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 RECIP. NAME: REGION 2, Atlanta, Office of the Director

SUBJECT: LER 80-001/01T-0: on 800108, during NUREG-0578 review, discovered control room habitability analysis error omitting airborne activity contribution to dose to control room operators. Realistic analysis verified dose acceptable.

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DUKE POWER COMPANY
OCONEE NUCLEAR STATION

Report Number: RO-269/80-1

Report Date: February 5, 1980

Facility: Oconee Unit 1, 2 and 3, Seneca, South Carolina

Identification of Occurrence: Control Room Airborne Activity not Considered
in Maximum Hypothesis Accident Analysis of
Control Room Habitability

Conditions Prior to Occurrence: Unit 1 Refueling
Unit 2 100% FP
Unit 3 100% FP

Description of Occurrence:

Although the design of Oconee Nuclear Station pre-dates General Design Criterion 19 of Appendix A to 10CFR50, Control Room post-accident exposures were a design consideration. Section 1A.11 of the Oconee Nuclear Station Final Safety Analysis Report states that 10CFR20 dose limits were used as guidelines for acceptable Control Room exposures. This is interpreted to mean a maximum whole body dose of less than 3 rem within 90 days. A search of Oconee Nuclear Station files was unable to provide verification that airborne radioactivity was included in the calculation of Control Room exposures. As a result, Control Room dose calculations were performed for airborne radioactivity as a follow-on to our shielding analysis performed to satisfy requirement 2.1.6.b of NUREG-0578. Criteria are outlined in Standard Review Plan 6.4. Dose criteria are:

1. whole body gamma dose from all sources of direct radiation should be <5 rem,
2. skin dose should be <30 rem, and
3. thyroid dose should be <30 rem.

Being unable to verify the inclusion of airborne radioactivity in the initial Control Room dose calculations and finding the recently calculated Control Room doses to exceed Oconee design criterion 11 (Section 1A.11, Oconee Nuclear Station FSAR) and GDC 19, Duke reported this discovery to the NRC under the provisions of Oconee Nuclear Station Technical Specification 6.6.2.1.a (8). This report deals only with exposures due to airborne radioactivity. Shielding concerns are being handled as a NUREG-0578 response.

Analysis of Occurrence:

Using the Control Room dose model presented in K. G. Murphy's paper "Nuclear Plant Control Room Ventilation System Design for Meeting General Design Criterion 19," a post-accident Control Room dose was calculated in accordance with Regulatory Guide 1.4 and SRP 6.4. Fifty percent of the containment leakage was assumed to leak into the Penetration Room where it was filtered by the Penetration Room Ventilation System prior to release. The remaining fifty percent was

assumed to leak unfiltered into the environment. This leakage partitioning is based on Technical Specification 4.4.1.1. The Penetration Room Ventilation System is discussed in 6.4 of the FSAR. The Control Room Ventilation System is discussed in Section 9.8.2.2 of the Oconee Nuclear Station FSAR. Iodine removal efficiencies for the Control Room and Penetration Room Ventilation Systems are based on the provisions of Regulatory Guide 1.52. The calculated exposures were found to exceed Oconee design criterion 11 and GDC 19.

Given the results of the design basis calculation, a study was initiated to determine whether or not an exposure problem for Control Room personnel existed with more realistic assumptions. A review of measured containment leak rates was conducted and the worst one selected for use as the realistic leak rate. RB leakage rate was based on this realistic value rather than the conservative technical specification value. Fifty percent of containment leakage was still assumed to leak into the Penetration Room even though this fraction was expected to be much larger. Only one train of the Penetration Room Ventilation System was assumed operable with iodine removal efficiencies as discussed in Technical Specification 4.5.3. Realistic atmospheric dilution factors were calculated for the present Control Room intakes. Only one train of the Control Room Ventilation System was assumed operable with iodine removal efficiencies as discussed in Technical Specification 4.12. Using a realistic iodine inventory in the RB, the CR dose criteria are met.

The results of this study provided sufficient evidence to assure that in the unlikely event of a DBA, exposures to Control Room personnel would not realistically be expected to exceed GDC 19.

Corrective Action:

Duke is continuing to evaluate potential methods to reduce the dose consequences to Control Room personnel during a post-accident situation. Inasmuch as this analysis is being performed in conjunction with the effort to respond to NUREG-0578, Item 2.1.6, any required plant modifications will be identified and completed on a schedule consistent with the completion of this NUREG-0578 item.

LICENSEE EVENT REPORT

EXHIBIT A

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17		During review of NUREG-0578 2.1.6.b item an error was discovered in the										85							
18		Control Room Habitability Analysis. The error involved the omission of the										86							
19		airborne activity contribution to dose to operators in the Control Room.										87							
20		Realistic Analysis verified the dose to operators following a DBA to be within										88							
21		acceptable limits.										89							
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