UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

FEB 11 1987

Report Nos.: 50-269/87-03, 50-270/87-03, and 50-287/87-03

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Docket Nos.: 50-269, 50-270, and 50-287 License Nos.: DPR-38, DPR-47, and DPR-55

Facility Name: Oconee 1, 2, and 3

Inspection Conducted: January 12-16, 1987

Inspector: F N Wright 2/10/87
F. N. Wright Date Signed

Approved by: H Collins 2/10/87
for C. M. Hosey, Section Chief Date Signed
Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced inspection of the radiation protection program included a review of internal exposure control and assessment licensee action on previous enforcement matters, followup on non-routine event and followup on TMI action items.

Results: One violation was identified for failure to adequately evaluate radiological hazards.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*D. Sweigart, Superintendent of Operations
*J. M. Davis, Superintendent of Technical Services
*T. B. Owens, Superintendent of Maintenance
*F. E. Owens, Compliance Shift Supervisor
*C. T. Yongue, Site Health Physicist
*C. Harlin, Compliance Engineer
*G. T. Powell, Associate Engineer Health Physics
*D. L. Davidson, Associate Health Physicist
*H. Lefkowitz, Associate Engineer, OSRG
K. F. Brown, Assistant Engineer Instrument Electrical
D. J. Berkshire, Associate Health Physicist
J. Jarrett, Health Physics Technician
R. Lingle, Nuclear Production Engineer
D. R. Grant, Mechanical Maintenance Technician

Other licensee employees contacted included four health physics technicians.

Other Organizations

C. M. Davis, Health Physics Technician, NUMANCO

Nuclear Regulatory Commission

*J. Bryant, Senior Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on January 16, 1987, with those persons indicated in Paragraph 1 above. The inspector discussed the apparent violation for failure to adequately evaluate the radiological hazards during the disassembly of 3B1 reactor coolant pump on January 13, 1987 (see Paragraph 4.b). The inspector discussed the remaining requirements which must be complete to closeout TMI Action Plan Item II.F.1.3, Containment High Range Monitor, and informed the licensee that the TMI item would be an unresolved item (see Paragraph 5). The licensee acknowledged the inspection findings and took no exceptions.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

3. External Exposure Control (83724)

10 CFR 20.203 specifies the posting, labeling, and control requirements for radiation areas, high radiation areas, airborne radioactivity areas and radioactive material areas.

During tours of the plant, the inspector reviewed the licensee's posting and control of radiation areas, high radiation areas, airborne radioactivity areas, contaminated areas, radioactive material areas and the labeling of radioactive material.

10 CFR 20.202 requires each licensee to supply appropriate personnel monitoring equipment to specific individuals and to require the use of such equipment. During tours of the plant, the inspector observed workers wearing appropriate personnel monitoring devices.

No violations or deviations were identified.

4. Internal Exposure Control and Assessment (83725)

The licensee is required by 10 CFR 20.103, 20.201(b), 20.401, 20.403, and 20.405 to control uptakes of radioactive material, assess such uptakes, and keep records of and make reports of such uptakes. FSAR Chapter 12 also includes commitments regarding internal exposure control and assessment.

a. Control Measures

During plant tours, the inspector observed the use of temporary ventilation systems, containment enclosures, and respirators. The inspector discussed the use of this equipment with workers and radiation protection technicians.

b. Uptake Assessment

On Wednesday morning, January 14, 1987, the licensee informed the inspector that several employees had been contaminated and received measurable intakes of radioactive material while working on a reactor coolant pump (RCP) the previous afternoon.

Reactor coolant pump 3B1 had been moved from Unit 3 containment to the hot machine shop (HMS) for disassembly and repair. Within the hot machine shop separate radiological protection zones had been established for controlling work on contaminated plant components. A sizable area of the HMS was zoned and controlled for RCP work.

In the morning of January 13, 1987, the 3B1 RCP shaft had been removed from the pump and that afternoon plant maintenance workers re-entered the RCP radiation control zone (RCZ) to continue disassembly of the pump's internals. Further disassembly required the removal of the recirculating pump stator and stator retaining ring from the pump stuffing box.

Workers entered the RCP radiation control zone in the hot machine shop to remove the stator ring under the instructions of Radiation Work Permit (RWP) 1152. RWP 1152 specified the special instructions, precautions, and requirements for Unit 3 RCP rebuild work. Continuous health physics coverage; alpha, beta, and beta gamma monitoring were indicated as requirements to be considered for applicability by health physics personnel. RWP 1152 also had four job classifications which prescribed various protective clothing and equipment requirements. Jobs were classified for (a) areas where contamination was less than 1000 dpm/100 $cm^2$; (b) inspections and observation where there was no hands on work, climbing or crawling; (c) general work; and (d) airborne radioactivity areas. Additional requirements to be specified on a "as needed basis" included extremity and high range dosimetry for classification (c) jobs and respiratory protection for classification (d) jobs.

A pump upender was utilized to support the pump during disassembly. Access to the recirculating pump stator, while the pump was in the upender, is through a hatch on the upenders platform floor. To remove the stator ring, a worker must kneel on the platform floor and extend both arms deep into the hatch and stuffing box, unseat and remove the stator retaining ring, and then pull out the stator ring.

The licensee reported the following RCP work conditions to the inspector. When the work began there was a health physics technician in the area providing continuous health physics coverage. Workers who handled internal components were required to wear extremity dosimetry; survey results reported contamination levels through the center hatch on the upender were 250,000 dpm/100 $cm^2$ smearable; dose rates at the hatch were 100 mRad/hr gamma, and 60 mRad/hr beta 1/2 inch from the surfaces. The workers were not required to wear respirators nor were air samples taken on the upender platform, which was approximately 10 feet off the floor. A licensee representative stated that respirators were not required because the job had been performed several times before without respirators and no contamination or airborne problems had been encountered. Licensee procedures do not have a contamination limit requiring or recommending respirator protection. Licensee representatives told the inspector that an air sample, in the work area on the RCP upender platform, should have been made during the RCP disassembly. The maintenance worker that removed the stator and stator retaining ring had performed the removal procedure on other RCPs. The worker informed the inspector that normally the retaining ring was freed using screwdrivers to dislodge it from its seat and then removed by hand. However on this occasion the components could not be freed by hand and the worker had to use a crane and lifting apparatus to dislodge the stator retaining ring and remove the stator. When the stator ring was removed from the stuffing box it was bagged in plastic and stenciled with an identification number using a stencil tool and hammer through the plastic bag. The stator ring was then stored in a shielded container. The stator ring survey reported 10 mRad/hr on a 100 $cm^2$ smear; 500 mRad/hr gamma and 3000 mRad/hr beta

at 1/2 inch from the surface; and 100 mRad/hr gamma and 60 mRad/hr beta at eighteen inches.

In the immediate work area during the stator removal were three licensee maintenance workers, a contract health physics technician, and a vendor pump representative. Another maintenance worker operated the crane used to free the stator but did not enter the RCP radiation control zone. In addition to these workers other licensee employees were engaged in various activities in the hot machine shop. As two of the maintenance workers left the RCZ other maintenance personnel entered the RCZ with respirators to clean various reactor coolant pump internals and take measurements. The two maintenance workers that left the RCZ were found to be contaminated. The remainder of the workers that were in the RCZ while the stator ring was being removed left about eighty minutes later and one of the three was found to be contaminated.

Of the six individuals involved with the stator ring removal, three were externally contaminated on the face with radioactive material measuring between 800 and 45,000 disintegrations per minute (dpm). The contaminated personnel were decontaminated and contamination reports completed. The licensee performed whole body counts for the three contaminated individuals. The intakes calculated by the licensee using whole body count results were 11, 26, and 202 maximum permissible concentrations-hour (MPC-hours). Other intake assessments were requested for all persons working on the stator removal job when the crane operator and one of the maintenance workers, who had frisked clean earlier, set off the portal monitors at the protected area exit point. Initial intake evaluations of the three workers reported two individuals with intakes of 3.5 and 6.7 MPC-hours and one with none detected.

The licensee performed whole body counts for 21 additional personnel who were in the general area of the HMS during RCP stator replacement. Initial results reported 18 of the 21 counted had uptakes less than 5% Maximum Permissible Organ Burdens (MPOBs) and three with MPOBs between 5.3 and 5.9.

10 CFR 20.201(b) requires each licensee to make or cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations and (2) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present. 10 CFR 20.201(a) states that "survey" means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive material or other sources of radiation under a specific set of conditions.

10 CFR 20.103(a)(3) requires each licensee to make suitable measurements of concentrations of radioactive materials in air to detect and evaluate the airborne radioactivity in restricted areas.

10 CFR 20.103(b)(2) requires that when it is impracticable to apply process on other engineering controls to limit concentrations of radioactive material in air below those defined in 10 CFR 20.203(d)(1)(ii), other precautionary procedures, such as increased surveillance, limitation of working times, or provision of respiratory protective equipment, shall be used to maintain intake of radioactive material by any individual within any period of seven consecutive days as far below that intake of radioactive material which would result from inhalation of such material for 40 hours at the uniform concentrations specified in Appendix b, Table 1, Column 1 as is reasonably achievable.

Failure to evaluate the extent of radiation hazards present during the disassembly of the RCP , in order to comply with the requirements of 10 CFR 20, was an apparent violation of 10 CFR 20.201(b) (50-269/87-03-01, 50-270/87-03-01 and 287/87-03-01).

10 CFR 20.103(a)(3) also requires each licensee to use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as may be necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals.

An isotopic analysis of the radioactive contamination found on the stator ring indicated that Silver-110m (Ag-110m) comprised about ten percent of the total activity on the smear sample. An air sample taken in the hot machine shop away from the upender platform during the removal of the stator reported AG-110m at 99.3% of MPC values; indicating that the licensee should have methods to assess personnel intakes of the isotope. The licensee does not have Ag-110m included in its whole body counting analysis software. When asked how the licensee would assess intakes of Ag-110m, the licensee discussed methods that could be used to qualify and quantify the isotope in the body. The inspector requested the licensee evaluate any possible Ag-110m uptakes for those persons involved with removing the RCP stator ring. The licensee agreed to consider potential Ag-110m exposure when assessing the uptakes of the personnel involved in the stator ring removal work. The inspector stated that the guidance, methods, and procedures used in the assessment would be reviewed in future inspections as an inspector followup item (50-269/87-03-02, 50-270/87-03-02, and 50-287/87-03-02).

No deviations were identified.

5. TMI Action Items (NUREG-0737) - Containment High Range Radiation Monitors

NUREG-0737, Item II.F.1.(3) directed licensees to install a minimum of two physically separated in-containment radiation level monitors with a maximum range of 1.0E+8 rad/hr. The requirement was revised in an October 30, 1979 letter from the NRC, to provide for a photon only measurement with an upper range of 1.0E+7 R/hr.

The licensee has installed two Victoreen-875 photon only radiation monitors in each containment. The inspector reviewed the licensee records which documented the installation of the monitors in containment. The monitors for Unit 2 were reported operable in Inspection Reports 50-269/83-36, 50-270/83-37 and 50-287/83-36. The inspector observed the installed detectors in Unit 3 containment on January 15, 1987. The Unit 3 detectors were installed approximately 110° apart. The inspector observed the readout and strip charts for the monitors in the Control Room. Only one of the two monitors per unit has a strip chart recorder. The monitors and strip chart recorders for the detectors were set as required in plant procedures and operational. The strip chart recorder for the Unit 2 monitor had to be pointed out to the inspector, however, since it was not clearly identified. The chart label was not in place. The inspector informed management of the need to have the chart recorder clearly identified. Licensee representatives initiated a work order to replace the label.

The inspector reviewed the vendor's literature and information provided by the licensee and determined that the monitor meets the range and sensitivity criteria established in NUREG-0737.

The inspector reviewed the calibration and response check procedures for the monitors. Emergency procedures were also reviewed which referenced the monitor in evaluating plant conditions.

The inspector reviewed the most recent electronic/radiation calibrations and response checks of the instruments. Each refueling cycle the detectors are calibrated with a source at the detector in a radiation field at approximately 10 R/hr. An electronic calibration was also conducted on all scales using a calibrated current source. The monitor checkout procedure verified that the monitor setpoints were properly set. These calibration activities appeared satisfactory to meet the specific TMI requirements in Table II, F.1-3 of NUREG-0737.

Special Environmental Qualification requirements of NUREG-0737, Item II.F.1.(3), Table II.F.1-3 require a type test for the detectors. The type test should demonstrate that a representative production detector's response to a radiation source is linear on all scales up to 1E+6 R/hr. The licensee was unable to provide the inspector with the type test calibration records. The inspector stated that the licensee should obtain a report from the vendor documenting the results of a type-test performed with a radioactive source and demonstrating linearity of the monitor through all scales up to 1E+6 R/hr and verifying the monitors design characteristics.

By letter dated March 18, 1983, the NRC issued a Confirmatory Order concerning certain Post-TMI actions. The Order required the licensee to install the containment high range monitors in accordance with the following schedule:

Unit 1 - Refueling Outage 8 (tentatively 9/83)
Unit 2 - Refueling Outage 7 (tentatively 12/83)
Unit 3 - Refueling Outage 8 (tentatively 7/84)

The inspector stated that failure to have a type test for the detectors used in the contaminment high range monitors as required by NUREG-0737, Table II.F.1-3 would be considered an apparent violation of the Confirmatory Order issued March 18, 1983. However, the licensee agreed to provide the calibration information to the Commission and pending a review of the type test calibration data, this will remain an unresolved item*. (50-269/87-03-03, 50-270/87-03-03, and 50-287/87-03-03).

*An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.