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

FEB 25 1994

Report Nos.: 50-369/94-03 and 50-370/94-03

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: January 24-28, 1994

Inspectors: R. B. Shortridge 2/23/94
R. B. Shortridge Date Signed

B. A. Parker 02/23/94
B. A. Parker Date Signed

Approved by: William H. Rankin 2/23/94
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; training and qualification; audits and appraisals; external exposure control; internal exposure control; surveys, monitoring, and control of radioactive materials and contamination; maintaining occupational exposures as low as reasonably achievable (ALARA); and a review of inspector followup items (IFIs).

Results:

Based on interviews with licensee management, supervision, station personnel, and records review, the radiation protection program continued to be effective in protecting the health and safety of the workers and the public. An IFI regarding the reduction of radiation levels around a valve (FW-9) and sump was reviewed and left open as licensee actions to resolve the high radiation levels were continuing. This will be reviewed during subsequent inspections (Paragraph 9). A non-cited violation (NCV) was identified regarding the procedure for controlling keys to locked high radiation areas. The issue was identified by the licensee and corrective actions were in progress prior to the end date of the inspection (Paragraph 7.c).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*W. Byrum, Radiation Protection Manager
*B. Caldwell, Manager, Site Training
R. Cross, Engineer, Regulatory Compliance
*M. Geddie, Station Manager
*L. Kunka, Engineer, Regulatory Compliance
S. Mooneyhan, General Supervisor, Radiation Protection

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

Nuclear Regulatory Commission

*G. Harris, Resident Inspector
G. Maxwell, Senior Resident Inspector

*Denotes attendance at the exit meeting held on January 28, 1994

2. Organization and Management Controls (83750)

The inspector reviewed changes made to the licensee's organization, staffing levels, and lines of authority as they relate to radiation protection. The Radiation Protection Manager (RPM) position has been filled by one of three General Supervisors, effective February 1, 1994. A second General Supervisor transferred to Work Control and that supervisory position will be refilled. The supervisory position vacated by the new RPM will not be refilled and the responsibilities in RP will be realigned under the two remaining General Supervisors who will continue to report to the RPM. Currently, the radiation protection (RP) staff consisted of 73 persons with all job coverage personnel being ANSI-qualified.

At the time of the inspection, the licensee was in the first week of a projected 30 day forced outage of Unit 1 due to excessive steam generator leak rates.

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 the Commission Regulations, individuals responsibilities and the availability of radiation exposure data.

In discussions with licensee training personnel, the inspector noted that continuing training was scaled back from approximately 80 hours per year to approximately 20 hours in 1993. Training personnel indicated that the heavy outage schedule experienced in 1993 was the major reason for less continuing training. The licensee planned to provide between 30 and 50 hours continuing training to the general plant populous in 1994. The licensee did not plan to have any training on plant systems; however, the inspector was informed that systems training was normally provided and would be considered for 1994 since the schedule was still being formulated. The licensee indicated that the training for HP personnel would address the radiological aspects of the subject system. The inspector reviewed the process for including "operating experience" in the training program and found no problems. The inspector found that core contract HP technicians received on-the-job training as well as continuing training.

No violations or deviations were identified.

4. Audits and Appraisals (83750)

The licensee maintained the Problem Investigation Process (PIP) system that 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. Discussions with licensee representatives and a review of the 43 PIPs for 1993 by the inspector indicated that corrective actions were being resolved in a timely manner in response to the identified findings. The inspector noted that PIP No. 0-M93-1307 investigated the failure to close an extra high radiation area (EHRA) door. The licensee was still in the process of developing a corrective action to preclude recurrence of this event during the inspection. The inspector determined that certain licensee findings during the investigation of this PIP identified root causes for other findings made by the inspector. This is discussed in detail in Paragraph 7.c of this report.

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 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 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; and

(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 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 the period January 1, 1993 through December 31, 1993. Through review of dose information, the inspector confirmed that all whole body exposures assigned during the period were within 10 CFR Part 20 limits.

During tours of Unit 1 containment, the inspector inquired of personnel about work area dose rates and the operational aspects of their monitoring equipment. The inspector observed personnel donning and doffing protective clothing, reviewing Radiation Work Permits (RWPs), and logging into Electronic Dose Capture (EDC) system with digital alarming dosimeters (DADs). Personnel were observed to wear and use the DADs correctly.

The EDC system tracked dose, dose alarms, and RWPs, and provided a means to restrict access to the radiologically controlled area (RCA) if certain training or other factors needed to be addressed. The standard administrative dose allowance per site employee was 2,000 millirem per year. At 80 and 90 percent of the administrative dose allowance, the EDC system had "alert" and "hold" stopgaps, respectively. Upon reaching the alert point, the individual's supervisor was required to request a dose extension or the individual's TLD would be pulled once the hold point was reached. A daily EDC printout tracked administrative, TEDE, CEDE, shallow, and lens doses, as well as DAC-hours. Duke and non-Duke dose were tracked in order to ensure adherence to procedural administrative allowances as well as 10 CFR Part 20 limits.

An issue regarding the availability of exposure records was reviewed during the inspection. Prior to the inspection, an NRC Region II employee that he had requested a copy of his exposure from the licensee and, when he received the information, his personal records were more complete than the data submitted by the licensee. During the inspection, the inspector requested all exposure data for this individual from the licensee, and the licensee furnished a copy of the subject records. Upon evaluation by the inspector, the missing record of the individual's exposure was found to be included in the records provided during this inspection by the licensee. The inspector discussed the fact that less than complete data may have been furnished to the NRC employee and the licensee stated that an administrative error may

have been responsible for the problem. Since all data was furnished on request to the inspector, the inspector concluded that the licensee's record system was not lacking.

No violations or deviations were identified.

b. Personnel Dosimetry

10 CFR 20.1502(a) requires each licensee to monitor occupational exposure to radiation and 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 of 10 CFR 20.1207 or 10 CFR 20.1208; and

(3) Individuals entering a high or very HRA.

In January 1993, the licensee changed their personnel dosimetry of record from film badges processed monthly to four-chip thermoluminescent dosimeters (TLDs) processed quarterly. The site provided terminating workers with a letter estimating their dose while onsite and the licensee's General Office (GO) provided final termination letters once each quarter. The GO read all of the TLDs and the inspector verified that the licensee was NVLAP-certified in all eight categories, effective until April 1, 1994.

As mentioned, DADs were used primarily for daily dose tracking and monitoring. The licensee maintained approximately 1800 DADs onsite. Extra DADs were available from other Duke sites, if needed. The DADs were robotically calibrated every six months. All DADs examined by the inspector were calibrated as required. The inspector reviewed Unusual Dosimetry Reports, which captured problems associated with DADs, and noted a few instances in which DADs would report unexpected dose. Investigation by the licensee revealed that other types of electromagnetic radiation were to blame, or, in one case, the shielding built into the DAD to shield radio waves had solder points that were "shorting out," causing the false readings on the DAD display. All of the DAD problems were few and minor and no adverse trends were noted.

The inspector discussed the correlation of DAD dose and TLD dose and was informed that correlation was calculated each quarter after TLD results were received. The inspector noted that correlation was excellent, routinely approaching 100 percent. This appeared to be mainly due to a tight DAD calibration error

range (± 4 percent) and the overall ruggedness and reliability of the equipment.

No violations or deviations were identified.

6. Internal Exposure Control (83750)

10 CFR 20.1204(a)(3) requires, in part, that the licensee, as appropriate, 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.

The inspector reviewed the licensee's bioassay program as implemented under Radiation Protection Manual Procedure No. 17.14, Internal Exposure Control Program. No problems were found during a review of the procedure or of selected bioassay records. Routine bioassays were performed at initial employment, annually, and at termination. Special bioassays were performed as needed. The licensee performed approximately 5200 routine bioassays and 220 special bioassays in 1993. Of those, only two exceeded one Derived Investigational Level (DIL), which was the licensee's administrative action level prompting additional evaluation. No internal exposures exceeded 10 CFR Part 20 limits.

No violations or deviations were identified.

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

a. Surveys

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.

The inspector reviewed selected records of radiation and contamination surveys performed during 1993, and discussed the survey results with licensee representatives. During tours of the plant, the inspector observed HP technicians performing radiation and contamination surveys. No concerns were identified. The inspector independently verified radiation and/or contamination levels in selected areas of the Unit 1 Containment Building, Auxiliary Building, and Radioactive Material Storage Areas.

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.

During tours of the plant and selected outside radioactive material storage areas, the inspector noted that the licensee's posting and control of radiation areas, high radiation areas, airborne radioactivity areas, contamination areas, radioactive material areas, was adequate. The inspector also noted radioactive material was properly labeled. During tours of Unit 1 refueling floor area, the inspector observed an area where the contamination area barrier was not complete. The opening was at an area that gave access to the refueling bridge crane which would allow a person to enter the contaminated area and cross over to the opposite side of the refueling canal. When informed of the circumstance, the HP technician responsible for the area took immediate corrective action to complete the contamination boundary.

c. High Radiation Areas

TS 6.12.1 requires, in part, that each HRA with radiation levels greater than or equal to 100 mrem/hr but less than 1000 mrem/hr be barricaded and conspicuously posted as a HRA. In addition, any individual or group of individuals permitted to enter such areas are to be provided with or accompanied by a radiation monitoring device which continuously indicates the radiation dose rate in the area or a radiation monitoring device which continuously integrates the dose rate in the area, or an individual qualified in radiation protection procedures with a radiation dose rate monitoring device.

TS 6.12.2, requires in part, that areas accessible to personnel with radiation levels greater than 1000 millirem per hour (mrem/hr) at 45 centimeters (cm) (18 inches) from the radiation source or from any surface which the radiation penetrates shall be provided with locked doors to prevent unauthorized entry, and the keys shall be maintained under the administrative control of the Shift Foreman on duty and/or health physics (HP) supervision.

During tours of the Auxiliary Building on January 25, 1994, the inspector noted a number of areas posted as EHRAs, which were licensee-designated areas with radiation levels greater than 1000 mrem/hr at 45 cm that must be locked per TS 6.12.2; however,

several bunkers in Room 818 were apparently not locked as required although the six bunkers had heavily shielded steel tops which covered the shielded concrete bunkers. The bunkers were posted as EHRAs but were not locked. After the inspector noted the apparent missing controls, licensee representatives indicated that the cranes in the area needed to lift the steel bunker covers provided the necessary controls to prevent unauthorized entry and that the electrical breakers for the cranes, a one ton jib and a 10 ton rail hoist, were locked in the "OFF" position. Breaker access required checking out a HRA key from the instrument checkout window, and accessing the breakers on a different elevation, which appeared to be an adequate control. However, on January 26, 1994, the licensee informed the inspector that for an unknown reason the crane breaker was not locked out on January 25, but in fact was energized. The inspector observed the crane breaker and found that although a lock was on it, the locking mechanism was broken and could be easily defeated.

The inspector reviewed Problem Investigation Process (PIP) reports to determine if similar problems had been experienced or an adverse trend existed. The review showed that there had recently been one instance in which a door leading to a EHRA was found unlocked and open, and the licensee was in the process of determining the appropriate corrective action. It was revealed from the licensee's investigation that for many of the entries made into the separate spent filter storage areas within Room 818 (separate locked EHRAs), keys had not been properly checked out and/or logged in the HRA key log on those particular days. In all but two cases, the HP technician had performed a required survey.

The inspector requested the licensee to perform a computerized search and determine for these entries how many people were signed in on the correct RWP. The search showed that of 44 possible times for filter changes in 1993, personnel failed to sign in on the correct RWP 16 times or 36 percent of the time.

The inspector reviewed procedures to determine the requirements for entry into a locked HRA using a HRA key. There were four procedures controlling HRA keys, although the licensee indicated that one of the procedures had been or was in the process of being cancelled. A comparison of HRA key requirements showed inconsistencies among the procedures but several aspects appeared to be close to the root cause of the key checkout problem. During tours when the inspector entered locked EHRAs the HP technician checking out the key only had to ask instrument check out personnel for the key. The HP technician did not have to sign for the HRA key as required by one of the procedures. Licensee Procedure III-15, Access Controls for High, Extra High, and Very High Radiation Areas, Revision 3, dated October 1, 1993, Step 5.3.3.3, requires a signature from the person checking out the key as a minimum. The inspector discussed the lack of control of keys to high radiation areas found by both the inspector and

the licensee. The primary concern of the inspector was the fact that the actual control of the keys had gotten too far away from the TS requirement of administrative control of the Shift Foreman on duty and/or HP Supervision. This was verified by the licensee's findings of personnel not always checking out HRA keys. Licensee management was involved with determining the appropriate corrective action when the inspector had findings regarding HRA key control. Since the licensee had initially identified the problem and was correcting the procedures, and all problems surrounding the issue of HRA keys (failure to check in on RWPs properly and to perform HRA required surveys) and because the events had relatively low safety significance, the failure of personnel to comply with procedure requirements and the failure of the procedure to contain requirements necessary for adequate key control was characterized as a non-cited violation of TS 6.12.2 (NCV 50-369, 370/94-03-01).

d. Personnel and Area Contamination

During facility tours, the inspector noted that contamination control and general housekeeping practices were adequate. Surface contamination was aggressively being controlled at its source. The controllable contaminated area was one tenth of one percent or 120 square feet of the total 120,000 square feet RCA.

The inspector reviewed the licensee's personnel contamination events (PCEs) in 1993. PCEs were tracked by the number of skin and clothing events as well as the number of particle and dispersed events. Some overlap in total numbers did occur in that an individual with contaminated clothing and skin was normally accounted for twice. The inspector noted that when contamination involved licensee-supplied modesty garments only with no skin contamination, a PCE report was not generated. This is an acceptable industry practice.

The 1993 skin contamination target was 93, and a total of 105 PCEs were documented for the year. The inspector reviewed a number of the PCEs reports and noted no significant events. The reports were sent to the contaminated individual's supervisor "for information only," with a cover letter statement that "this is not an attempt to find fault or obtain disciplinary action."

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.

One NCV was identified.

8. 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).

The inspector discussed ALARA initiatives with licensee ALARA personnel. Based on licensee data for the last quarter of 1993, the licensee's program to reduce out of core source term by flushing and removing hot spots continues to be effective. The licensee removed nine hot spots during the last quarter and were tracking 17 for resolution. Licensee personnel stated that during the next outage the plan was to reduce the majority of those remaining. Since the inception of the program in April 1992, a total of 83.506 rem per hour has been removed from the reactor coolant system.

Letdown Filter downsizing was accomplished on Unit 1 and Unit 2 in November 1993. One micron filters were installed on these dates downstream of the mixed bed demineralizers. In addition, station management approved the Cobalt Reduction Program and the team plans to develop cost vs. benefit methodology to support this program by July 1, 1994.

The licensee's collective dose goal for 1994 is 412 person-rem. The collective dose through January was 3.15 person-rem compared to the projection of 5.4 person-rem. The inspector attended the January meeting of the ALARA Committee and noted that the meeting appeared fruitful in resolving issues and well supported by management.

No violation or deviations were identified.

9. Followup on Inspector Followup Items (IFI) (92702)

(Open) IFI 50-369/93-14-01: Very High Radiation Levels on FW Valve

During tours of the Unit 2 Containment (inspection 93-14), the inspector noted an area on the "A" floor where a refueling cavity drain line had a 90 degree bend. The elbow was approximately 12 inches below valve FW-9 and read approximately 50 rem per hour at shutdown, 4.5 rem after flushing, and was currently at 200 millirem per hour after shielding. The licensee has barricaded the area and posted a yellow flashing light both at the top and bottom of the ladder accessing the area; however, the inspector inquired if the area should have an enclosure constructed to support locking the area. Licensee representatives indicated that the area was very tightly packed with components and piping which precluded easily constructing an enclosure for locking. There were approximately nine access points to the area around the pipe chase in addition to other ways over low walls to access the area. The inspector reviewed licensee efforts to resolve the problem and noted that

engineering authorization had been received to perform a modification on the pipe run to get rid of the crud trap; however, at the last ALARA committee meeting a problem was identified that the sump just below the FW-9 valve had increased in radiation levels and was contributing to the problem. The inspector requested licensee management review resources being applied to resolve the problem and informed the licensee that this would be tracked by the NRC as an Inspector Followup Item (IFI 50-369/93-14-01) and progress toward resolution would be evaluated during a subsequent inspection.

10. Exit Meeting (83729)

At the conclusion of the inspection on January 28, 1994, an exit meeting was held with those licensee representatives denoted in Paragraph 1 of this report. The inspector summarized the scope and findings of the inspection. The inspector discussed one IFI identified below and in Paragraph 9 of this report. The inspector also discussed a violation for an inadequate procedure for extra high radiation area key control. The inspector received no dissenting comments.

Type	Item Number	Status	Description and Reference
IFI	50-369/93-14-01	Open	Followup on licensee actions to reduce radiation levels in the area of valve FW-9, Reactor Cavity Drain Line (Paragraph 9).
NCV	50-369, 370/94-03-01	Closed	Inadequate procedure for control of extra high radiation area keys (Paragraph 7.c).