



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

JAN 22 1992

Report Nos.: 50-280/91-36 and 50-281/91-36

Licensee: Virginia Electric and Power Company
 Glen Allen, VA 23060

Docket Nos.: 50-280 and 50-281 License No.: DPR-32 and DPR-37

Facility Name: Surry 1 and 2

Inspection Conducted: December 16-20, 1991

Inspector: Roger B. Shortridge 1/17/92
 Roger B. Shortridge Date Signed

Accompanying Personnel: Bryan A. Parker

Approved by: John P. Potter 1/17/92
 John P. Potter, Chief Date Signed
 Facilities Radiation Protection
 Section
 Radiological Protection and Emergency
 Preparedness Branch
 Division of Radiation Safety and
 Safeguards

SUMMARY

Scope:

This routine inspection was announced and conducted in the area of occupational radiation safety during normal operations. Elements of the program inspected included an examination of audits and appraisals, external exposure control, control of radioactive materials and contamination, surveys and monitoring, and maintaining occupational exposure as low as reasonably achievable (ALARA). During the inspection, the licensee provided a detailed briefing of the capabilities, and tour of the new radwaste facility (NRF) for both regional and headquarters NRC personnel.

Results:

In the areas inspected, no violations or deviations were identified. The radiation protection (RP) 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. Management oversight, audits and appraisals, exposure control, and collective dose/source term reduction were considered RP program strengths.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *W. Benthall, Supervisor, Licensing
- *R. Bilyeu, Licensing Engineer
- *M. Biron, Supervisor, Radiological Engineering
- *J. Butrick, Health Physics Supervisor
- *D. Hart, Supervisor, Quality Assurance
- *M. Kansler, Station Manager
- *D. Miller, Health Physics Supervisor
- *L. Morris, Supervisor, Radwaste
- *M. Olin, Supervisor Decontamination Services
- *J. Price, Assistant Station Manager
- *T. Steed, Station ALARA Coordinator
- *D. White, Health Physics Supervisor
- *W. Wigley, Manager, Corporate Nuclear Operations Support

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

Nuclear Regulatory Commission

- *M. Branch, Senior Resident Inspector

*Attended December 20, 1991 Exit Meeting

2. Occupational Exposure (83750)

a. Audits and Appraisals

Technical Specification (TS) 6.1.C.3 requires audits of station activities to be performed under the cognizance of Quality Assurance (QA) Department for conformance of facility operations to TS and applicable license conditions.

The inspector reviewed QA's audit of the RP program, number 91-13, dated October 8, 1991. The audit identified strengths, findings, observations and enhancements. The inspector found the audit to contain substantive findings and observations that were programmatic in nature. The audit report stood alone in the documentation of the audit scope and findings and presented them in a narrative section of the report entitled "program implementation." The inspector noted that this method of auditing and documenting results departed from the compliance type audit and described how the subject item fit into, and contributed to or detracted from the program. The inspector also noted

that items identified in the audit were corrected in a timely manner. The QA group routinely performs a followup audit to determine if the corrective action taken corrected the problems, verifying that the correct root cause was identified.

In January 1991, the QA department published the results of a RP program assessment. This assessment program was conducted in parallel with the QA audit program and was designed to be a performance-based assessment. In November 1991, QA published the results of the RP program assessment. The assessment covered areas that were initially identified as marginal from a performance standpoint, as well as other areas that were not assessed in the original report. The inspector noted that both programs were functioning to improve the RP program and were in fact identifying and correcting items that would otherwise be in violation of NRC regulations. In addition, RP staff make daily rounds and identify radiological discrepancies on radiological assessor reports (RAR). A review of RARs by the inspector indicated that this program continues to provide positive results toward identifying problems before they become serious. In interviews with licensee management, the inspector determined that management is familiar with these programs and knowledgeable of the findings, and that the programs enabled good management oversight of the RP program. The inspector discussed the quality of all assessment programs with licensee management and indicated the self-identification of problems as a RP program strength.

b. Radiological Problem Reports

As of December 1, 1991, the licensee had written 64 Radiological Problem Reports (RPRs) in 1991. Of the RPRs reviewed by the inspector, all appear to be resolved and the paperwork completed in a timely manner with three minor exceptions.

RPR Nos. 91-07, 91-44 and 91-49 do not appear to have been closed out. When the inspector inquired about them, the licensee indicated that the issues had been resolved but the closeout paperwork had not been completed. The three RPRs in question did not pose any significant safety hazards and the licensee indicated that these and future RPRs would be monitored more closely for timely completion.

c. External Exposure Control

TS 6.4.B requires the licensee to have written radiation control procedures that discuss permissible

radiation exposure, including the use of radiation work permits (RWPs), and stringent administrative procedures to assure adherence to restrictions placed on high radiation areas.

The inspector observed the preparation and, the initial phase of a job that required entry into the Unit 1 containment while subatmospheric and at 100 percent power. The work to be accomplished was the weld repair of a drain valve on the Regenerative Heat Exchanger (RHX) on the 3'6" elevation of containment. RWP 91-2-2045 was issued that specified radiological requirements. Radiation levels ranged from 3,000 millirem per hour (mrem/hr) general area to 5,000 mrem/hr contact on the RHX drain piping. Contamination levels to 335,000 dpm/100 cm² were expected, as well as water from the leaking component. Dress requirements included full protective clothing with self-contained breathing apparatus (SCBA) for entry into the containment. In addition, plastic suits were required for those personnel that may come in close proximity to the leaking component.

The inspector received a special training session to qualify for work in a SCBA. The licensee performed a person-rem cost benefit analysis that showed that it was not beneficial to shut the unit down to make the repair. The inspector attended the initial scoping meeting that involved all departments required to perform/support the operation. A rough schedule was developed during the meeting and various departments received certain assignments to perform to support the final planning meeting to be held later that day. The inspector noted that health physics (HP) ALARA personnel at the initial planning meeting were able to show other departments a picture of the area and the specific valve that was leaking from the ALARA Visual Information System (VIMS). This information alone was able to give interfacing personnel enough information to save one trip into containment and the radiation exposure that would have been incurred. In addition to the final planning meeting, the licensee was required to brief and obtain approval from the Station Nuclear Safety and Operating Committee (SNSOC) any time an entry was made into containment while at power. The inspector attended the final planning meeting and the meeting where SNSOC approval was granted. At this point, all personnel involved in the operation, as well as station management, were knowledgeable of each step required to be performed in the drain valve repair and the radiological requirements and conditions.

The inspector made the initial entry into containment with licensee personnel and noted that all aspects of

the operation went as planned. The crew observed the area and verified the leak position on the drain fitting to be repaired. Weld machines were also taken in and positioned for the subsequent repair. All personnel worked as a team and monitored their digital alarming dosimeters (DADs) during the operation. The highest DAD dose received on the first entry was 35 mrem. The inspection ended before the full job was completed. The inspector determined that the licensee was using every means to inform workers of the radiological environment and exercised excellent exposure control during the operation.

Procedure HP-6.1.21, Contaminated Skin Dose Assessment, Rev. 1, dated November 6, 1990, provides instruction for calculating skin dose due to contaminated skin or clothing. Skin dose assessments (SDAs) are required if, (1) a hot particle on skin measures > 100,000 disintegration per minute (dpm); (2) a hot particle on clothing measures > 1,000,000 dpm; (3) skin area contamination measures > 1,000,000 dpm; or (4) skin contamination measures > 10,000 dpm after decontamination.

As of December 19, 1991, two personnel contamination events (PCEs) in 1991 required a SDA. Both were evaluated as required by HP-6.1.21. PCE Report No. 91-71, from June 1991, involved a hot particle on a worker's neck measuring 200,000 dpm. The skin dose was calculated to be 286 mrem. PCE Report No. 91-119, from December 1991, involved contamination on a worker's skin and clothing measuring up to 380,000 dpm. The skin dose was calculated to be 1833 mrem.

Both SDAs were performed as required by HP-6.1.21 and followup of both events was completed in a timely manner.

d. Control of Radioactive Material, Surveys, and Monitoring

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 radioactive hazards that may be present.

During tours of the auxiliary building, the inspector performed radiation and contamination surveys and noted that the results agreed with the survey results posted by the licensee. All postings and labels on radioactive material were as required by station procedure.

The inspector reviewed the licensee program to control contamination at the source. The program is tracked by maintenance and progress is stated by monthly reports. In order to determine "effectiveness," the reports weigh the importance of each item and this, multiplied by the completion percentage, gives a weighted percent of program effectiveness. Items tracked include: painting, decontamination, installation of permanent shielding, ground water intrusion, out-of-core source term reduction, radioactive leaks, and insulation replacement. As of December 17, 1991, 67.49% of the 1991 project completion goal had been achieved.

Specific areas of achievement included reduction of contaminated areas, radioactive hot spots, and personnel contamination events (PCEs). The goal of 10,000 square feet (ft²) of contaminated area or less was achieved. In mid-December, the station reported 9,635 ft² of the 89,500 ft² total radiologically controlled area as contaminated. As of December 20, 1991, 123 PCEs had occurred in 1991, exceeding the 1991 station goal of 160 PCEs. The licensee continues to investigate each PCE to determine root cause and take pertinent corrective action.

As of December 3, 1991, the licensee had reduced out-of-core source term by flushing 36 radioactive hot spots and removing 403 rem/hour. Based on a review of the program to control contamination at the source, the inspector determined that the licensee has been effective. Licensee representatives stated that for the remainder of 1991, special emphasis had been given to repairing 104 known radioactive leaks. Radioactive leaks have been placed on the station commitment list and extra maintenance crews have been assigned to reduce the number of radioactive leaks. To improve the rate of reducing contaminated area, twelve additional decontamination technicians are being added to the reclamation efforts. Licensee representatives stated that a concerted effort will be needed for a long duration to reduce radioactive leaks and contaminated square footage.

e. Maintaining Occupational Exposure As Low As Reasonably Achievable (ALARA)

10 CFR 20.1(c) states that persons engaged in activities under licenses issued by the 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 Radiation Exposure ALARA.

The inspector reviewed the licensee's programs to reduce out-of-core source term, as well as, collective radiation exposure. A review of the major dose reduction/source term reduction items listed on the five year business plan for Surry showed that the licensee's program is aggressive and on schedule. Currently, Surry is operating on elevated pH, utilizing hydrogen peroxide injection and early boration and sub-micron filtration for letdown coolant. Stellite minimization in the reactor coolant system (RCS) is also being conducted to both minimize introducing cobalt into the RCS and reduce its activation. To minimize stellite, low stellite grid spaces are on all new fuel being installed, and valves with low or no stellite are replacing valves with stellite. The licensee is in the process of construction of a full-size mockup for resistance temperature detector (RTD) replacement scheduled for Unit 1 in 1992. In discussions with ALARA personnel, the inspector learned that the licensee will not be performing chemical decontamination (loop stop to loop stop valve) as intended. This is a concern since the decontamination of the steam generators (S/G) would drastically reduce general area loop room dose rates for both S/G work, as well as, RTD removal. Licensee management stated that chemical decontamination could not be adequately planned for the Unit 1 outage but would be performed for Unit 2 in 1993.

A review of the RP Department Exposure Reduction Action Plan for 1991 showed that 14 of the 15 action items had been completed. Many of the department action items dealt with remote monitoring equipment, digital alarming dosimeters, and process reviews regarding operator rounds. One of the more significant accomplishments was the addition of permanent shielding for operating components. The station ALARA coordinator stated that engineering personnel had performed seismic studies and engineering safety analysis for all charging pumps and was providing support for the permanent shielding of other major high-dose components.

In discussion regarding planning for the replacement of RTDs, licensee personnel stated that a full-size mockup with space restrictions was to be used. The licensee

portion of the operation would be removal of the RTDs with contract personnel performing installation of the new components. The licensee also stated that all personnel involved in the operation would be monitored telemetrically with digital alarming dosimeters and that four closed-circuit television cameras had been approved for the RTD operation to provide better exposure control and dose reduction. The licensee, through specifically-contracted equipment, will have the capability to telemetrically monitor up to 300 people. The system to be used will readout each person's dose almost continuously and maintain the highest doses on a computerized readout that lists personnel doses in descending order.

Based on a review of ALARA documentation, the inspector noted that one of the Surry assistant station managers attended the REM Seminar. The seminar is a major annual event for utilities to discuss the current and future status of technology for reducing personnel radiation exposure. In reviewing the trip report, the inspector noted that a good assessment of Surry's ALARA program relative to industry wide progress was obtained. The inspector also noted that the attendance of management, as well as staff at the seminar, was indicative of the extent that teamwork is utilized to reduce dose and maintain program oversight.

The inspector noted that the 1991 collective dose at the end of the inspection was approximately 570 person-rem. This is below the station collective dose goal projection for this time in the calendar year and it appears that Surry will be below the 1991 station goal of 598 person-rem.

No violations or deviations were identified.

3. New Radwaste Facility (NRF) (84750)

The inspector and radwaste personnel from NRC headquarters received a tour and detailed briefing on the capabilities of the NRF. The inspector noted that although the NRF has only been operational for a short time, significant results have been realized from processing liquid radwaste and sludge. In October - December, 1991, the NRF processed 750,000 gallons of liquid radwaste with no release above potable water limits. Also, radwaste from the emergency sump in the auxiliary building was processed using Bitumen solidification. The material from the sump had radiation levels of 1,500 rem/hr. After processing, none of the 30 solidified drums containing the

radioactive waste read over 60 mrem/hr. Licensee representatives stated that the vapor evaporator and bitumen solidification systems had performed flawlessly since startup on September 27, 1991. The inspector learned that the licensee currently has the capacity to store dry radwaste for 18 months and solidified radwaste drums for 24 months (at the current rate of generation). In addition, the NRF has four 30,000 gallon tanks for receiving and storing liquid radwaste.

4. Exit Meeting

The inspector met with the licensee representatives indicated in Section 1 at the conclusion of the inspection on December 20, 1991. The inspector summarized the scope and findings of the inspection and discussed the high standards observed in implementation of the RP program. The licensee did not identify any documents or processes used or observed by the inspector as proprietary. Dissenting comments were not received.