UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-369/95-20 and 50-370/95-20

Licensee: Duke Power Company
P. O. Box 1007
Charlotte, NC 28201-1007

Docket Nos.: 50-369 and 50-370 License Nos.: NPF-9 and NPF-17

Facility Name: McGuire 1 and 2

Inspection Conducted: July 24-28, 1995

Inspector: _____ 08/24/95
B. A. Parker Date Signed

Approved by: _____ 8/24/95
W. H. Rankin, Chief Date Signed
Facilities Radiation Protection Section
Emergency Preparedness and Radiological Protection Branch
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, announced inspection was conducted in the area of occupational radiation safety and included an examination of: organization and management controls, audits and appraisals, training and qualification, external exposure control, internal exposure control, control of radioactive material, surveys and monitoring, and maintaining occupational exposures ALARA.

Results:

Based on interviews with licensee management, supervision, personnel from station departments, and records review, the inspector found the radiation protection (RP) program to be effective in protecting the health and safety of plant employees. No violations or deviations were identified.

Enclosure 1

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

S. Abernathy, Radiation Protection (RP) Supervisor
D. Britton, RP Scientist
*W. Byrum, RP Manager
G. Cayton, ALARA Specialist
J. Correll, RP Supervisor
*L. Criminger, RP General Supervisor
*R. Cross, Regulatory Compliance Specialist
P. Dame, ALARA Specialist
*B. Dolan, Safety Assurance Manager
*M. Geddie, Station Manager
G. Johnson, RP Scientist
*P. Herran, Engineering Manager
*R. Michael, Chemistry Manager
L. Morris, Dosimetry Supervisor
K. Murray, RP Scientist
J. Pope, RP Scientist
J. Puckett, ALARA Specialist
H. Sloan, RP Scientist
*J. Snyder, Regulatory Compliance Manager

Other licensee employees contacted during the inspection included technicians, maintenance personnel and administrative personnel.

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G. Harris, Resident Inspector
*D. Jones, Senior Radiation Specialist
*G. Maxwell, Senior Resident Inspector
*M. Sykes, Resident Inspector

*Denotes attendance at the exit meeting held on July 28, 1995.

2. Organization and Management Controls (83750)

Changes in organization and management controls were reviewed to assess their impact on the effective implementation of the occupational radiation protection (RP) program. The inspector reviewed changes made to the licensee's organization, staffing levels and lines of authority as they relate to RP. The licensee continued to maintain a core radiological control organization, although some reductions in staff had occurred in the RP area since the last inspection of this area in November 1994. The licensee was authorized for a total RP staff of 65. At the time of inspection, the RP staff consisted of 62 individuals with some extra contract employees. In addition, the licensee continued to maintain 15 long-term contractors as part of a utility contractor pool.

The inspector noted that the licensee's RP organization was essentially the same as other RP organizations in the Duke nuclear system.

Based on discussions with licensee representatives and observations of activities in progress, no concerns were identified regarding the licensee's organization and staffing.

No violations or deviations were identified.

3. Training and Qualifications (83750)

10 CFR 19.12 requires that licensees instruct all individuals working or frequenting any portion of the restricted areas in the health protection aspects associated with exposure to radioactive material or radiation, in precautions or procedures to minimize exposure, and in the purpose and function of protection devices employed, applicable provisions of Commission regulations, individuals responsibilities and the availability of radiation exposure data.

The inspector discussed and reviewed the RP continuing training program with training representatives and noted no problems. At the time of inspection, the licensee was conducting refresher training for the RP organization that consisted of fundamental health physics concepts and principles such as radioactive decay, properties of alpha/beta/gamma radiations, interaction of radiation with matter, and radiation detection. This training was prompted by a "diagnostic test" given by the RP trainers in late 1994 to evaluate the future training needs of the RP staff. In addition, recent training was given concerning the handling of a contaminated injured worker. This training maintained the interface between RP and the onsite Medical Emergency Response Team.

In general, the licensee tried to average 40 hours of continuing training per person per year. In 1994, the RP personnel received approximately 28 hours of training per person, and to date in 1995, greater than 40 hours had already been given. The inspector noted that training received appropriate RP and plant management support and participation.

No violations or deviations were identified.

4. Audits and Appraisals (83750)

10 CFR 20.1101(c) requires that the licensee periodically (at least annually) review the RP program content and implementation. Licensee activities, audits, and appraisals were reviewed to determine the adequacy of identification and corrective action programs for deficiencies or weaknesses related to the control of radiation or radioactive material.

The licensee's independent audits and appraisals in the radiation control area consisted of formal audits per TS requirements, documented observations and specific surveillance. Documentation of problems by licensee representatives was included in Quality Assurance (QA) audits. The QA audits and surveillances reviewed in the area of RP since the last inspection included:

- Regulatory Audit SA-95-21(MC)(RA), Radiation Protection and Chemistry, dated May 2, 1995; and

- In-Plant Review 94-033, RCA Access/Exit From Room 1004, dated September 28, 1994.

The audit and in-plant review were well planned and conducted, and contained substantive comments and findings relating to the radiation protection program. Corrective actions were tracked with the Problem Identification Process (PIP) system and identified findings were appropriately resolved in a timely manner.

In general, the PIP system was accessible to employees plant-wide and provided a means for identifying, tracking and trending all significant concerns, issues and problems within the plant. No adverse trends were noted since the last inspection.

No violations or deviations were identified.

5. External Exposure Control (83750)

a. Whole Body Exposure

10 CFR 20.1201(a) requires each licensee to control the occupational dose to individual adults, except for planned special exposures (PSEs) under 10 CFR 20.1206 to the following dose limits:

(1) An annual limit, which is the more limiting of:

(i) The total effective dose equivalent (TEDE) being equal to 5 rems; or
(ii) The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems.

(2) The annual limits to the lens of the eye, to the skin, and to the extremities, which are:

(i) An eye dose equivalent of 15 rems; and
(ii) A shallow-dose equivalent (SDE) of 50 rems to the skin or to any extremity.

The inspector reviewed and discussed with licensee representatives external exposures for plant and contract personnel for 1994 and 1995 year-to-date. Total collective dose received during 1994 was 396.7 person-rem. The goal for the year was 412 person-rem. As of July 23, 1995, the collective dose in 1995 was approximately 44.7 person-rem versus a goal to date of 56.9 person-rem. The licensee had recently adjusted the 1995 goal from 235 to 211 person-rem based on a change in the schedule of the upcoming refuel outage.

The maximum TEDE and SDE recorded for plant personnel in 1994 was 1,998 and 6,659 millirem, respectively. To date in 1995, the maximum TEDE and SDE recorded for plant personnel was 444 and 849 millirem, respectively.

Overall, dose incurred by the licensee was well-managed, and through review of dose information, the inspector confirmed that all whole body exposures assigned during the period were within 10 CFR Part 20 limits.

No violations or deviations were identified.

b. Hot Spot Reduction

The inspector reviewed and discussed the licensee's efforts to reduce hot spots throughout the plant. A hot spot was defined as a specific area on piping in which the radiation levels are greater than 100 millirem per hour contact and greater than five times the general area dose rate. At the time of inspection, the licensee reported that since 1992, 70 hot spots have been identified. Of those, 44 have been removed, mostly through flushing. Of the 26 remaining, 16 were located in the Reactor Buildings and 10 were in the Auxiliary Building. Four hot spots had been removed since January 1995 and the licensee indicated that essentially all "flushable" hot spots had been flushed. Other measures would have to be employed to remove many of the remaining hot spots, such as physical removal/replacement of the affected valve or pipe section. According to the licensee, a total number of hot spots equivalent to a cumulative dose rate of 120 rem per hour had been removed since the beginning of the hot spot reduction program. The inspector found the licensee's efforts to be aggressive, effectively removing source term and significantly reducing personnel dose.

c. Personnel Dosimetry

10 CFR 20.1502(a) requires each licensee to monitor occupational exposure to radiation and shall supply and require the use of individual monitoring devices by:

(1) Adults likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of the limits in 10 CFR 20.1201(a);

(2) Minors and declared pregnant women likely to receive, in one year for sources external to the body, a dose in excess of 10 percent of any of the applicable limits in 10 CFR 20.1207 or 10 CFR 20.1208; and

(3) Individuals entering high or very high radiation areas.

10 CFR 20.1501(c)(1) and (2) requires that dosimeters used to comply with 10 CFR 20.1201 shall be processed and evaluated by a processor accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for the types of radiation being monitored.

The inspector reviewed and discussed the licensee's dosimetry program with site personnel and determined licensee dosimetry was being processed by corporate personnel. The inspector reviewed licensee NVLAP certification records and determined the licensee to be certified in all eight categories which included all types of radiation being monitored by the licensee.

The inspector observed during plant tours that workers were appropriately wearing thermoluminescent dosimeters (TLDs) and digital alarming dosimeters (DADs) as required. In addition, the inspector observed proper utilization of the Electronic Dose Capture (EDC) system.

No violations are deviations were identified.

6. Internal Exposure Control (83750)

10 CFR 20.1502(b) requires each licensee to monitor the occupational intake of radioactive material by and assess the committed effective dose equivalent (CEDE) to:

(1) Adults likely to receive, in one year, an intake in excess of 10 percent of the applicable ALI in Table 1, Columns 1 and 2 of Appendix B to 10 CFR 20.1001-20.2401; and

(2) Minors and declared pregnant women likely to receive, in one year, a CEDE in excess of 0.05 rem.

10 CFR 20.1204(a) requires that for the purposes of assessing dose used to determine compliance with occupational dose equivalent limits, each licensee shall, when required under 10 CFR 20.1502, take suitable and timely measurements of:

(1) Concentrations of radioactive materials in air in work areas; or
(2) Quantities of radionuclides in the body; or
(3) Quantities of radionuclides excreted from the body; or
(4) Combinations of these measurements.

a. Respiratory Protection

Evaluations for TEDE/ALARA purposes were required by procedure to be performed by RP prior to performing work in airborne radioactivity areas to demonstrate that respiratory protection provisions were consistent with the goal of maintaining individual and collective total effective dose equivalent ALARA. The inspector noted that the licensee continued to reduce the use of respirators. Since 1990, the number of full-face respirators used annually dropped from approximately 5300 to 300 in 1994. To date in 1995, approximately 175 full-face respirators had been issued. Based on review and discussions with licensee representatives, the inspector determined that the licensee had made efforts to maintain TEDEs ALARA. Furthermore, the inspector noted that the licensee did not observe an increase in the number of positive intakes for individuals who did not wear respirators for those activities in which individuals would have worn them in the past, indicating that applied engineering controls were working as designed.

No violations or deviations were identified.

b. Internal Exposure Assessments

10 CFR 20.1204 requires that for purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee, when required to monitor internal exposure, shall take suitable and timely measurements of concentrations of radioactive materials in air, quantities of radionuclides in the body, quantities of radionuclides excreted from the body, or combinations of these measurements. When specific information on the behavior of the material in an individual is known, that information may be used to calculate the CEDE.

The inspector discussed the licensee's program for monitoring internal dose and noted that the licensee utilized a threshold of 10 millirem CEDE for assigning internal dose. The inspector reviewed internal dose assessments from 1994 and 1995. The inspector found that no internal dose had been recorded in 1995, and one internal dose of 112 millirem was recorded in 1994.

The inspector concluded that the licensee's program for monitoring, assessing, and controlling internal exposures was conducted in accordance with regulatory and procedural requirements with no exposures in excess of 10 CFR Part 20 limits identified.

No violations or deviations were identified.

7. Surveys, Monitoring, and Control of Radioactive Material and Contamination (83750)

10 CFR 20.1501(a) 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 radioactive hazards that may be present.

a. Surveys

The inspector reviewed selected records of radiation and contamination surveys performed during 1995 and discussed the survey results with licensee representatives. During tours of the plant, the inspector observed RP technicians performing routine surveys. No concerns were identified in this area.

No violations or deviations were identified.

b. Posting and Labeling

10 CFR 20.1904(a) requires the licensee to ensure that each container of licensed material bears a durable, clearly visible label bearing the radiation symbol and the words "Caution, Radioactive Material", or "Danger, Radioactive Material." The label must also provide sufficient information (such as radionuclides present, and the estimate of the quantity of radioactivity, the kinds of materials and mass enrichment) to permit individuals handling or using the containers, to take precautions to avoid or minimize exposures.

10 CFR 20.1902 specifies the requirements for radiation, high radiation, very high radiation, and airborne radioactivity areas. In addition, 10 CFR 20.1902(e) requires the licensee to post each area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in appendix C to §§20.1001-20.2401 with a conspicuous sign or signs bearing the radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)."

During the previous inspection of this area conducted November 28 - December 2, 1994, and documented in NRC Inspection Report No. 50-369, 370/94-28, two violations (one cited and one

non-cited) were identified for (1) failure to properly label radioactive material, and (2) failure to properly post radioactive material areas. During this inspection, the inspector toured various portions of the radiation control area (RCA). Overall, the inspector noted improvement in the posting and labeling of radioactive material. No examples of unlabeled material were identified and postings on various elevations were more informative and appropriate. (See Paragraph 10 for closeout of the cited violation.)

No violations or deviations were identified.

c. High Radiation Areas

10 CFR 20.1601(a) specifies, in part, control devices, mechanisms or direct surveillance methods to ensure that each entrance or access point to a high radiation area has one or more features to ensure positive high radiation area controls.

10 CFR 20.1602 requires in addition to the requirements in 10 CFR 20.1601, that the licensee shall institute additional measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 500 rads (5 grays) or more in one hour at one meter from a radiation source or any surface which the radiation penetrates. The areas are also required to be posted as Very High Radiation Areas (VHRAs).

Technical Specification (TS) 6.12 allows the licensee to only barricade and control access to high radiation areas (HRAs) with radiation levels between 100 and 1,000 millirem per hour at 30 centimeters (cm). Areas with radiation levels greater than 1,000 millirem per hour at 30 cm and less than 500 rads per hour at one meter were designated and posted as Extra High Radiation Areas (EHRAs) and were required to be locked or otherwise conspicuously barricaded to prevent inadvertent access.

During tours of the Auxiliary Building, the inspector noted that all HRAs, EHRAs, and VHRAs were posted, controlled, and locked as required. The licensee's posting of the affected areas appeared conservative and appropriate based on current survey data.

No violations or deviations were identified.

d. Personnel and Area Contamination

During facility tours, the inspector noted that contamination control and general housekeeping practices were satisfactory, having improved somewhat since previous inspections in this area.

The licensee controlled approximately 115,000 square feet (ft^2) as RCA, and the inspector noted that 378 ft^2 or 0.3 percent of the RCA was tracked as contaminated recoverable area. The maximum contaminated square footage thus far in 1995 was 573 ft^2, and the peak in 1994 had been 1360 ft^2.

The inspector noted that the number of catch containments had steadily increased from about to 25 to 50 over the past year or so. The inspector discussed this trend with the licensee and noted that it was related to some of the material condition improvements previously mentioned. The licensee also informed the inspector of a formal material condition improvement project that was in its early stages at the time of the inspection. The ALARA Committee had recently approved plans to expend limited dose as part of an effort to decontaminate, repaint and recondition a large portion of the Auxiliary Building.

In 1994, a total of 318 personnel contamination events (PCEs) occurred during the year, comprised of 159 skin and 159 clothing PCEs. At the time of inspection, 51 PCEs had occurred thus far in 1995 comprised of 47 clothing and four skin PCEs. The inspector reviewed selected PCE reports and noted that licensee documentation and followup on the individual events was appropriate.

No violations or deviations were identified.

e. Radiation Detection and Survey Instrumentation

During tours of the plant, the inspector noted that friskers and contamination monitors had up-to-date calibration stickers and had been source-checked as required. In addition, the licensee appeared to possess an adequate number of survey instruments and related equipment with only a small number out of service and in need of repair. The inspector interviewed instrument specialists and discussed calibration and source check requirements. The inspector also observed personnel source checking selected portable instruments.

No violations or deviations were identified.

8. Operational and Administrative Controls (83750)

a. Radiation Work Permits (RWPs)

The inspector reviewed selected routine and special RWPs for adequacy of the radiation protection requirements based on work scope, location and conditions. For the RWPs reviewed, the inspector noted that appropriate protective clothing, respiratory

protection, and dosimetry were required. During tours of the plant, the inspector observed the adherence of plant workers to RWP requirements and discussed the RWP requirements with plant workers at the job site.

No violations or deviations were identified.

b. Notices to Workers

10 CFR 19.11(a) and (b) require, in part, that the licensee post current copies of 10 CFR Part 19, Part 20, the license, license conditions, documents incorporated into the license, license amendments and operating procedures, or that a licensee post a notice which describes the document and where it may be examined.

10 CFR 19.11(c) and (d) requires that a licensee post form NRC-3, Notice to Employees. Sufficient copies of the required forms are to be posted to permit licensee workers to observe them on the way to or from licensee activity locations.

During the inspection, the inspector verified that NRC Form-3 was posted properly at plant locations permitting adequate worker access. In addition, notices were posted referencing the location where the license, procedures, and supporting documents could be reviewed.

No violations or deviations were identified.

9. Program for Maintaining Exposures As Low As Reasonably Achievable (ALARA) (83750)

10 CFR 20.1101 (b) requires that the licensee shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as reasonably achievable (ALARA).

Regulatory Guides 8.8 and 8.10 provide information relevant to attaining goals and objectives for operating light water reactors and provide general philosophy acceptable to the NRC as a necessary basis for a program of maintaining occupational exposures ALARA.

The inspector attended a Station ALARA Committee meeting held during the inspection. The inspector noted that the Committee membership included representatives from appropriate organizations including RP, Chemistry, Operations, Training, Engineering, Maintenance, Work Control, and the Plant Manager. Attendance to the meeting was satisfactory and meetings were held on a monthly basis. Significant topics and other items of substance were discussed and reviewed during the meeting. Special projects were discussed and the Committee was authorized to approve and

fund ALARA-related projects and needs. The inspector noted no concerns and found the Committee to be playing an important role in the licensee's overall ALARA program.

One of the significant projects under the auspices of the ALARA Committee was a dose rate monitoring system. This was a proposed system for continuously monitoring dose rates in a large number of areas throughout the plant. At the time of the inspection, the licensee was preparing to implement the pilot phase of the system. Long-term goals for the system include direct uplinking with the station's computer network. With that, plant personnel could access the real-time data and utilize it for a variety of purposes such as dose reduction, work planning, and trend analysis. The inspector discussed the system plans with the licensee and noted no concerns.

The inspector reviewed and discussed long-term dose reduction plans with the licensee and noted that by the year 2000 the licensee is aiming for a three year collective dose average of 120 person-rem per unit per year. Although the licensee's three year average has been steadily decreasing, the year 2000 goal is challenging considering the licensee's chronic steam generator problems, shorter-than-normal fuel cycles, and, most importantly, the upcoming steam generator replacement projects for both units. However, the licensee indicated that ALARA was well supported by management and felt that with continued aggressive efforts, the goal could be reached.

Based on licensee planning efforts to reduce source term and the licensee's efforts to achieve established exposure goals which were challenging, the inspector determined the licensee was effectively controlling exposures ALARA.

No violations or deviations were identified.

10. Review of Previously Identified Inspection Findings (83750)

a. (Closed) Inspector Followup Item (IFI) 50-369/93-14-01: IFI on licensee actions to reduce radiation levels in the area of valve FW-9, Reactor Cavity Drain Line.

The inspector reviewed the licensee's initiatives related to the IFI. Preliminary calculations had been completed that indicated no adverse impact to the Emergency Core Cooling System (ECCS) or the recirculation with respect to the Containment Sump if the FW-9 valves are eliminated. Further refinements were being made to the calculations. The licensee indicated that the plan was to remove the FW-9 valve from each unit during the Cycle 11 refuel/steam generator replacement outages in 1997. The inspector informed the

licensee that the initiatives taken thus far to resolve the dose concerns related to the FW-9 valves were sufficient to close the IFI. No further concerns were noted. This item is considerd closed.

b. (Closed) VIO 50-369, 370/94-28-01: Violation for failure to properly label radioactive material as required by 10 CFR 20.1904(a).

The inspector reviewed the licensee's corrective actions to the violation during the inspection. The licensee generated PIP No. 0-M95-0088 to track the corrective actions, which included (1) training housekeeping and decontamination personnel, and (2) improving/increasing plant area surveillance. The PIP noted the causes of the violation to be management choice to post areas in lieu of labeling as well as failure to label items per licensee procedure. The inspector verified that personnel were trained and that the licensee established an administrative plan to ensure that posting and labeling activities were appropriate. The licensee's "accountability plan" included assignment of RP technicians to specific portions of the RCA and a requirement that RP supervision and management conduct periodic walkdowns/inspections. The PIP was closed on May 2, 1995, and the inspector noted no concerns with the licensee's actions. As noted in Paragraph 7.b. above, overall improvement in posting and labeling was noted during the inspector's tours of the plant and RCA areas. This item is considered closed.

11. Exit Meeting (83750)

An exit meeting was held on July 28, 1995, with those licensee representatives denoted in Paragraph 1 of this report. The inspector summarized the scope and findings of the inspection and indicated that no violations were identified. The licensee did not indicate any of the information provided to the inspector during the inspection as proprietary in nature and no dissenting comments were received from the licensee.

Type	Item Number	Status	Description and Reference
IFI	50-369/93-14-01	Closed	Licensee actions to reduce radiation levels in the area of valve FW-9, Reactor Cavity Drain Line (Paragraph 10.a).
VIO	50-369, 370/94-28-01	Closed	NRC-identified violation for failure to properly label radioactive material as required by 10 CFR 20.1904(a) (Paragraph 10.b).