



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

APR 29 1993

Report Nos.: 50-280/93-09 and 50-281/93-09

Licensee: Virginia Electric and Power Company

Docket Nos.: 50-280, 50-281

License Nos.: DPR-32, DPR-37

Inspection Conducted: March 29 - April 2, 1993

Inspectors:	<u>B. A. Parker</u>	<u>04/27/93</u>
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	Radiological Protection and Emergency Preparedness	
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	Division of Radiation Safety and Safeguards	

SUMMARY

Scope:

This routine, announced inspection was conducted in the area of occupational radiation exposure. Specific elements of the program examined included: organization and management control; training and qualification; external exposure control; internal exposure control; surveys, monitoring, and control of radioactive material; maintaining occupational radiation exposure as low as reasonably achievable (ALARA); and previously identified inspector followup items (IFIs).

Results:

In the areas inspected, one apparent violation was identified for failure to (1) provide positive control over an open locked high radiation area and, (2) allow two individuals uninhibited egress from a locked high radiation area. The licensee's radiation protection program was well-supported by both corporate and station management and was functioning effectively to protect the health and safety of plant personnel and the general public. The ALARA program in general was considered a program strength.

## REPORT DETAILS

### 1. Persons Contacted

- \*D. Anderson, Shift Supervisor, Health Physics
- \*W. Benthall, Supervisor, Licensing
- \*R. Bilyeu, Engineer, Licensing
- \*M. Biron, Supervisor, Radiological Engineering
- \*E. Brennan, Coordinator, Water Treatment
- \*D. Christian, Assistant Station Manager, Operations
- \*D. Erickson, Superintendent, Radiation Protection
- \*B. Garber, Supervisor, H.P. Technical Services
- \*M. Kansler, Station Manager
- \*D. Miller, Supervisor, Health Physics Operations
- \*L. Morris, Superintendent, Radwaste
- \*M. Olin, Supervisor, Radwaste Operations
- \*J. Price, Assistant Station Manager, Licensing
- \*R. Saunders, Assistant Vice President, Nuclear Operations
- \*E. Smith Jr., Manager, Quality Assurance
- T. Steed, ALARA Coordinator
- \*W. Thornton, Corporate Director, Health Physics and Chemistry
- \*D. White, Shift Supervisor, Health Physics
- K. Wyatt, Maintenance Department QMT Coordinator

Other licensee employees contacted during this inspection included: craftsmen, engineers, operators, contract personnel, and administrative personnel.

#### Nuclear Regulatory Commission

- \*J. York, Acting Senior Resident Inspector

- \*Attended Exit Interview conducted on April 2, 1993.

### 2. Occupational Exposure (83750)

#### a. Organization and Management Controls

The inspectors reviewed the staffing of the radiation protection (RP) organization as related to lines of authority and verified that changes had not been made that would adversely affect the licensee's ability to control radiation exposure or radioactivity during outage and non-outage periods.

A review of the licensee's program to self-identify and correct problems via the Radiation Problem Report (RPR) system showed that the licensee utilized the system routinely. Radiological performance problems, when identified, were promptly corrected. The inspectors noted that when a problem had increased significance, a station deviation report was issued. During the inspection, the inspectors identified an apparent violation (see Paragraph 2.c) in which the licensee issued a station deviation report to ensure that the problem received early

attention and prompt closure. Management systems were observed to be operating satisfactorily to keep management apprised of radiological problems to support oversight of the RP program.

No violations or deviations were identified.

b. Training and Qualification

The inspectors noted that the licensee continues to support staff participation in the National Registry of Radiation Protection Technologists (NRRPT) certification process. The inspector learned that, in 1992, 16 of the licensee's staff became NRRPT-certified, in addition to 17 others who were certified in 1991.

The inspectors reviewed the required background readings for the health physics (HP) staff. The reading material appeared appropriate with the majority of it relating to HP work in general. The readings were accomplished in a timely manner and no problems were noted with the subject matter.

10 CFR 1.53 contains the requirements for use of the NRC seal or replicas. 10 CFR 1.59 requires that in order to ensure adherence to the authorized uses of the NRC seal as provided in this subpart, a report of each suspected violation of this subpart, or any questionable use of the NRC seal should be submitted to the Secretary of the Commission.

During participation in site specific training, the inspectors noted that the licensee used the NRC seal a number of times in several training publications. The inspector found that when the publications discussed NRC-related information such as NRC regulatory philosophy; Form NRC-3, "Notice to Employees;" and the Resident Inspection Program, NRC seals were used as graphic illustrations in the document margins. While the use did not appear inappropriate, the regulation does not allow latitude with regard to authorization for use, nor for reporting suspected unauthorized use. The resident inspectors recalled discussing the subject with the licensee and regional management, but were not sure if the NRC Office of the Secretary was contacted as required. To ensure the matter was resolved, the inspector discussed the licensee's use of the NRC seal with Regional II Counsel, who in turn contacted the Office of the Secretary. The Assistant Secretary of the Commission agreed that the licensee's use of the NRC seal did not appear to be inappropriate. The inspectors informed the licensee of the Office of the Secretary's ruling and cautioned the licensee to seek pre-approval for future uses of the NRC seal.

No violations or deviations were identified.

c. External Exposure Control

10 CFR 20.101 requires, that no licensee possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area, to receive in any period of one calendar quarter a total occupational dose in excess of 1.25 rem to the whole body, head and trunk, active blood forming organs, lens of the eyes, or gonads; 18.75 rem to the hands, forearms, feet and ankles; and 7.5 rem to the skin of the whole body.

As of March 30, 1993, the licensee had experienced 31 personnel contamination events (PCEs). The inspector reviewed selected PCE reports and noted no significant external exposures. Skin dose assessments were performed as required and only relatively low skin doses resulted. No problems were noted with the licensee's methods or reporting requirements.

10 CFR 20.202 requires each licensee to supply appropriate monitoring equipment to specific individuals and requires the use of such equipment. During tours of the plant, the inspector observed workers wearing appropriate personnel monitoring devices. The licensee routinely issued digital alarming dosimeters and tracked dose via a computerized system. For relatively high dose jobs, the licensee utilized a teledosimetry system to track dose real-time.

10 CFR 20.202(c) requires that personnel dosimetry used in accordance with 10 CFR 20.202 (a) be processed by a processor accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for the appropriate types of radiation. The inspector noted that the licensee was NVLAP-approved to process dosimetry for all eight categories of radiation.

10 CFR 20.203(c)(2)(iii) requires that each entrance or access point to a high radiation area be maintained locked except during periods when access to the area is required, with positive control over each individual entry.

10 CFR 20.203(c)(3) states that the controls required by 10 CFR 20.203(c)(2) of this section be established in such a way that no individual will be prevented from leaving a high radiation area.

Technical Specification (TS) 6.4.1.B requires that procedures for personnel radiation protection be prepared consistent with the requirements of 10 CFR Part 20 and be approved, maintained, and adhered to for all operations involving radiation exposure.

Attachment 1, Requirements and Responsibilities to Enter a Locked High Radiation Area, of Health Physics Procedure HP-8.0.61, High Radiation Area Key Control, Revision 1, dated

April 16, 1991, requires the individual who has cognizance over the area to verify (1) that the entrance to the locked high radiation area (LHRA) is under constant surveillance while it is unlocked to prevent unauthorized entries (Step 2.3); and, (2) that no one is left in the area and the entrance is securely locked when leaving the area (Step 2.4).

During one of the tours of Unit 2 containment to assess radiological performance, the inspectors stopped at the entrance to "C" Reactor Coolant Pump Loop Room, a LHRA, and inquired of a HP technician in the immediate area the requirements for entry into the loop room. The HP technician replied that extra shoe covers and gloves were needed and proceeded to supply the inspectors with the items. Two inspectors donned the items and immediately proceeded to enter the area. The inspectors were wearing digital alarming dosimeters (DADs) and had been briefed and authorized to enter high radiation areas under RWP No. 93-2-2045, Rev. 001. The rope barrier into the area was posted "DAD, Dose Rate Meter, or HP Required for Entry" and "Extra Shoe Covers and Gloves Required." The inspectors crossed the stepoff pad, noted that the loop room door was unlocked and open, and proceeded into the loop room. Dose rates in the loop room were greater than 1000 millirem per hour at 12 inches. After touring the area for approximately three minutes, the inspectors returned to the entry point and found the loop room door chained and padlocked from the outside. Momentarily, a HP technician arrived to unlock the door for an individual entering to perform work in the area and the inspectors exited the loop room. No unnecessary radiation exposures were received due to the event.

Later, the licensee informed the inspector that the door was found unlocked upon the inspectors' entry due to the presence of an advanced radiation worker (ARW) in the loop room. The ARW apparently exited the area after the inspectors entered and neither party saw the other while in the loop room. The inspector learned that the unseen ARW in the LHRA was actually in charge of the area and not the HP technician contacted outside the loop room prior to the inspectors' entry since the ARW was issued a key with which to enter the area. This was consistent with the aforementioned procedure HP-8.0.61. The inspector concluded that the failure to maintain constant surveillance over the LHRA entrance while it was unlocked, and the failure to ensure that no one was left in the area prior to locking the entrance, thereby preventing the inspectors' exit from LHRA constituted an apparent violation of 10 CFR 20.203(c) (VIO: 50-280, -281/93-09-01).

One apparent violation was identified.

## d. Internal Exposure Control

10 CFR 20.103(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 selected PCE reports and noted no significant internal exposures. All exposures were well below the 40 MPC-hour limit in 10 CFR Part 20.

10 CFR 20.103(b)(1) requires that the licensee use process or other engineering controls to the extent practicable to limit concentrations of radioactive materials in the air to levels below those which delimit an airborne radioactivity area as defined in 20.203(d)(1)(ii).

10 CFR 20.103(c)(2) permits the licensee to maintain and implement a respiratory protective program that includes, at a minimum: air sampling to identify the hazard; surveys and bioassays to evaluate the actual exposures; written procedures to select, fit, and maintain respirators; written procedures regarding supervision and training of personnel and issuance of records; and determination by a physician prior to the use of respirators, that the individual user is physically able to use respiratory protective equipment.

10 CFR 20, Appendix A, Footnote (d), requires adequate respirable air of the quality and quantity in accordance with NIOSH/MSHA certification described in 30 CFR Part 11 to be provided for atmosphere-supplying respirators.

30 CFR 11.121 requires that compressed, gaseous breathing air meets the applicable minimum grade requirements for Type 1 gaseous air set forth in the Compressed Gas Association (CGA) Commodity Specification for Air, G-7.1 (Grade D or higher quality).

The inspector reviewed and discussed the licensee's respiratory protection program with cognizant personnel. The licensee maintains a total of 36 active self-contained breathing apparatus (SCBAs), 17 of which contain compressed air and 19 that contain a mixture of 35 percent oxygen/65 percent nitrogen. The mixed SCBAs are used for containment entries at power due to the subatmospheric operating condition. Staged SCBAs were pressure-checked weekly and checked for function on a monthly basis. SCBA maintenance was performed by a factory-certified technician onsite.

The inspectors reviewed the licensee's breathing program and noted that the 35/65 air was purchased in 300 cubic foot bottles and transferred via a cascade-type system to the SCBA bottles as needed. Other compressed air used for breathing air was required to meet Grade D criteria. No atmospheric compressed air was purchased and the inspectors verified that the compressed breathing air produced onsite met the Grade D criteria. Air checks were performed every six months with the last occurring in October 28, 1992. The inspectors also reviewed a study performed by Radiological Engineering (CAF #91-RE-402) that verified that the breathing air systems utilized onsite met ANSI Standard Z88.2-1980. No problems were noted with the licensee's methods or findings.

The inspectors noted the licensee's reduction of respirator usage. Numbers of respirators issued this outage compared to numbers from previous outages indicate a reduction by as much as 80 percent. The licensee indicated that a combination of more ALARA planning, worker training, and the use of faceshields to help to minimize the increase in PCEs and internal contamination expected with less respirator usage. However, the licensee's extensive use of engineering controls in and around potential airborne radioactivity areas was the major contributing factor in avoiding the consequences often accompanied by a reduction in respirator usage.

The inspectors noted that the licensee had replaced the rubber masks used with the 35/65 SCBAs with silicone masks. This was done in response to a finding from a study in which Virginia Power participated with Lawrence Livermore National Laboratory (LLNL). The study was conducted to support a 10 CFR Part 20.103(e) request to the NRC from Virginia Power for specific authorization to use 35/65 SCBAs in containment, at reduced pressure, under both routine and emergency (e.g. fire fighting) conditions. A series of tests were performed including flame-testing of the 35/65 SCBA equipment. One recommendation was made as a result of the study regarding replacement of rubber facepieces on 35/65 SCBAs with silicone facepieces. This was based on a finding that the rubber facepieces continued to burn around the exhalation valve after flame-testing due to the enriched oxygen.

In another related matter, the licensee was investigating the effects of replacing old SCBA brass parts with parts made of aluminum. This was due to the fact that aluminum burns under enriched oxygen conditions. The results of this investigation were pending.

No violations or deviations were identified.

## e. Surveys, Monitoring, and Control of Radioactive Material

During the previous inspection, the inspectors toured Unit 2 containment and noted that the incore seal table area was easily accessed. After exiting containment, the inspectors noted that the power to the Incore Moveable Detectors (IMDs) was not tagged out. This tagout would serve as a backup means for protection against inadvertent operation of the system, with personnel in containment and in close proximity to the IMD pathway. The inspectors noted the same accessibility to the incore seal table this inspection; however, the licensee now provides tagout protection in the control room when the containment is open.

In response to an inspector concern for inconsistency in radiological precautions and warnings in operations and maintenance procedures, the licensee instituted changes to the following procedures to correct the deficiency:

- 1-OP-57, Incore Movable Detector System, Revision 1, dated July 31, 1991
- 2-OP-57, Incore Movable Detector System, Revision 1, dated July 31, 1991
- 1-OP-57A, Incore Movable Detector System Alignment, Revision 1, dated June 6, 1991
- 2-OP-57A, Incore Movable Detector System, Revision 0, dated September 11, 1987
- 1-NPT-RX-002, Reactor Core Flux Maps, Revision 2, dated May 22, 1992
- 2-NPT-RX-002, Reactor Core Flux Maps, Revision 2, dated May 22, 1992
- IMP-C-IFM-20, IFM Detector System, Revision 1, dated October 2, 1990
- 1-IMP-C-IFM-38, Cleaning Incore Flux Thimbles, Revision 0, dated May 26, 1987
- 2-IMP-C-IFM-85, Cleaning Incore Flux Thimbles, Revision 0, dated June 26, 1989
- MMP-C-RC-028, Flux Thimble/Thermocouple Assembly Withdrawal and Reinsertion, Revision 0, dated September 13, 1988

- O-MCM-1101-01, Flux Thimble/Thermocouple Assembly Withdrawal and Insertion, Revision 0, dated April 20, 1992

The inspector reviewed the listed procedures and noted the corrective actions were comprehensive and sufficient. This action contributes to the closure of inspector followup item (IFI) 50-280/92-16-03.

The licensee's program to control contamination at the source has greatly improved. The licensee's goal for 1993 is to maintain approximately 98 percent (135,000 square feet (ft<sup>2</sup>)) of the auxiliary building as clean and free of contamination above 1,000 disintegrations per minute per 100 square centimeters (1,000 dpm/100 cm<sup>2</sup>). The licensee initiated a reclamation project in 1992 to reclaim many contaminated areas and, as a result, the licensee ended 1992 with only 1,574 ft<sup>2</sup> of contaminated area (1.2 percent of the RCA). Licensee representatives indicated that during the outage, the contaminated area of the plant had expanded to 6,549 ft<sup>2</sup>, mostly due to laydown area requirements. The supervisor in charge of decontamination activities indicated that seven foremen, 28 senior decontamination technicians, and 12 junior decontamination technicians were required to complete the major job of reclaiming chronic contaminated areas.

The inspector toured the licensee's onsite laundry facilities and discussed laundry activities with some of the aforementioned decontamination technicians. The inspectors reviewed the licensee's methods for laundering, surveying and decontaminating protective clothing (PCs) and respirators. PCs were sorted, laundered, surveyed on a conveyor system, inspected for flaws/defects, and either folded for reuse or discarded. If one of the eight detector zones was triggered during the survey, the conveyor belt would immediately stop, allowing the technician to identify the contaminated article. The article would be relaundered and resurveyed or discarded as radioactive waste.

Respirators were washed, dried, and surveyed for fixed and removable contamination. If contamination was found, those respirators were rewashed and surveyed or discarded. The respirators were then inspected, sealed in bags, and tagged as usable for 30 days. If unused after 30 days, the respirators had to be pulled from the shelf and reinspected before being bagged and tagged again for reuse. The inspectors noted that lead technicians over the area were closely tracking respirator and PC usage as well as the failure rates of specific items.

No problems were noted with the licensee's methods or procedures.

No violations or deviations were identified.

f. Instrumentation

The inspectors toured the licensee's instrument repair and calibration shop. The licensee utilized a number of sources for calibrating instruments with cesium-137 (Cs-137) being the isotope of primary use. Most of the sources were of millicurie activity, although a nominal 400 curie Cs-137 source was used for calibrating high ranges. The inspectors noted that the licensee tracked instruments through a bar-code system to assist in completing periodic inventories and calibrations. No problems were noted with the licensee's methods or procedures.

No violations or deviations were identified.

g. Program to Maintain Occupational As Low As Reasonably Achievable (ALARA)

10 CFR 20.1(c) states that persons engaged in activities under licenses issued by NRC should make every reasonable effort to maintain radiation exposures as low as reasonably achievable. The recommended elements of an ALARA program are contained in Regulatory Guide 8.8, Information Relevant to Ensuring That Occupational Radiation Exposure at Nuclear Power Stations will be ALARA, and Regulatory Guide 8.10, Operating Philosophy for Maintaining Occupational Exposures ALARA.

The inspectors discussed the ALARA program with the Station ALARA coordinator and the Maintenance Department ALARA coordinator. In addition, the inspectors reviewed methods the licensee used to maintain occupational exposure ALARA.

The licensee's total collective dose goal for 1993 was 595 person-rem or less, with one outage to be performed. Currently, the licensee collective dose for the outage was an actual 118 person-rem compared to a projected 185 person-rem for that point in the schedule. For the year to date, the licensee stood at 149 person-rem compared to 240 person-rem projected. Licensee HP and Maintenance ALARA representatives indicated that some of the following were responsible for the improved performance: 85 percent of pre-job ALARA reviews were completed prior to the outage start; all known work orders were received prior to outage start and were reviewed; 48 shielding packages utilized 65 tons of temporary lead shielding; job briefings were performed using enhanced surrogate tour for dose intensive jobs; and specific ALARA training was provided to all personnel working the outage. In addition, the projected dose

for removal of the Resistance Temperature Detectors (RTDs) was 11 person-rem, but the operation was actually performed for six person-rem.

The inspectors also reviewed a number of other dose reduction initiatives including the installation of permanent shielding. Water shields were erected in the Ion Exchange Alley in the basement of the auxiliary building, resulting in a 70 percent reduction in general area dose rates. Also, permanent lead shielding was installed on more operating systems, including letdown lines and charging pumps. Including valve 2-SI-85 that was being replaced during the inspection, the licensee has replaced four valves with non-stellite valves. A number of other valves were scheduled for replacement during future outages. Other initiatives noted by the inspector included the use of green flashing lights to call attention to low dose waiting areas and the performance of ALARA reviews for low-dose-per-person, high-man-hour jobs.

The inspectors noted the ALARA program to be a significant strength to the licensee's overall program. Strong management support and heavy worker involvement contributed to the continued success in the area of ALARA.

No violations or deviations were identified.

### 3. Exit Meeting

The inspectors met with licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on April 2, 1993. The inspectors summarized the scope of the inspection findings including those listed below and stated that the RP program at the station is a strength. The licensee did not identify any documents or processes as being proprietary. Dissenting comments were not received from the licensee.

#### Item Number

#### Description and Reference

50-280, 281/93-09-01

VIO - Failure to (1) provide positive control over an open locked high radiation area and, (2) allow two individuals uninhibited egress from a locked high radiation area (Paragraph 2.c).