke response to NRC RAI #2, Question #5, Duke provides its first detailed description of the control room dose analysis. In this description, Oconee states that for the control room, "unfiltered infiltration flow rate assumed for the control room following a MHA (is) 10 cfm (per SRP 6.4, as referenced)." This assumption was made with the understanding that completed modifications to the control room and CRVS had established the capability to achieve a positive pressure in the control room.

The Duke reply to NRC RAI #2 also contained detailed design information of the Oconee CRVS including drawings, flow-rates, and calculations. In response to Question #4 of NRC RAI #2, Duke notes in part that "none of the Control Room HVAC loads are safety-related."

In mid 1984, the NRC staff requested additional information from Oconee via NRC RAI #3 on Item III.D.3.4 of NUREG-0737 (Ref. 14). Question #1 of RAI #3 requested general information about the single failure design of the Oconee CRVS. In addition, Question #3 of RAI #3 requested that Duke provide a control room dose analysis assuming loss of one of the "50% capacity filter trains."

In the October 1984 Duke reply to NRC RAI #3 (Ref. 15), Duke reiterated its previous position regarding the CRVS single failure issue and CRVS design:

> "Oconee Nuclear Station, an early 1970's vintage plant, consists of a control room ventilation system that was designed and installed in accordance with HVAC Industry Standards and practice for commercial and industrial systems at that time. However, the proposed modifications to the control room ventilation systems will maintain redundancy capabilities as currently addressed in Section 9.4.1 of the Oconee

FSAR."

The Oconee FSAR at that time (1982 Update) did not contain information regarding CRVS single failure or pressurization requirements. The FSAR continued to address the trains as "50% capacity filter trains."

In response to Question #2 of NRC RAI #3, pertaining to failure of a 50% capacity train, Duke states:

> "With the completion of the proposed modifications, failure of one of the 50% capacity outside air filter trains would result in a reduced capacity to maintain control room pressurization, but would not eliminate a pressurized control room. With the single outside air handling unit supplying positive pressurization flow, the unfiltered inleakage rate should not significantly deviate from that previously assumed, i.e., 10 cfm."

However, following completion of the proposed modifications, subsequent correspondence in 1985 revealed that neither Duke nor the NRC staff were convinced that control room pressurization capability could be achieved using only one 50% filtration train. Therefore, the above response to Question #2 is not an NRC commitment since it was superseded by future correspondence pertaining to the CRVS.

In late 1984, in a request for an NRC/Duke meeting (Ref. 16), the NRC requested information regarding damper single failures and their affect on the ability to maintain a positive pressure in the control room. Question #1 of the meeting request reads:

> "The functional ability of the CRVS should be discussed including single failure considerations (e.g., what effect would the failure of a single isolation damper have on control room emergency conditions). Can the control room be isolated assuming single

failures in isolation dampers? How do the single failures in the ventilation system affect control room habitability for both toxic gas and radiological releases?"

In addition, Question #4 of the NRC meeting request asks if the control room temperatures can be maintained assuming a single failure of one of the "50% capacity filter trains."

By early 1985, Duke had not responded via the docket to the questions in the NRC meeting request. As a result, the NRC staff met with Duke management at Oconee for two days to discuss the CRVS design and operation. Following this meeting, the NRC sent an April 1985 letter to Duke (Ref. 17) which summarized the Staff's position on the Oconee CRVS:

> "On February 12 and 13, 1985, the Commission staff met with members of your staff at ONS to discuss "Control Room Habitability". The Commission staff requested this meeting with Duke to resolve open items and obtain additional information for questions or areas of concern that served as the agenda for the meeting. As a result of the information presented at this meeting, both the Commission and the Duke staff had to pursue further action."

The Staff Position further states that:

> "as a result of the meeting, the Commission staff gained a clearer understanding of Oconee's control room habitability systems, its configuration, and unique problems. The staff committed to send Duke the staff position which we have enclosed with this letter."

The Staff Position was provided as follows:

" 1) Licensee representatives have stated that they are unable to maintain a positive pressure in the Unit 1 and 2 control room and that only a slightly positive pressure (<< 1/8 inch) can be maintained in the Unit 3 control room. Therefore, Oconee currently lacks the ability to mitigate unfiltered contaminants from entering the control room following accidents, as assumed in dose calculations.

2) Single failures in the habitability systems at Oconee may well significantly degrade the protection afforded operators; and,

3) There are no Technical Specification requirements concerning surveillance on the control room habitability systems, including the booster filters and control room periodic pressure tests.

Because the staff finds that the existing systems and proposed modifications fall far short of the level of protection that should be afforded the operators, the staff takes the following position. The licensee should:

1) a) Continue to increase the "leak tightness" of the control room ... with the objective of achieving a pressurization capability of 1/8 inch W.G. with the currently installed "booster system";

b) Perform a single failure modes and effects analysis demonstrating the effects of single failures on the ability to maintain the positive pressure that would be achieved with no such failures and both booster fans in

operation;

c) Perform dose calculations using leakage characteristics corresponding to a worst-case single failure determined in item (b) above. The calculation should follow ... SRP Section 6.4 ... additional unfiltered inleakage should be assumed in the calculation if the control room cannot be maintained at a pressure greater than or equal to 1/8 inch W.G. with a single failure. With respect to damper failure, repair could be credited by using the criteria for valve or damper repair alternative in SRP Section 6.4, Appx A; and,

d) Propose appropriate surveillance requirements in accordance with standard technical specifications, as requested in GL 83-37."

The staff position states, in Item (1a), that it should be an objective for Oconee to achieve a 1/8 inch W.G. pressure in the control room. An internal Duke memorandum which documented an NRC/Duke conference call (Ref. 35) regarding the Staff Position also provides further evidence that Item (1a) did not require that the Oconee CRVS achieve 1/8 inch W.G. pressure, but that Oconee should try to achieve this level of pressurization. Essentially, the NRC staff position acknowledges that the CRVS may be vulnerable to single failures, however, these single failures should be accounted for in the dose analysis.

In May and June 1985, Duke provided two responses (Refs. 18, 19) to the NRC Staff position. In the Duke Response #2 to the Staff Position, Duke demonstrated, through a one-time test, that a positive pressure could be maintained in the control room (relative to adjacent zones) assuming single failures of the booster fans/50% capacity filter trains, and single failures of dampers. In response to the NRC Staff Position requiring a single failure modes and effects analysis, Duke states that:

> "testing of the Control Room HVAC System was also performed to determine what affect failure of single components would have on the ability to pressurize the control room. Part of the test was performed with only one of the filter trains and booster fans operating and all other components operating correctly. The control room was still positive with respect to adjacent spaces. Secondly, a single isolation damper was failed, i.e., locked open but with both filter trains and booster fans operating. The control room was still pressurized. Comparing the single failure testing, it appears that the worst case single failure would be the loss of one of the filter trains and booster fans."

In the Response #2 to the Staff Position, Duke also provided the requested dose analysis and committed to provide technical specifications to address the CRVS. This was the second occasion that the Oconee control room dose analysis was provided on the docket. The docketed dose analysis description does not state the assumption for control room filtration bypass inleakage, nor does the description of the dose analysis address single failure assumptions. A historical review of Oconee's control room dose calculations indicates that Duke continued to assume no single failure and continued to assume the 10 cfm infiltration bypass inleakage per SRP 6.4. The dose analysis was "discussed with the (NRC) staff prior to submittal." The results of the dose analysis indicated that skin doses were less than the limits specified in SRP 6.4, and the 30-day control room operator dose was less than GDC-19 skin and whole-body dose limits.

Following a review of all the previous Duke CRVS correspondence, the NRC issued its first Safety Evaluation Report (SER) in November 1986, (Ref. 20), on Oconee's CRVS. In page 2 of the SER, the NRC states:

> "With regard to radiation protection for

> the control room operator... the licensee presented the results of tests that were performed to demonstrate the ability to pressurize the control room under differing HVAC operating conditions to prevent unacceptable radioactive contamination inleakage following a LOCA. Generally, the control room could be pressurized to a level of one-sixteenth of an inch water gauge or less with a single failure of a booster fan or of a damper. With two booster fans and the main air handling unit in operation, positive pressures of between 0.08 inches and 0.14 inches water gauge were measured. A positive pressure in the control room is needed to assure that no flow will bypass the control room ventilation filters... The positive pressures measured during the test do not provide enough margin to assure that there would be no unfiltered infiltration over the life of the plant."

Following this NRC SER, no further dialogue occurred pertaining to CRVS single failure requirements. However, the application of single failure requirements potentially impacts the control room dose analysis. As a result of the NRC review of the Oconee CRVS information, the NRC concluded that

> "to reduce the doses to the control room operators, the control room intake should be located further away from the containment building than the present seven meter distance and the control room leakage paths should be tightened."

In this SER, the NRC also/deferred review of the thyroid dose analysis pending consideration of a new source term by the NRC staff.

In Response #1 to the NRC SER, (Ref. 21), Duke proposed

"to conduct a test program to develop site specific atmospheric dilution factors in lieu of relocating the (control room) intake structure." After approximately 6 months of reviewing this option, in August 1987, in Response #2 to the NRC SER (Ref. 22), Duke informed the NRC staff that "the Units 1 and 2 control room intake and the Unit 3 control room intake should be relocated." Duke requested NRC concurrence with this proposal prior to commencing with the modification.

By January 1988, Duke submitted the proposed technical specifications for the CRVS (Ref. 23). In the proposed CRVS technical specification submittal, Duke proposed a surveillance requirement as follows for the CRVS:

> "On a refueling frequency, verify the system maintains the control room at a positive pressure with both outside air booster fans on during system operation."

In addition, the Bases of Section 4.12 of the proposed new CRVS technical specification again contained the statement that "The (CRVS) is designed with two 50% capacity filter trains."

In early 1989, Duke submitted Supplement #1 to the proposed CRVS technical specification (Ref. 24). Supplement #1 contained further information in support of the proposed CRVS technical specifications. Supplement #1 acknowledges that "technical issues," such as thyroid dose, continued to remain open regarding the Oconee CRVS. However, Duke continued to assert that "this (CRVS) system was not designed with the intent of meeting GDC-19."

In mid 1989, the NRC issued an SER (Ref. 25) for the Oconee CRVS Technical Specifications 3.15 and 4.12. The NRC approved the specifications which contained the surveillance requirement to measure a positive pressure in the control room using both trains of CRVS. The NRC in part stated that even though technical issues, such as thyroid dose, remained open, the specifications impose additional surveillance and shutdown requirements for the system, and are therefore conservative.

After further review of the open technical issues, an NRC letter (Ref. 26) was issued in December, 1989, regarding the proposed control room intake relocation modification. This 1989 NRC letter stated that "the NRC staff is in the process of developing a new criteria and methodology for evaluating control room habitability issues which may lead to the conclusion that the proposed relocation of the intake is unnecessary." As a result, the 1989 letter closed NUREG-0737, Item III.D.3.4, Control Room Habitability, and stated that:

> "any action required on (Oconee's) part concerning the control room ventilation system as a result of the new criteria will be treated as a separate issue."

In 1996, Duke submitted a proposed technical specification amendment for the Penetration Room Ventilation System (PRVS) (Ref. 27) to the NRC staff. Due to the potential impact of the PRVS on the CRVS, both the NRC staff and Duke realized the need to revisit the Oconee control room dose calculation methodology. As a result, Oconee has incorporated some of the new methodology as recommended by the staff, and has continued to interface with the staff on the CRVS and control room dose calculations.

ATTACHMENT 5

REFERENCES

1) NRC Safety Analysis Report for Oconee Unit 1, Supplement 2, Appendix E, "General Information Required for Consideration of the Effects of a Piping System Break Outside Containment", dated December 19, 1972.

2) NUREG-0578, TMI Lessons Learned Task Force, Status Report and Short-Term Recommendations, dated July 1, 1979.

3) Letter from W. O. Parker, Jr., Duke Power Company, to H. R. Denton, USNRC, dated November 21, 1979, Supplemental Response to NUREG-0578.

4) Letter from W. O. Parker, Jr., Duke Power Company, to J. P. O'Reilly, USNRC, dated February 5, 1980, Event Report RO-269/80-01, regarding the Oconee Control Room Habitability Analysis.

5) NUREG-0737, Clarification of TMI Action Plan Requirements, Section III.D.3.4, dated November, 1980

6) Letter from W. O. Parker, Jr., Duke Power Company, to H. R. Denton, USNRC, dated January 2, 1981, Response #1 to NUREG-0737 items, with Enclosure (10), response to Item III.D.3.4, Control Room Habitability.

7) Letter from J. F. Stoltz, USNRC, to W. O. Parker, Jr., Duke Power Company, dated February 11, 1981, Request for Additional Information (RAI) #1 for Item III.D.3.4.

8) Letter from W. O. Parker, Jr., Duke Power Company, to H. R. Denton, USNRC, dated April 5, 1982, Response to RAI #1, regarding Item III.D.3.4, Control Room Habitability.

9) Letter from H. B. Tucker, Duke Power Company, to H. R. Denton, USNRC, dated November 15, 1982, Status Report on NUREG-0737 items.

10) Letter from H. B. Tucker, Duke Power Company, to H. R. Denton, USNRC, dated September 22, 1983, Response to information informally transmitted to Duke containing

questions about Item III.D.3.4, Control Room Habitability.

11) Generic Letter 83-37, NUREG-0737 Technical Specifications, dated November 1, 1983.

12) Letter from J. F. Stoltz, USNRC, to H. B. Tucker, Duke Power Company, dated March 20, 1984, RAI #2 for Item III.D.3.4.

13) Letter from H. B. Tucker, Duke Power Company, to H. R. Denton, USNRC, dated April 20, 1984, Response to RAI #2 on NUREG-0737 Item III.D.3.4, Control Room Habitability.

14) Letter from J. F. Stoltz, USNRC, to H. B. Tucker, Duke Power Company, dated August 17, 1984, RAI #3 for Item III.D.3.4.

15) Letter from H. B. Tucker, Duke Power Company, to H. R. Denton, USNRC, dated October 5, 1984, Response to RAI #3 regarding Item III.D.3.4, Control Room Habitability.

16) Letter from J. F. Stoltz, USNRC, to H. B. Tucker, Duke Power Company, dated December 26, 1984, Meeting Agenda with Questions regarding NUREG-0737, Item III.D.3.4, Control Room Habitability.

17) Letter from J. F. Stoltz, USNRC, to H. B. Tucker, Duke Power Company, dated April 15, 1985, Summary of February 12-13, 1985 NRC/Duke Meeting regarding NUREG-0737, Item III.D.3.4, Control Room Habitability, with NRC Staff Position.

18) Letter from H. B. Tucker, Duke Power Company, to H. R. Denton, USNRC, dated May 1, 1985, Response to NRC Staff Position regarding Item III.D.3.4, Control Room Habitability.

19) Letter from H. B. Tucker, Duke Power Company, to H. R. Denton, USNRC, dated June 24, 1985, Followup Response to NRC Staff Position regarding Item III.D.3.4, Control Room Habitability with CRVS pressurization test results.

20) Letter from J. F. Stoltz, USNRC, to H. B. Tucker, Duke Power Company, dated November 24, 1986, NRC Safety

Evaluation Report and Final Staff Position regarding NUREG-0737, Item III.D.3.4, Control Room Habitability.

21) Letter from H. B. Tucker, Duke Power Company, to USNRC, dated January 8, 1987, Response #1 to NRC SER regarding Item III.D.3.4, Control Room Habitability.

22) Letter from H. B. Tucker, Duke Power Company, to USNRC, dated August 14, 1987, Response #2 to NRC SER regarding Item III.D.3.4, Control Room Habitability.

23) Letter from H. B. Tucker, Duke Power Company, to USNRC, dated January 6, 1988, Proposed Technical Specification Amendment for Control Room Habitability System.

24) Letter from H. B. Tucker, Duke Power Company, to USNRC, dated May 17, 1989, Proposed Technical Specification Amendment, Supplement #1, for Control Room Habitability System.

25) Letter from L. A. Wiens, USNRC, to H. B. Tucker, Duke Power Company, dated June 6, 1989, Safety Evaluation and Issuance of Technical Specification Amendment 174, 174, 171, for Control Room Habitability System.

26) Letter from L. A. Wiens, USNRC, to H. B. Tucker, Duke Power Company, dated December 7, 1989, regarding Oconee Nuclear Station Control Room Habitability Analysis.

27) Letter from J. W. Hampton, Duke Power Company, to USNRC, dated February 10, 1997, Proposed Technical Specification Amendment for Penetration Room Ventilation System.

28) Internal NRC Memorandum from D. E. LaBarge, USNRC, to H. N. Berkow, USNRC, documenting July 21, 1997 NRC/Duke Conference Call on Control Room Habitability Analysis issues.

29) Original Oconee Final Safety Analysis Report, Units 1, 2, and 3, Sections 1A.11, 7.1.1.7, and 9.8.2.2

30) Oconee Updated Final Safety Analysis Report, 1982 Update, Sections 3.1.11, 3.11.4, 6.4, and 9.4.1.

31) Oconee Updated Final Safety Analysis Report, 1996 Update, Sections 3.1.1, 3.1.11, 3.11.4, 6.4, and 9.4.1.

32) Oconee Technical Specifications, Section 4.12, through Amendment 3/3/0, dated July 19, 1974, for Units 1, 2, and 3, respectively.

33) Oconee Technical Specifications, Sections 3.15 and 4.12, through Amendment 174/174/171, dated June 6, 1989, for Units 1, 2, and 3, respectively.

34) NUREG-0800, Standard Review Plan, Revision 2, dated July 1981, Section 6.4.

35) Internal Duke Memorandum dated April 19, 1985, documenting NRC/Duke Conference Call on March 27, 1985, prior to providing docketed NRC Staff position on Oconee CRVS.

36) Letter from John F. Stoltz, USNRC, to H. B. Tucker, Duke Power Company, dated March 18, 1983, regarding NUREG-0737 Implementation Order.