



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30303

Report Nos.: 50-327/84-34 and 50-328/84-34

Licencee: Tennessee Valley Authority  
500A Chestnut Street  
Chattanooga, TN 37401

Docket Nos.: 50-327 and 50-328

License Nos.: DPR-77 and DPR-79

Facility Name: Sequoyah

Inspection Conducted: October 29 - November 2, 1984

Inspector:

*William J. Hoey*  
for C. M. Hoey

*11/16/84*

Date Signed

Approved by:

*G. R. Jenkins*  
G. R. Jenkins, Section Chief  
Division of Radiation Safety and Safeguards

*11/16/84*

Date Signed

SUMMARY

Scope: This routine, unannounced inspection involved 40 inspector-hours on site in the areas of radiation protection, including audits and surveillances, organization and management, training and qualifications, external exposure control and personal dosimetry, internal exposure control, surveys, monitoring and control of radioactive material, ALARA programs, IE Information Notices and followup on previous inspector identified items.

Results: Violation - improper efficiency test for air purifying respirator filters.

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## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees Contacted

- \*P. R. Wallace, Plant Manager
- J. M. Anthony, Operations Superintendent
- \*G. B. Kirk, Compliance Engineer
- \*D. E. Crawley, Health Physics Supervisor
- \*S. P. Holderfer, Supervisor, Health Physics Operations Unit
- \*J. S. Steigleman, Supervisor, Health Physics Support Unit
- J. T. Dills, Supervisor Health Physics Technical Unit
- W. Williams, Chemical Engineer
- J. Osborne, Health Physics Shift Supervisor
- J. Leamon, ALARA Engineer
- V. Faust, Dosimetry Supervisor
- D. L. Cowart, Quality Surveillance Section
- L. W. Smith, Plant Training

Other licensee employees contacted included construction craftsmen, eight technicians, two operators, five mechanics, and three office personnel.

#### NRC Resident Inspectors

E. Ford, Senior Resident Inspector

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on November 2, 1984, with those persons indicated in paragraph 1 above. Two violations described in Paragraph 6, Failure to Label and/or Mark Radioactive Material were discussed in detail. Since the violations were identified by the licensee, and met the criteria of 10 CFR 2, Appendix C, a Notice of Violation will not be issued. One unresolved item described in Paragraph 7, improper efficiency test of air purifying respirator filter prior to reuse, was discussed. The item was unresolved pending an NRC review of the acceptability of substituting polydispersed corn oil for nondispersed DOP in the efficiency test. On November 8, the inspector notified the plant health physics supervisor that the unresolved item would be changed to a violation, in that 10 CFR 20, Appendix A footnote d-2(b) specifies that thermally generated DOP test is required to determine the efficiency of the filter prior to reuse and the NRC has not approved any other method for determining efficiency. The licensee acknowledged the inspector findings and took no exceptions.

3. Licensee Action on Previous Enforcement Matters

(Closed) Violation (327/82-31-01) The inspector reviewed the licensee's response dated February 1, 1983, and verified that the corrective action specified in the response had been taken. The inspector had no further questions.

4. Organization and Management Controls (83722)

Technical Specification 6.2.2 describes the licensee's onsite organization. The licensee has made extensive changes to the plant organization.

The inspector reviewed the licensee's organization, staffing level and lines of authority as they related to radiation protection and radioactive material control, discussed these areas with the plant's radiation protection staff, and verified that the licensee had not made organizational changes which would adversely affect the ability to control radiation exposures or radioactive material.

The inspector reviewed the plant's replies for documenting more significant radiation protection problems and the appropriateness of the corrective action taken.

No violations or deviations were identified.

5. Training and Qualification (83723)

Technical Specification 6.3.1 requires that each member of the facility staff meet or exceed the minimum qualification of ANSI N18.1-1971 for comparable positions, except for the Health Physicist (Radiation Protection Manager) who shall meet or exceed the qualification of Regulatory Guide 1.8, September, 1975.

Paragraph 4.5.2 of ANSI N18.1 states that technicians in responsible positions shall have a minimum of two years of working experience in their specialty. The inspector reviewed the experience and training records for selected contract health physics technicians currently working at the station. The inspector discussed radiological controls for specific jobs with contract and plant health physics technicians. The inspector observed health physics technicians during implementation of radiological controls for selected activities.

Paragraph 4.3.2 of ANSI N18.1 states, that supervisors not requiring a license shall have a minimum of four years experience in the craft or discipline supervised. The inspector reviewed the experience and training records for first and second line health physics supervisors and discussed radiological control activities related to their positions with selected supervisors.

Regulatory Guide 1.8, September, 1975 requires the Radiation Protection Manager to have a bachelor's degree or the equivalent in a science or engineering subject, including some formal training in radiation protection and at least five years of professional experience in applied radiation protection. At least three years of the professional experience should be in applied radiation protection work in a nuclear facility dealing with radiological problems similar to those encountered in nuclear power plants.

The inspector reviewed the qualifications of the Plant Health Physicist and discussed the qualifications with the individual.

10 CFR 19.12 requires the licensee to instruct all individuals working in or frequenting any portion of the restricted area in the health protection problems associated with exposure to radioactive material or radiation, in precautions or procedures to minimize exposures, and in the purpose of functions of protective devices employed, applicable provisions of Commission regulations, individual responsibilities and the availability of radiation exposure data.

Plant procedures AI-14, Plant Training Program, and RCI-2, Radiological Hygiene Training, establishes the program for implementing the requirement to instruct each individual entering the restricted area.

The inspector discussed the radiation protection aspects of the general employee training program with licensee representatives. During tours of the plant, the inspector interviewed workers to assess their knowledge and understanding of radiation protection requirements.

The inspector reviewed the training and examinations given to selected contract health physics technicians prior to beginning work at the plant.

No violations or deviations were identified.

6. External Exposure Control and Personal Dosimetry (83724)

10 CFR 20.101 specifies the applicable radiation dose standards. The inspector reviewed the computer printouts (NRC Form 5 equivalent) for the period July - October 31, 1984, and verified that the radiation doses recorded for plant personnel were well within the quarterly limits of 20.101(a).

10 CFR 20.101(b)(3) requires the licensee to determine an individual's accumulated occupational dose to the whole body on an NRC Form 4 or equivalent record prior to permitting the individual to exceed the limits of 20.101(a). The inspector reviewed selected occupational exposure histories for individuals who exceeded the values in 10 CFR 20.101(a). The exposure histories were being completed and maintained as required by 10 CFR 20.102.

10 CFR 20.202 requires each licensee to supply appropriate personnel monitoring equipment to specific individuals and require the use of such equipment.

The inspector reviewed the following plant procedures which established the licensee's program for personnel monitoring of external dose in accordance with 10 CFR 20.202:

RCI-1, Radiological Hygiene Program, Rev. 24  
RCI-3, Personnel Monitoring

The inspector reviewed the records of personnel monitoring provided for selected special maintenance activities, such as steam generator eddy current testing and reactor coolant pump seal work, discussed the monitoring with licensee representatives and observed the issuance, use, and processing of special dosimetry for whole body (multiple badge) and extremity monitoring.

During tours of the plant, the inspector observed workers wearing appropriate personnel monitoring devices (pocket dosimeters and/or TLDs).

Technical Specification 6.8 requires the licensee to have written radiation protection procedures, including the use of radiation work permits. The inspector reviewed plant procedure RCI-14 which provided detailed instructions on the preparation and processing of Radiation Work Permit (RWPs).

The inspector reviewed selected active RWPs for appropriateness of the radiation protection requirements based on work scope, location, and conditions. During tours of the plant, the inspector observed the adherence of plant workers to the RWP requirements and discussed the RWP requirements with plant workers at the job site.

20.401(a) requires each licensee to maintain records showing the radiation exposure of all individuals for whom personnel monitoring is required under 20.202 of the regulations. Such records shall be kept on Form NRC-5 or equivalent.

The inspector reviewed selected individual exposure records maintained by the licensee.

The inspector discussed the planning and preparation for the current Unit 2 refueling outage with licensee representatives. Specific areas discussed included increased staffing, special training, equipment and supplies, health physics involvement in outage planning, licensee control over contractor health physics technicians, dose reduction methods to be employed and radioactive waste reduction activities.

10 CFR 20.203 specifies the posting, labeling and control requirements for radiation areas, high radiation areas, airborne radioactivity areas and radioactive material. Additional requirements for control of high radiation areas are contained in Technical Specification 6.12.

Plant procedure RCI-1 contains additional information on the posting and control of radiological areas.

During tours of the plant, the inspector reviewed the licensee's posting and control of radiation areas, high radiation areas, airborne radioactivity areas, contamination areas, radioactive material areas and the labeling of radioactive material.

10 CFR 20.203(f) requires that each container that contains a quantity of licensed material in excess of the applicable quantity listed in Appendix C of Part 20, bear a durable, clearly visible label identifying the radioactive contents. The label must also bear the standard caution symbol and the words "Caution or Danger - Radioactive Material."

On November 1, 1984, the inspector observed two pieces of radioactive material wrapped in yellow plastic in the auxiliary building (690' elevation railroad bay) which were not labelled. The radiation levels on the packages were approximately two mr/hr.

The inspector stated that the radiation levels on the packages were such that labelling of the packages in accordance with 10 CFR 20.203 (f) was required. Plant Procedure RCI-1, Paragraph VI requires that contaminated material removed from contaminated areas shall be wrapped in yellow plastic, the proper warning tag affixed or pertinent survey data, date and surveyor's initials clearly marked on this item and radiation warning tape affixed to the item. On November 2, the inspector observed three yellow plastic bags of contaminated material outside the waste evaporator package room on the 669' elevation of the auxiliary building and one yellow bag of contaminated material near the refueling water purification pump which were not marked and/or labeled in accordance with RCI-1 area on the 669' elevation of the auxiliary building. The bags of contaminated material were located outside a contaminated area. The radiation levels in the base were less than 2 mr/hr. The inspector stated that failure to label packages of radioactive material containing greater than Appendix C quantities of licensed material is a violation of 10 CFR 20.203(4), and failure to mark/and or label contaminated material removed from contaminated area is failure to follow plant procedure RCI-1 and a violation of Technical Specification 6.8.

A licensee representative informed the inspector that an audit performed by health physics personnel during the week of October 22, 1984, identified similar problems with marking and labeling of containers of radioactive material. A licensee representative stated that the licensee has begun conducting special training sessions for the health physics staff on the criteria and proper methods for marking and/or labeling radioactive material and that this training will be completed by November 6, 1984. In addition the licensee is evaluating the need and proper method for providing specific information to the plant workers on the management of radioactive material from contaminated areas.

The inspector stated that since the violations were identified by the licensee, are Severity Level IV or V Violations, will be corrected in a reasonable time and were not violations that could reasonably be expected to have been prevented by the licensee's corrective actions for a previous

violation, no enforcement action will be taken in accordance with Appendix C to 10 CFR 2.

7. Internal Exposure Control (83725)

10 CFR 20.103(a) establishes the limits for exposure of individuals to concentrations of radioactive materials in air in restricted areas. This section also requires that suitable measurements of concentrations of radioactive materials in air be performed to detect and evaluate the airborne radioactivity in restricted areas and that appropriate bioassays be performed to detect and assess individual intakes of radioactivity.

The inspector reviewed selected results of general in-plant air samples taken during the period September and October 1984 and the results of air samples taken to support work authorized by specific radiation work permits.

The inspector reviewed selected results of bioassays (whole body counts) and the licensee's assessment of individual intakes of radioactive material performed during the 3rd and 4th Quarter 1984. At the request of the inspector the licensee performed special whole body counts on selected individuals who worked on jobs that required respiratory protection.

10 CFR 20.103(b) requires the licensee to use process or other engineering controls, to the extent practicable, to limit concentrations of radioactive material in air to levels below that specified in Part 20, Appendix B, Table I, Column 1 or limit concentrations, when averaged over the number of hours in any week during which individuals are in the area, to less than 25 percent of the specified concentrations.

The use of process and engineering controls to limit airborne radioactivity concentrations in the plant was discussed with licensee representatives.

10 CFR 20.103(b) requires that when it is impracticable to apply process or engineering controls to limit concentrations of radioactive material in air below 25% of the concentrations specified in Appendix B, Table 1, Column 1, other precautionary measures should be used to maintain the intake of radioactive material by any individual within seven consecutive days as far below 40 MPC-hours as is reasonably achievable. By review of records, observations and discussions with licensee representatives, the inspector evaluated the licensee's respiratory protection program, including medical qualifications, MPC-hour controls, and the use, decontamination, repair and storage of respirators.

During a tour of the respirator repair and storage facility, the inspector noted that the licensee reused respirator filters. In discussions with the inspector, a licensee representative stated that the filters were tested using pharmaceutical grade corn oil.

10 CFR 20, Appendix A, footnote d-2(b) requires that in order for a protection factor to be used, the air-purifying respirator must have a high efficiency particulate filter. A high efficiency filter is one that is 99.97% efficient using a monodispersed 0.3 micrometer DOP test.

The inspector stated that the licensee must demonstrate that the filter is still a high efficiency filter prior to reuse and that the monodispersed 0.3 micrometer DOP test must be used to demonstrate this efficiency. The inspector stated that failure to use a monodispersed 0.3 micrometer DOP test to demonstrate that filters used in air purifying respirators are 99.97% efficient prior to reuse of the filter is a violation of 10 CFR 20, Appendix A, footnote d-2(b)(327/328/84-34-01).

The inspector reviewed the following plant procedures which established the licensee's internal exposure control and assessment program and verified that the procedures were consistent with regulations, Technical Specifications and good health physics practices:

RCI-1, Radiological Hygiene Program, Rev. 24  
RCI-4, Responding Protection Program, Rev. 18  
RCI-11, Bioassay Program, Rev. 4

8. Surveys, Monitoring, and Control of Radioactive Material (83726)

The inspector discussed planning and preparation for the current Unit 2 Refueling outage with licensee representatives. Specific areas discussed included use of auxiliary ventilation systems, documentation of equipment prior to maintenance and availability of respiratory protection equipment.

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 radiation hazards that may be present.

The inspector reviewed selected records of radiation and contamination surveys performed during October, 1984 and discussed the survey results with licensee representatives.

During tours of the plant the inspector observed health physics technicians performing radiation and contamination surveys.

The inspector performed independent radiation and loose surface contamination surveys in the auxiliary building and in the restricted area outside the auxiliary building and verified that the areas were properly posted.

The inspector discussed with the licensee the method used to release material from the restricted area and observed technicians performing release surveys for material.



The inspector observed personnel using the personnel frisker (RM-14/RM-16 with HP-210 pancake probe) to perform contamination surveys of themselves prior to exiting the controlled area.

No violations or deviations were identified.

9. Licensee Audits and Surveillances (83722, 83723, 83723, 83724, 83725, 83726, 83728, 84722, and 86721)

The inspector discussed the audit and surveillance program related to radiation protection, radioactive waste management and transportation of radioactive material with licensee representatives. The inspector reviewed the following audits and surveillances:

- a. INPO Evaluation , Weeks of January 23 and 30, 1984  
Report No. TR-02-04,
- b. Special Evaluation Report - Evaluation of Extremity and Multibadging Dosimetry, October 3, 1984

QA Audit CH-8400-14, Health Physics Training and Staff Qualification, July 23 - 27, 1984

QA Audit SQ-8400-10, Radioactive Waste Management and Process Control Program, May 14 - 18, 1984

Inplant Survey Checklist 9a-84-P-009, Reporting Protection Program

Inplant Survey Checklist 2d-84-P-004, Health Physics Training

No violations or deviations were identified.

10. ALARA Program (83728)

10 CFR 20.1c states that persons engaged in activities under licenses issued by the NRC should make every reasonable effort to maintain radiation exposure as low as reasonably achievable (ALARA). 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 Exposures ALARA.

The inspector reviewed plant procedure RCI-10 which establishes the program for keeping occupational exposures ALARA and discussed the administrative aspects of the program with licensee representatives.

During tours of the plant, the inspector interviewed workers to determine their knowledge of the ALARA program and their direct involvement in the program.

The inspector discussed the ALARA goals and objectives for the current year with licensee representatives and reviewed the man-rem estimates and results for the current year.

As of October 26, 1984 the actual collective exposure for calendar year 1984 was 772 man-rem which represented 77 percent of the estimated exposure for the year.

The inspector reviewed the following prejob ALARA planning reports for jobs performed during the unit's refueling outage.

84-72, Reassembly/reinstallatin of Rx Head  
84-C7, RCP seal work

Action taken by the licensee as the results of prework planning are estimated by the licensee to reduce the man-rem for the above jobs approximately 20% and 10% respectively.

No violations or deviations were identified.

11. I.E. Information Notices (92717)

The following IE Information Notices were reviewed to ensure their receipt and review by appropriate licensee management:

- 84-24, Physical Requalification of Individuals to Use Respiratory Protective Devices
- 84-34, Respirator User Warning: Defective Self-Contained Breathing Apparatus Air Cylinder
- 84-40, Deliberate Circumventing of Station Health Physics Procedures
- 84-60, Failure of Air-Purifying Respirator Filters to Meet Efficiency Requirement
- 84-61, Overexposure of Diver in Pressurizer Water Reactor (PWR) Refueling Cavity
- 84-75, Calibration Problems - Eberling Instrument Model 6112B Analog Teletectors

No violations or deviations were identified.

12. Followup On Previous Inspector Identified Items (93701)

- a. (Closed) IFI (327/80-08-01) Radiofrequency Interference with Radiation Monitor. This item pertains to spurious alarms of radiation monitors caused by the generating of RF interference due to heliarc welding.

The problem was originally identified during construction. A licensee representative stated that the completion of construction and better control of welding machines has reduced the number of occurrences. The inspector had no further questions.

- b. (Closed) IFI (327/80-08-04) Pressurizer Access for Maintenance. A licensee representative stated that an access hatch had been added to the top of the pressurizer missile shield to provide access to the valves on the top of the pressurizer for maintenance and that no access problems have been experienced during past outages. The inspector had no further questions.
- c. (Closed) IFI (327/328-82-19-03) Noble Gas Leaks in Auxiliary Building. This item pertained to the numerous noble gas problems the licensee has experienced the auxiliary building. The licensee has evaluated each release and has taken appropriate corrective action to prevent a recurrence. The inspector had no further questions.
- d. (Closed) IFI (328/81-23-01) Permanent Shielding of Resin Discharge Line in Auxiliary Building. The licensee has evaluated the installation of shielding of the resin lines in pipe penetration rooms and has elected to control access to the areas during resin transfer administratively. The inspector had no further questions.