

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

Report Nos.: 50-280/95-21 and 50-281/95-21

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

Docket Nos.: 50-280 and 50-281

License Nos.: DPR-32 and DPR-37

Facility Name: Surry Power Station Units 1 and 2

Inspection Conducted: October 2-6, 1995

Inspector:

Approved by: T. Decker, Acting Chief

Plant Support Branch Division of Reactor Safety

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; audits and appraisals; external exposure control; internal exposure control; surveys, monitoring, and control of radioactive material; and maintaining occupational radiation exposure as low as reasonably achievable (ALARA).

Results:

Based on observations, interviews with licensee management, supervision, personnel from station departments, and records reviewed, the inspector found the licensee's program for occupational radiation safety was functioning adequately to protect the health and safety of the radiation workers and the general public. Radiation Protection staffing levels appeared adequate to support on-going activities and RP personnel interviewed were well trained. The licensee's self-assessment program was conducted in accordance with requirements. The licensee continued to implement effective internal and external exposure control programs with all exposures less than 10 CFR Part 20 limits. However, one non-cited violation was identified as failure to wear dosimetry as required by radiation protection procedure (Paragraph 5.).

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REPORT DETAILS

- 1. Persons Contacted
 - *M. Biron, Supervisor, Radiation Protection
 - *D. Boone, Quality Assurance
 - *M. Bowling, Manager, Nuclear Licensing
 - *B. Bryant, Licensing
 - *D. Christian, Station Manager
 - *D. Erickson, Superintendent, Radiation Protection
 - *B. Garber, Licensing
 - *H. McCallum, Nuclear Training
 - *J. McCarthy, Assistant Station Manager
 - D. Miller, Supervisor, Radiation Protection
 - *G. Miller, Corporate Licensing
 - *F. McConnell, Materials
 - D. Noce, Radiation Protection
 - M. Olin, Supervisor, Radiation Protection
 - *J. Price, Assistant Station Manager
 - *S. Sarver, Operations
 - *R. Saunders, Vice President, Nuclear Operations
 - *B. Shriver, Assistant Station Manager
 - *E. Smith, Quality Assurance
 - *D. Sommers, Licensing
 - *T. Sowers, Engineering
 - T. Steed, ALARA Coordinator, Radiation Protection
 - *J. Steinert, Quality Assurance
 - E. Topping, Radiation Protection

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

Nuclear Regulatory Commission

- *M. Branch, Senior Resident Inspector
- D. Kern, Resident Inspector
- K. Poertner, Resident Inspector
- *A. Belisle, Branch Chief, Division of Reactor Projects, RII

*Attended Exit Interview conducted on October 6, 1995.

2. Organization and Management Controls (83750)

The inspector reviewed the staffing of the radiation protection (RP) organization as related to lines of authority and noted no changes since the previous inspection conducted June 5-9, 1995, and documented in NRC Inspection Report (IR) 50-280/95-11 and 50-281/95-11. At the time of the inspection, Unit 1 was undergoing a 37-day refueling outage and Unit 2 was operating.

Based on a review of this area, the inspector noted that at the time of the inspection, the licensee maintained an adequate level of staffing to support ongoing operations and all RP personnel interviewed were well trained to perform their assigned duties.

No violations or deviations were identified.

3. Audits and Appraisals (83750)

10 CFR 20.1101(c) requires that the licensee periodically (at least annually) review the radiation protection program content and implementation.

The inspector noted that since the last inspection in this area conducted June 5-9, 1995, and documented in IR 50-280/95-11 and 50-281/95-11, an audit had been conducted by the licensee's Quality Assurance Organization entitled, "Radiological Protection Program Audit," 95-06, dated September 5-9, 1994. The audit assessed the following Radiological Protection Program attributes:

- Internal Exposure Control
- External Exposure Control
- Radiation Detection Instrumentation Program
- Transportation of Radioactive Material and Waste
- Training and Qualifications

Based on the audit results, the licensee concluded that regulatory requirements were effectively being implemented. The licensee audit reported that this determination was based on interviews, observations of work being performed, reviews of implementing documents, and applicable corrective actions implemented since the completion of the previous audits in these areas. However, some areas of weakness were identified in the area of procedural compliance. The licensee determined during a follow-up of previously opened items, that an RP audit finding (S94-07-01), which was issued because some workers did not understand survey data and Radiation Work Permit (RWP) requirements prior to entering the Radiological Control Area (RCA), would remain open. The licensee did note that worker awareness had improved and follow-up corrective actions had been performed; however, this item was not closed pending further evaluation by the licensee during the Unit 1 outage in September of 1995. The inspector determined that the licensee was identifying areas of weakness or non-compliance for improvement and that the audits being performed were meeting the licensee's requirements for performing annual audits in the area of RP.

The inspector also reviewed the licensee's internal program for selfidentification of weaknesses as it related to the RP program other than those identified during the annual audit and the appropriateness of corrective actions taken. The program included Station Deviation Reports (SDRs) and Radiation Awareness Reports (RARs). Both systems were utilized by the licensee to document, investigate, and track items of concern. The SDR system was a plant-wide system for identification of concerns, while the RAR was a lower-tier system utilized mainly by the RP organization to identify a variety of minor concerns.

The inspector reviewed various RARs initiated in 1995 and noted that the licensee was identifying substantive items of concern and was following through with appropriate corrective actions to prevent recurrence.

In general, the audits reviewed were determined to be well planned and met requirements for conducting audits in the area of radiation protection, as required by the licensee's appraisal process.

4. Internal Exposure Controls (83750)

10 CFR 20.1703(a)(3) permits the licensee to maintain and to implement a respiratory protection program that includes, at a minimum: air sampling sufficient to identify the hazard; surveys and bioassay to evaluate the actual intakes; testing of respirators immediately prior to each use; written procedures regarding selection, fitting, issuance, maintenance and testing of personnel and monitoring, including air sampling and bioassays; record keeping; and determination by a physician prior to the use of respirators, that the individual user is physically able to use respiratory protective equipment.

The inspector reviewed portions of the licensee's incorporation of 10 FR 20.1703(a)(3) during this inspection to include: air sampling, bioassay results, and records for six employees who had recently worn respiratory protection equipment. The inspector verified that for the records reviewed, each worker had successfully completed respiratory protection training, was medically qualified, and was fit-tested for the specific respirator type used in accordance with the licensee procedural requirements. The inspector also reviewed bioassay results for approximately 120 individuals who had worked in the RCA and reviewed air sample results for three specific jobs where airborne radioactivity was monitored. At the time of the inspection, the licensee was tracking approximately 124 positive intakes for 1995, of which, all were less than 10 percent of an annual Allowable Limit of Intake (ALI). Many of the positive intakes resulted in no internal dose after evaluations were performed. Individual intakes for 1995 were reviewed with cognizant licensee personnel to verify the methodology for assigning a Committed Effective Dose Equivalent (CEDE). The maximum CEDE for a single individual was approximately 50 millirem which was a small percentage of the regulatory limits of 5,000 millirem per year.

The inspector discussed with the licensee, respirator reduction efforts to enhance ALARA concepts with respect to worker training and use of face shields, decontamination efforts to minimize the potential for airborne radioactivity, and various engineering controls to include work site and building ventilation systems. Approximately six Radiation Work Permits were reviewed by the inspector to determine if engineering controls were being applied during the Unit 1 outage as required by licensee procedure for jobs where surveys indicated that high levels of contamination existed and respiratory protection was not worn. The inspector noted that engineering controls had been included on the Radiation Work Permits (RWPs) reviewed.

Based on the review conducted in this area, the inspector determined that the licensee had controlled internal exposures below regulatory limits.

No violations or deviations were identified.

5. External Exposure Controls (83750)

10 CFR 20.1101, "Radiation Protection Programs", (a) states "Each licensee shall develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this part."

Technical Specification 6.4B requires that procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained, and adhered to for all operations involving radiation exposure.

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.

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:

- 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 high radiation area.

10 CFR 20.1201 (a) requires each licensee to control the occupational dose to individual adults, except for planned special exposures less than 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 (CDE) 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 selectively reviewed the licensee's dosimetry program to ensure that the licensee was meeting the monitoring requirements of revised 10 CFR Part 20. The inspector verified that the licensee was NVLAP accredited based on the licensee maintaining a current NVLAP certificate.

Licensee representatives stated, and the inspector confirmed, that all TEDE, CDE, and SDE exposures assigned since the previous NRC inspection of this area were within 10 CFR Part 20 limits.

During tours of the RCA, the inspector observed personnel wearing dosimetry devices appropriately as required by RWPs. However, between September 17-29, 1995, the licensee identified four individuals who had entered the RCA not wearing dosimetry as required by the RWPs for the areas entered. The following multiple examples of failure to adhere to radiation control procedures were identified:

On September 17, 1995, a worker entered the Unit 1 Reactor Containment Building to work on the "A" Steam Generator work platform. Upon exiting the area, the worker determined that he was not wearing extremity thermoluminescent dosimetry (TLD) on the left and right wrist as required by the RWP. The worker immediately notified RP personnel that he had not worn the required dosimetry. Based on records reviewed, the inspector determined that the licensee had appropriately assigned exposure to the individual for the left and right wrist after the licensee performed an investigation of the event.

On September 23, 1995, four workers entered the Unit 1 Reactor Containment Building to perform the final inspection on the "A" Steam Generator and install the hot and cold leg diaphragm. Radiation Protection personnel determined that teledosimetry was not being detected at the telemetric system monitoring station for two of the workers in the work area. An RP supervisor requested the two workers to come down from the work platform to determine why the teledosimetry was not registering on the telemetric system. At this time RP determined that the workers were not wearing dosimetry required by the RWP. Based on records reviewed, the inspector determined that the licensee investigated this event and assigned exposure to the individuals.

On September 29, 1995, a worker entered the Unit 1 Reactor Containment Building to perform work in the Seal Table Room. Upon exiting the work area, the worker determined that he did not have the required dosimetry and informed RP that he may have lost it. Further

investigation determined that the worker had not carried the required Digital Alarming Dosimeter (DAD) as required by RWP into the work area. Based on records review, the inspector determined that the licensee investigated this event and assigned exposure to the individual properly.

The licensee investigated each event and corrective action was taken to brief all plant workers on the importance of complying with RWP requirements. Specific work groups were excluded from working in the RCA until corrective action could be implemented. Surry requested that an independent assessment of the events be performed by the Virginia Electric Power Company corporate office. Surry assigned an RP technician to the RCA entrance to monitor each individual entering the RCA to ensure that personnel understood their RWP requirements. The inspector reviewed licensee procedures which provided guidance to personnel preparing, briefing, and controlling work following radiation work permit requirements and observed RP personnel conducting radiological pre-job briefings. The inspector reviewed selected RWPs and discussed the RWP system with licensee representatives. In addition, the inspector observed personnel being briefed prior to entering the RCA. The RP group conducted adequate briefings for personnel entering an area for the first time on a specific RWP. Personnel were also required to notify RP prior to entry into the RCA.

The inspector noted in Paragraph 3, above, that the licensee had previously identified problems with workers not complying with RWP requirements. The inspector informed the licensee that failure of workers to follow RWP requirements for wearing TLD badges and other assigned dosimetry was a violation of licensee radiation procedure, VPAP-2101, Radiation Protection Program, Paragraph 6.6.1, Revision 7, dated August 10, 1995, which stated that workers shall wear assigned TLD badges and dosimetry. Based on the licensee's efforts in identifying and correcting the violation, which meet the criteria specified in section VII.B of the Enforcement Policy, the violation will not be cited, in accordance with the Enforcement Policy.

External exposure controls for four other outage evolutions were reviewed by the inspector to assess potential exposures to workers and to review the licensee followup actions. The events reviewed were as follows:

On September 14, 1995, while shutdown for refueling, the reactor vessel water level (RVWL) standpipe indication for Surry Unit 1 Reactor Vessel experienced an unexpected drop from approximately 18 feet to 13.3 feet which resulted in a temporary loss of shielding to workers in the immediate vicinity of the reactor head. The workers were performing head detensioning. Additional operational details of this event are addressed in NRC IR 50-280/95-20 and 50-281/95-20. The inspector reviewed the licensee's actions to assess any additional potential exposures received by the workers as a result of the loss in shielding. Based on a review of area radiation monitors, routine radiation surveys for the work area, and histogram readings from the DADs worn by the workers, no increase in dose rates during the loss of shielding could be determined. The histograms indicated dose rates

increasing and decreasing during this time period as workers moved around in the area to perform work. The inspector concluded that the licensee's actions to assess the exposures was adequate. Personnel in the work area were being monitored with DADS and TLDs.

On September 13, at approximately 1830 hours, the PRT was vented to the containment without the use of the required procedure. The Surry NRC Resident inspectors noted, through interviews, and review of logs and completed procedures, that section 5.5 of 1-OP-RC-011, Pressurizer Relief Tank (PRT) Operations, revision 1, established the method for venting the PRT to the vent system. The PRT was vented by opening 1-RC-ICV-5025 which established a vent path from the PRT through pressure transmitter PT-1472 to containment. A review of the release permits for that day showed that there was no Gaseous Group Release Permit for venting the PRT to the vent system as required by step 5.5.4. Interviews determined that there was no poly hose connected from the vent tap, 1-RC-ICV-5025, to the nearest Containment Purge Exhaust as required by step 5.5.5. Additional operational details of this event are addressed in NRC IR 50-280/95-20 and 50-281/95-20. inspector reviewed the radiological consequences of this event and determined that Xenon-133 gas had been released to the Unit 1 reactor containment and workers in the area had been assigned an SDE based on airborne radioactivity airborne results. Maximum SDE assigned for this event was approximately 5 millirem compared to an annual regulatory limit of 50,000 millirem SDE.

On September 16, 1995, as a result of lifting the reactor head, the licensee determined that Xenon-133 gas was present in the Unit 1 reactor containment at a concentration of approximately 3.35E-4 microcuries per milliliter. The inspector reviewed licensee air sample results and licensee assigned SDE exposures for workers in the affected areas. The maximum SDE assigned was approximately 147 millirem compared to an annual regulatory limit of 50,000 millirem SDE.

On October 5, 1995, a worker walked onto the reactor upper internals to retrieve a screw that had possibly been seen lying on the upper internals. The contract worker was also to maintain communications with the crane operator lowering the reactor head into place. During this evolution a jack stand was bent which stopped the evolution. The inspector reviewed this event based on the worker entering a dose rate field of approximately 5 Rem. per hour general area and 15 Rem. per hour contact with the jack stands. A review of this event determined that the worker's whole body was monitored with TLDs and multi-badge teledosimetry which was being constantly monitored by RP personnel. An RP technician was also stationed in the reactor cavity to provide constant radiological work coverage. The inspector concluded that the licensee closely monitored worker external exposure during this event.

Based on observations, records review, and interviews with plant workers, the inspector concluded the licensee was effectively controlling external radiation exposure consistent with the requirements of 10 CFR Part 20 limits. However, examples of workers failure to follow procedure requirements for wearing dosimetry was identified as a non-cited violation.

One non-cited violation was identified

6. Control of Radioactive Material and Contamination, Surveys, and Monitoring (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 radiological hazards that may be present.

a. Posting and Labeling

10 CFR 20.1904(a) requires, in part, each container of licensed material containing greater than Appendix C quantities to bear a durable, clearly visible label identifying the radioactive contents and providing sufficient information to permit individuals handling or using the containers, or working in the vicinity thereof, to take precautions to avoid or minimize exposures.

During tours of the Auxiliary Building, and various radioactive material storage locations, the inspector independently verified that selected containers of radioactive material were labeled consistent with regulatory requirements. The inspector interviewed selected workers to ensure personnel were properly trained to understand posting and labeling requirements.

Discussions were conducted with selected cognizant individuals in RP regarding their responsibilities as described in the licensee procedural requirements. Based on observations during the inspection, discussions with cognizant licensee personnel, and records reviewed, the inspector determined that cognizant personnel were knowledgeable of the licensee's procedural requirements for controlling and surveying potentially radioactive material.

Based on a review of this area, the inspector determined that the licensee was posting areas and labeling radioactive material consistent with regulatory requirements.

No violations or deviations were identified.

b. Personnel and Area Contamination

The inspector reviewed selected Personnel Contamination Events (PCEs) and discussed contamination control practices for selected outage operations. During plant tours, the inspector observed adequate housekeeping and contamination control practices. The inspector observed handling, packaging, and surveying of contaminated equipment for movement and judged the work evaluations satisfactory. At the time of the inspection, the licensee was averaging approximately 2150

 ft^2 (1.57 percent) of the RCA as recoverable contaminated space. During non outage periods, the licensee was maintained less than one percent (less than 200 ft^2) of the total RCA as recoverable contaminated space. The licensee maintained approximately 1.8 percent of the total RCA as recoverable contaminated space during the last Refueling Outage of Unit 2.

At the time of the inspection, the licensee had incurred approximately 170 PCEs in 1995, of which 127 PCEs occurred during the Unit 2 ten year In Service Inspection (ISI) refueling outage. At the time of the inspection, 34 PCEs had occurred during the current Unit 1 outage and the remainder of the PCEs for the year had occurred during non-outage periods.

Based on a review of records, facility tours and discussions with licensee personnel, the inspector determined that the licensee was effectively implementing contamination control practices.

No violations or deviations were identified.

c. High Radiation Areas

TS 6.12.1 required, in part, that each High Radiation Area (HRA), with radiation levels greater than or equal to 100 millirem/hour but less than or equal to 1000 millirem/hour, be barricaded and conspicuously posted as an 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.

During tours of the Auxiliary Building, the inspector noted that all HRAs and locked HRAs inspected were locked and/or posted, as required.

Based on a review of procedures, facility tours, and interviews, the inspector determined that the licensee's implemented program for HRA controls met the requirements of 10 CFR Part 20 and the licensee's TS requirements.

No violations or deviations were identified.

d. Radiation Detection and Survey Instrumentation

The inspector reviewed the plant procedure which established the licensee's radiological survey and monitoring program and verified that the procedures were consistent with regulations, and good RP practices. During facility tours, the inspector observed RP personnel operating survey instruments during the performance of radiation and contamination surveys. The inspector noted that survey instrumentation and continuous air monitors in use within the RCA were

operable and displayed current calibration stickers. The inspector further noted that an adequate number of survey instruments were available for use. During the inspection, the inspector discussed source check requirements with RC supervision and based on observations determined source checked instruments were being used for documented surveys.

The inspector reviewed selected records of radiation and contamination surveys performed during 1995 and discussed the survey results with licensee representatives. Licensee personnel interviewed were knowledgeable of the radiation survey results for the areas to which they were assigned. The inspector received a thorough briefing on the dose rates inside the Auxiliary Building prior to entry.

During facility tours, the inspector verified, by independent surveys or observation of surveys, radiation and/or contamination surveys in randomly selected areas of the Auxiliary Building, outside areas, and other radioactive material storage areas.

Based on a review of this area, the inspector concluded that the licensee was performing surveys consistent with regulatory requirements.

No violations or deviations were identified in this area.

7.

Programs for Maintaining Exposures As Low As Reasonably Achievable (ALARA) (83750)

10 CFR 20.1101(b) states that the licensee shall use to the extent practical, procedures and engineering controls based upon sound radiation protection procedures to achieve occupational 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 planning and 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 reviewed and discussed with licensee representatives successful ALARA initiatives used during the current 37 day Unit 1 refueling outage. These initiatives included the utilization of temporary shielding, teledosimetry, remote video cameras, and radio communications, and mockup training. The inspector reviewed the current work scope package for the Unit 1 outage as compared to the previous Unit 2 (46.1 days) outage performed in February and March 1995. The licensee identified that the dose rates for the two units were comparable. Work scope differences in the two Units identified an increase in work scope in Unit 1 of approximately 18 person-rem. The inspector determined, by a review of documentation, that the licensee had continued to track and trend dose rates, develope engineering controls for exposure reduction, perform TEDE ALARA evaluations, perform shielding evaluations and install shielding to reduce dose rates, conduct post-job reviews with craft personnel and supervision to improve preplanning and to establish work

controls consistent with ALARA goals. Actual exposure expended as of day 23 in the current Unit 1 outage was trending slightly below exposure projections for that day, which was consistent with the completion of steam generator work being approximately 1 day ahead of schedule. Based on a review of exposure trending records for each unit, the inspector determined that the licensee was meeting pre-establed exposure goals during outages and that annual exposures per Unit had continued to trend lower.

Based on a review of the licensee's ALARA program, the inspector determined that the licensee was continuing to implement procedures and engineering controls to maintain occupational exposures ALARA.

No violations or deviations were identified in this area.

8. Exit Meeting (83750)

The inspector met with licensee representatives indicated in Paragraph 1 at the conclusion of the inspection on October 6, 1995. The inspector summarized the scope and findings of the inspection. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed during the inspection. The licensee did not identify any such documents or processes as proprietary. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Status</u>	Description and Reference
50-280, 281/95-21-01	Closed	NCV - Licensee failure to fol

, 281/95-21-01 Closed

NCV - Licensee failure to follow procedures for wearing dosimetry. (Paragraph 5.).