



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
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 ATLANTA, GEORGIA 30323-0199

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Report No: 50-261/93-26

Licensee: Carolina Power and Light Company  
 P. O. Box 1551  
 Raleigh, NC 27602

Docket No.: 50-261

License No.: DPR-23

Facility Name: H. B. Robinson

Inspection Conducted: October 25-29, 1993

Inspectors:	<u><i>A. T. Boland</i></u>	<u>11/24/93</u>
	A. T. Boland, Radiation Specialist	Date Signed
	<u><i>E. D. Testa</i></u>	<u>11/24/93</u>
	E. D. Testa, Senior Radiation Specialist	Date Signed

Accompanying Personnel: J. Bell  
 D. Carter

Approved by:	<u><i>William H. Rankin</i></u>	<u>11/24/93</u>
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SUMMARY

Scope:

This routine, announced inspection of the licensee's radiation control (RC) program involved review of health physics (HP) activities primarily associated with the current Unit 2 refueling outage (RFO-15). The specific areas evaluated included organization and staffing; RC training and qualifications; audits and appraisals; external and internal exposure monitoring and assessment programs; operational and administrative controls; control of radioactive material and contamination, surveys and monitoring; As Low As Reasonably Achievable (ALARA) program implementation; and the licensee's response to previously identified inspection findings. In addition, the implementation of the new 10 CFR Part 20 requirements was evaluated, primarily in the focus areas of high and very high radiation areas, declared pregnant women, planned special exposures (PSEs), and total effective dose equivalent (TEDE) ALARA program implementation utilizing a draft Temporary Instruction (TI).

## Results:

Based on interviews with licensee personnel, records review, and observation of work activities in progress, the inspector found the RC program adequately protected the health and safety of plant workers. Organizational changes were noted within the E&RC function; however, no concerns were noted with the new reassignment of responsibilities. RC staffing appeared adequate to support on-going outage activities. Internal and external exposure control programs were effectively implemented with all exposures within 10 CFR Part 20 limits. With respect to the revised 10 CFR Part 20 focus areas reviewed, appropriate incorporation of the requirements into plan procedures and training program was noted. Respirator reduction, implementation of the RC Outage Coordinator position, and the interaction of RC technicians with workers were noted as program strengths. The following violations were identified:

- Violation of Technical Specification (TS) 6.11 for the failure to follow procedures for administratively controlling keys to lock high radiation areas (Paragraph 5).
- Non-cited violation of TS 6.11 for the failure to follow procedures for labelling containers of radioactive material whose contents exceeded 10 CFR Part 20, Appendix C limits (Paragraph 8).
- Violation of TS 6.5.1.1.1 for the failure to follow procedures for controlling an irradiated bolt with contact dose rates of 650 Rem/hour while stored in the spent fuel pool (Paragraph 8).

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*R. Barnett, Project Manager
- D. Beaur, Regulatory Compliance
- M. Bedenbaugh, ALARA Specialist
- \*W. Brand, Radiation Control (RC) Supervisor, Environmental and Radiation Control (E&RC)
- S. Brown, Corporate Health Physicist, Dosimetry
- \*T. Cleary, Manager, Technical Support
- \*S. Collins, RC Supervisor, E&RC
- M. Crabtree, RC Supervisor
- C. Dietz, Vice President, Robinson Nuclear Plant
- \*W. Flanagan, Jr., Manager, Operations
- E. Gardner, RC Supervisor, E&RC
- \*J. Harrison, Manager, E&RC Support
- \*J. Henderson, Principal Specialist, Nuclear Assessment Department (NAD)
- M. Herrell, Manager, Training
- \*A. Love, Health Physics Technician, RadWaste
- \*C. Olexik, Manager, Robinson NAD
- \*A. Padgett, Manager, E&RC
- \*M. Pearson, Plant General Manager
- \*T. Pilo, Senior Specialist, E&RC
- \*W. Richie, Senior Specialist, ALARA
- \*M. Scott, Manager, Nuclear Steam Supply System
- L. Williams, Manager, Security
- \*T. Williams, Manager, Technical Training
- \*D. Waters, Manager, Regulatory Affairs

Other licensee employees contacted included engineers, technicians, and office personnel.

#### Nuclear Regulatory Commission

- \*C. Ogle, Resident Inspector
- W. Orders, Senior Resident Inspector

\*Attended October 29, 1993 Exit Meeting

### 2. Organization and Staffing (83729)

The inspector reviewed and discussed with licensee representatives changes made to the RC organization since the last NRC inspection of this area conducted June 28 through July 2, 1993, and documented in Inspection Report (IR) 50-261/93-16, dated July 30, 1993.

Cognizant licensee personnel informed the inspector that the organizational structure of the Environmental and Radiation Control (E&RC) group had recently changed. The principal change involved the creation of the position of Manager, Environmental and Chemistry (E&C)

who is responsible for the chemistry and environmental programs including oversight of the corresponding supervisors, technicians, and specialists. In effect, creation of this position and realignment of the supporting staff served to consolidate these two functional areas into one group with the Manager, E&C reporting directly to the Manager, E&RC. Previously, the Supervisor, E&C reported to the Manager, E&RC directly and the specialists in these areas were under the direction of the Manager, E&RC Support. The new responsibilities of the Manager, E&RC Support are primarily limited to the direction of the specialists' activities related to the RC function. No changes were noted in the organizational responsibilities of the four remaining RC Supervisors. The inspector did not note any concerns regarding the organizational change or redistribution of managerial responsibility, and all functions continued to be appropriately assigned within the RC function.

The inspector noted that the licensee's routine RC organization continued to remain relatively stable with approximately 30 RC and dosimetry technicians and 6 specialist positions allocated to the group. At the time of the onsite inspection all technician positions were filled and two specialist positions were vacant. Regarding the latter, licensee representatives stated that these two positions were new resulting from the reapportioning of RC resources from the corporate organization. Actions to fill the positions were currently in progress.

The inspector also reviewed the licensee's organization to support ongoing Refueling Outage (RFO-15) activities. For the outage, the licensee employed approximately 81 contractor personnel to supplement the routine staff. This number included 49 senior technicians, 16 junior technicians, 8 decontamination technicians, 3 ALARA technicians, 4 supervisors, and a site coordinator. The position of Health Physics (HP) Coordinator was established to facilitate planning, coordination, and direction of HP activities for the outage. All primary outage RC supervisors reported to this individual. The addition of this position was considered a program strength.

Based on discussions with licensee representatives and observation of activities in progress, the RC staffing levels appeared adequate to support on-going outage activities. Overall, no concerns were noted, and observed interactions between HP technicians and workers was considered to be good.

No violations or deviations were identified.

3. Health Physics Training and Qualifications (83729 and Draft TI)

10 CFR 19.12 requires, in part, that the licensee instruct all individuals working in or frequenting any portion of a restricted area in the health protection aspects associated with exposure to radioactive material or radiation; in precautions or procedures to minimize

exposure; in the purpose and function of protection devices employed; in the applicable provisions of the Commission regulations; in the individual's responsibilities; and in the availability of radiation exposure data.

The inspector reviewed various aspects of the licensee's HP training program with respect to incorporation of information related to implementation of the revised 10 CFR Part 20. In addition, the programs were evaluated for any changes implemented since the last inspection of this area conducted June 28 through July 2, 1993, and documented in IR 50-261/93-16. The following procedures and/or documents were reviewed related to this program area:

- Procedure ERC-012, Transient Health Physics Training and Qualification, Revision (Rev.) 5
- Training Instruction (TI) No. 114, Related Technical Training and On-the-Job Training for Environmental and Chemistry and Radiation Control Classification, Rev. 0
- TI No. 911, Training Exemption, Rev. 0
- Lesson Plan for E&RC Continuing Training, 10 CFR Part 20 Revisions (Course RC792G)
- Lesson Plan for Contractors and Continuing Training, 10 CFR Part 20 Overview (Course TM6C01G)
- Lesson Plans for General Employee Level I Training (Course GNB01N)
- Lesson Plans for RC Contractor Technician Training (Courses RA0001R, RA0002R, RA0003R, and RA0004R)
- Lesson Plans for General Employee Level II Training (Course GNB02N)
- Lesson Plans for General Employee Retraining (Course GNO31N)

The inspector noted that no significant changes had been made to the HP related training program since this area was last reviewed with one exception. In response to a previous Nuclear Assessment Department (NAD) finding as well as a non-cited NRC violation, the licensee developed TI No. 911 which provided the guidelines for the training exemption process for newly hired employees. The procedure addressed the methods to verify equivalent knowledge and/or skills as well as the approval authorities required for exemption. No concerns were noted regarding the procedure.

Regarding incorporation of the revised Part 20 into training, the inspector reviewed and discussed the following training elements with the licensee: Initial RC Technician training, RC Technician Continuing training, RC Contractor Technician training, General Employee Initial

and Requalification training (GET), and Reactor Operator/Senior Reactor Operator Requalification training. In general, the inspector determined that the training, study guides, and selected examination questions appropriately incorporated the new 10 CFR Part 20 concepts, terminology, and requirements.

In addition, the inspector reviewed the training provided to workers with respect to the use and limitations of digital alarming dosimeters (DADs). The review determined that all personnel received training on DADs during initial GET and annual requalification GET; however, several items were discussed with the licensee. First, although workers were instructed in GET as to what actions to take in the event of an alarm (leave the area on a high dose alarm or back away from a radiation source when the dose rate alarm sounds), these instructions were different from the instructions given by RC during pre-job briefings (leave the area and contact HP on any alarm). Second, GET did not appear to address all the limitations and precautions necessary to the use of DADs (e.g., use in high noise areas, calibration and source/response checks required for operation) as was addressed for other instruments and dosimetry. Finally, the DAD instrument models used for instruction and demonstration during GET training were different from the those used in the plant for entry into high radiation areas. RC personnel stated that DADs were rented specifically to support the outage; however, the inspector noted that the training department was unaware of the use of the different model DADs. Even though specific instructions were provided to workers on the use of DADs at issuance or during pre-job briefings, licensee representatives agreed to evaluate this area for program improvement.

The inspector reviewed training records and resumes for selected RC contractor technicians involved in RFO-15 activities. For the records reviewed, the inspector determined that the contractor technicians met or exceeded ANSI Standard N18.1-1971 qualifications and had completed GET, indoctrination training, examinations, and procedural reviews in accordance with procedural requirements. No concerns were noted.

No violations or deviations were identified.

#### 4. Audits and Appraisals (83729)

Technical Specification (TS) 6.5.4.1 requires audits of the facility to be performed by the NAD encompassing conformance of facility operation to the provisions contained within the TS and applicable license conditions at least once per 12 months and the Process Control Program (PCP) and implementing procedures at least once per 24 months.

The inspector reviewed Robinson NAD assessments that had been performed related to the RC function since the last NRC inspection of this area in June 1993, specifically, the inspector reviewed the results of an assessment performed during the period October 18-20, 1993, related to the implementation of the new 10 CFR Part 20. The assessment was not a formal, routine assessment by NAD, but was instead conducted at the

request of the site. Results of the special assessment were discussed in detail with the Manager, E&RC, and a summary report was forwarded to the Site Vice President on October 21, 1993. The inspector reviewed the assessment plan and associated observations as well as discussed the conduct of the assessment with the principal auditor. The assessment appeared thorough and appropriate in scope to address the principal RC areas affected by the new regulations. In addition, the inspector noted that the assessment team members were appropriately qualified in HP and/or the new regulations to assess this area adequately.

In general, the assessment found the implementation of the new regulations to be effective at the Robinson plant with 26 specific observations documented. Licensee representatives stated that observations requiring corrective actions would be entered into the E&RC corrective action program with the remainder to be utilized in the NAD on-going observation process. Since this assessment had been recently performed, completion of specific corrective actions associated with each of the findings was not evaluated by the inspector for adequacy, and the inspector informed licensee representatives that such follow-up would be addressed during a future inspection. However, the licensee's response to two of the areas regarding declaration of pregnancy and as low as reasonably achievable (ALARA) evaluations were reviewed in detail and are discussed in the appropriate topical section of this report.

The inspector reviewed the licensee's program for self-identification of weaknesses related to the RC program and the appropriateness of corrective action taken. The inspector reviewed selected 1993 internal self-assessments, Concerns, and Radiation Safety Violations (RSVs) for the period July 1 through October 25, 1993. The inspector noted that the licensee had identified approximately 15 RSVs for 1993, and the review noted no significant trends or indicators of RP problems. One item regarding the failure to document Total Effective Dose Equivalent (TEDE) ALARA evaluations was discussed with the licensee in detail. Specifically, the inspector noted that the licensee self-identified that the evaluations were not being conducted in July 1993; however, corrective actions were not fully implemented until October 1993. The technical aspects of this item are discussed in Paragraph 9; however, the licensee stated that a Management Review Committee had been recently established to review, on a weekly basis, the various E&RC corrective action program items to verify completion of timely and adequate corrective actions. For the other items reviewed, corrective actions appeared both appropriate and timely, and no additional concerns were noted.

No violations or deviations were identified.

5. External Exposure Control (83729/Draft TI)

10 CFR 20.1201(a) requires each licensee to control the occupational dose to individual adults, except for planned special exposures, to the following dose limits: (1) an annual limit, which is the more limiting of the total effective dose equivalent, being equal to 5 rems, or the

sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye, being equal to 50 rems, and (2) the annual limits to the lens of the eye, to the skin, and to the extremities, which are an eye dose equivalent of 15 rems, and a shallow-dose equivalent of 50 rems to the skin or to any extremity.

a. Whole Body Exposure and Personnel Monitoring

10 CFR 20.1502(a) requires each licensee to supply appropriate monitoring equipment to specific individuals and requires the use of such equipment.

The inspector selectively reviewed the dosimetry program to ensure that the licensee was meeting the monitoring requirements of the new 10 CFR Part 20. During tours of the plant, the inspector observed proper use of thermoluminescent dosimeters (TLDs) and self reading dosimeters (SRDs).

In addition, the inspector discussed the cumulative whole body exposures for plant and contractor employees. Licensee representatives stated and the inspector independently confirmed that all whole body exposures assigned since the previous NRC inspection of this area were within 10 CFR 20 limits. The licensee had not granted any administrative dose extensions, greater than 2000 mrem utility acquired dose, as of October 29, 1993.

No violations or deviations were identified in this area.

b. Planned Special Exposures

10 CFR 20.1206 permits the licensee to authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in 10 CFR 20.1201 provided that certain conditions are satisfied. Such exposures cannot exceed the dose limits in 10 CFR 20.1201(a) in any year or five times the annual dose limits during an individual's lifetime.

Section 6.10 of the licensee's Radiation Control and Protection Manual (RC&PM), Rev. 21 states the Carolina Power and Light and policy on planned special exposures. Specifically, the utility states that it will not utilize the planned special exposure provisions of 10 CFR 20 to allow individuals to receive dose in excess of annual dose limits. Discussions with licensee personnel noted that in light of the policy no procedures had been developed at the Robinson plant for implementation of this aspect of the new 10 CFR Part 20 regulations. No concerns were noted by the inspector.

No violations or deviations were identified.



c. Dose to the Embryo/Fetus

10 CFR 20.1208(a) requires that the dose to the embryo/fetus not exceed 500 mrem during the entire pregnancy due to occupational exposure of a declared pregnant woman.

Section 6.3 of the RC&PM and Procedure RC-PD-17, Embryo/Fetus Exposure Monitoring, detail the licensee's program and policies regarding declaration of pregnancy as well as exposure monitoring and dose limits for the declared pregnant female and embryo/fetus. Review of these procedures as well as discussion with licensee personnel noted that the aforementioned procedural requirements were consistent 10 CFR Part 20 requirements and Regulatory Guide provisions. Specifically, the licensee requires that declaration of pregnancy be provided in writing to RC Supervision. With the declaration, the individual agrees to abide by the lower dose limits for protection of the embryo/fetus including: (1) limiting the dose during the entire pregnancy to 500 mrem; (2) attempting to maintain a uniform exposure rate of 55 mrem during each month of pregnancy; (3) no work involving multibadging; (4) no work in airborne radioactivity areas; and (5) no work in high radiation areas. Further, any declared pregnant woman expected to receive greater than 50 mrem during her entire pregnancy is required to be monitored for exposure. No concerns were noted with the licensee's declared pregnant woman policy and procedures.

During the NAD assessment of 10 CFR Part 20, auditors identified a worker who was approximately seven months pregnant who had not formally declared her pregnancy to RC Supervision in writing. The individual was an office worker who primarily worked outside the protected area; however, the individual was badged and had an active dosimeter for accessing the protected and radiologically controlled area (RCA). According to NAD representatives the individual informed her supervisor of her pregnancy and desired reduced dose limits; however, the written documentation was not appropriately completed.

Further review by the inspector determined that although the worker in question had an active TLD, no entries had been made into the RCA within the last five quarters. The TEDE for 1993 was 0 mrem, the last whole body analysis indicated no internal deposition, and the woman received appropriate training in this area through GET. In response to the NAD finding, the licensee initiated Concern Report 93-CRN-125 to investigate the event, and the inspector noted that the woman completed the declaration paperwork on October 25, 1993. Her TLD was also terminated on October 25, 1993, with her agreement. Electronic mail was also sent to all supervisors reiterating the pregnancy policy.

The inspector interviewed four women concerning the licensee's program for declared pregnant women. All four of the women knew of the utility's declaration requirements and were aware of their

limit of 500 mrem over the entire pregnancy. One woman, a technician, was not aware that she could receive an additional dose of 50 mrem, if the dose to the embryo/fetus was found to have exceeded 500 mrem by the time the woman declared the pregnancy to the licensee. Overall, based on the interviews, the inspector noted that workers appeared knowledgeable of the licensee's requirements in this area.

Based on inspector review licensee corrective actions appeared effective and overall improvement in worker awareness was appropriate.

No violations or deviations were identified.

d. High and Very High Radiation Areas

10 CFR 20.1601, 10 CFR 20.1602 and 10 CFR 20.1902 specify the control and posting requirements for high radiation areas (HRAs) and very high radiation areas (VHRAs). In addition, TS 6.12 provides additional requirements for the control of HRAs.

The inspector reviewed and discussed with licensee representatives the program for controlling access to HRAs, locked high radiation areas (LHRAs), and VHRAs. As of the time of the onsite inspection, the licensee had not submitted a revision to TSs to incorporate the new requirements of Part 20; however, the following procedures were reviewed with respect to this program area: Administrative Procedure (AP)-031, Administrative Controls for Entry into Locked High Radiation Areas, and Health Physics Procedure (HPP)-001, Radiation Control Area Surveillance Program. In general, the inspector determined that the procedures adequately addressed the requirements of the revised Part 20; however, one item was discussed with the licensee for clarification. During the review of Procedure AP-031, the inspector noted that the licensee did not appear to clearly address the additional control measures needed to ensure that an individual was not able to gain unauthorized or inadvertent access to VHRAs, nor did it reference Regulatory Guide 8.38. Licensee representatives stated that the intent was to require such controls, and the procedure would be evaluated to determine if additional information was needed.

During tours of the Containment and the Auxiliary Buildings, the inspector reviewed the implementation of posting and access controls for various LHRAs and VHRAs. For the areas reviewed, all LHRAs and VHRAs were found to be properly posted and controlled, and no concerns were noted. At the time of the inspection, only two plant areas, the Primary Resin Storage Tank and the Spent Fuel Dry Storage Modules, were classified as VHRAs, and both areas had their accesses welded shut to preclude entry. Also, two additional areas are generally designated as VHRAs, the containment sump during power operation and the area below the

fuel transfer canal during fuel movement. These areas are then locked with unique VHRA locks and keys are maintained under the direct control of the Manager, E&RC.

In accordance with Procedure AP-031, keys for LHRAs were dedicated and maintained under the administrative control of the RC Supervisor. LHRAs designated for emergency use only were also maintained under that administrative control of the Operations Shift Supervisor. The inspector noted that RC personnel inventoried the keys maintained at the RC office at least on a daily basis, as required; however, no formal inventory system was procedurally documented to control the total number of LHRAs keys. The inspector was able to account for all LHRAs keys through the use of security key records.

During the inventorying process, the inspector determined that the Control Room had been issued LHRA keys numbered 178, 179, and 180 for use during emergency situations. Upon inspection, it was discovered the keys were not from the same core as those maintained in the RC Office (Core D-10 in the Control Room versus Core D-11 in the RC Office). Licensee representatives stated that the apparent reason for the discrepancy was that on September 22, 1993, a LHRA key was lost. Corrective actions for the event were to rekey all the LHRA locks on September 23, 1993; however, only the keys in the RC Office were changed out, leaving the three keys in the Control Room invalid. Therefore, for the period September 23 through October 26, 1993, the Control Room did not possess operable keys for LHRA access if needed to respond to an emergency situation. Such keys may be required to respond to a fire affecting plant operation or to implement a specific emergency procedure (e.g., End Path Procedure, EPP-9, Transfer to Cold Leg Recirculation). Immediate corrective actions implemented by the licensee included replacement of the Control Room keys with valid D-11 core keys and initiation of Concern Report 93-CRN-137. The inspector informed licensee representative that the failure of the RC Supervisor to issue new LHRA keys in a timely manner to the control room was a violation of TS 6.11 for the failure to follow Procedure AP-031, Section 3.4 which states that "the Radiation Control Supervisor is responsible for issuing master locked high radiation area and locked high radiation area keys," (VIO 50-261/93-26-01).

In addition, during the review of Control Room key issuance logs, the inspector determined that on two occasions the Control Room issued LHRA keys to personnel for routine use. Specifically, on September 17, 1993, key No. 180 was issued to a fire protection worker for approximately seven hours, and on September 21, 1993, key No. 178 was issued to an instrument and control technician for approximately five minutes. Discussions with licensee personnel indicated that the keys were probably issued for the universal valve lock keys which were also maintained on the rings for each of the three LHRA keys. Review of security access logs determined

that only the fire protection worker actually entered the RCA with the LHRA key. In addition, review of DAD dose information for the two individuals noted no exposures during the periods in question. In response to the finding, the licensee issued Adverse Condition Report 93-227. The inspector informed licensee representatives that the two instances of the issuance of LHRA keys by the Control Room was an additional example of a violation of TS 6.11 for the failure to follow Procedure AP-031, Section 3.5 which states that "the Unit 2 Operations Shift Supervisor is responsible for administratively controlling locked high radiation area keys maintained for emergency use," (VIO 50-261/93-26-01).

One violation with two examples of the failure to implement responsibilities for administratively controlling LHRA keys was identified.

6. Operational and Administrative Controls (83729)

a. Radiation Work Permits (RWPs)

The inspector reviewed selected outage RWPs for appropriateness of the radiation protection requirements based on work scope, location, and conditions. For the RWPs reviewed, the inspector determined they appropriately addressed radiological concerns.

In addition, the inspector observed a pre-job briefing for work in the reactor cavity requiring entry into a LHRA. The briefing informed the workers of the radiation and contamination levels in the work area, the worker stay-times, each workers allowed dose, high dose rate areas to avoid, special hazards, DAD alarm setpoints and associated actions to take upon DAD alarm, and RWP requirements for entry into the LHRA. The inspector also observed the work addressed by the briefing and noted that workers appropriately complied with the provisions of the RWP and proper LHRA controls were maintained throughout the evolution.

Based on the above, the inspector found the licensee's program for RWP implementation to adequately address radiological protection concerns, and to provide for proper control measures.

No violations or deviations were identified.

b. Notices to Workers

10 CFR 19.11(a) and (b) require, in part, that the licensee post current copies of 10 CFR 19, 20, the license, license conditions, documents incorporated into the license, license amendments and operating procedures, or that a licensee post a notice describing these documents and where they may be examined.

10 CFR 19.11(d) requires that a licensee post NRC Form-3, Notice to Employees. Sufficient copies of the required forms are to be posted to permit licensee workers to observe them on their way to or from licensee activity locations.

During the inspection, the inspector verified that NRC Form-3 was posted properly at various plant locations permitting adequate worker access. In addition, notices were posted referencing the location where the license, procedures, and supporting documents could be reviewed.

No violations or deviations were identified.

7. Internal Exposure Control (83729)

10 CFR 20.1204 states that for purposes of assessing dose used to determine compliance with occupational dose equivalent limits, the licensee, when required to monitor internal exposure, shall take suitable and timely measurements of concentrations of radioactive materials in air, quantities of radionuclides in the body, quantities of radionuclides excreted from the body, or combinations of these measurements. When specific information on the behavior of the material in an individual is known, that information may be used to calculate the Committed Effective Dose Equivalent (CEDE).

The inspector reviewed and discussed the licensee's program for monitoring internal dose. The RC&PM states that based on historical bioassay data plant workers are not likely to exceed 10 percent of the annual intake limits during routine operations; therefore, routine internal exposure monitoring is not required to comply with the requirement of 10 CFR 20.1502(b). The inspector reviewed "RNP Position on Internal Dose Monitoring," dated October 25, 1993, which had been developed to support NAD questions regarding a documented basis for the policy stated in the RC&PM. The analysis provided summarized positive whole body counting information for the period 1986-1993 detailing the radionuclides detected, calculated intakes, and the corresponding percent of annual limits of intake (ALIs). For the information provided, the maximum percent of an ALI calculated for the period was 2.44 percent in 1987; all other intakes were determined to be less than 1 percent. The inspector concluded that the licensee's policy regarding internal exposure monitoring was appropriately supported.

Based on the policy, licensee representatives stated that derived air concentration-hours (DAC-hrs) would not be individually tracked; however, the licensee continues to require periodic monitoring for internal radioactivity through the whole body analysis program.

In accordance with Section 6.23 of the RC&PM, the licensee requires initial and termination bioassays; annual bioassays for individuals assigned permanent dosimetry; and special bioassays whenever an intake is suspected. Special bioassays are also required to be performed within two weeks of completing work involving planned internal exposures

when exposures exceeding 40 DAC-hrs could have been received based on a prospective evaluation. Although not required by regulation, the inspector further noted that whenever an individual is determined to have a measurable body burden (above minimum detectable activity) due to licensed activities, the licensee has committed to calculating CEDE and summing the internal and external doses, regardless of the amount of intake.

Through October 29, 1993, licensee representatives stated that three positive internal contamination events had occurred for the year, as determined by whole body counting. Review of the three events revealed that the maximum calculated exposure was 5 mrem CEDE associated with an Iodine-131 intake during RFO-15. Total CEDE for the three events was approximately 7 mrem. The inspector verified that the calculated doses were added to the individuals' computer exposure files, and summing of internal and external doses to obtain TEDE had been performed.

Based on above evaluation, the inspector concluded that the licensee's program for monitoring, assessing, and controlling internal exposures was conducted in accordance with regulatory and procedural requirements with no exposures in excess of 10 CFR Part 20 limits identified.

No violations or deviations were identified.

8. Control of Radioactive Material and Contamination, Surveys, and Monitoring (82729)

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.

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 Containment, Spent Fuel Storage Building, Radioactive Waste Processing Building, and various radioactive material storage locations, the inspector performed independent posting and labeling verification of selected radioactive material areas. The inspector, during a tour of the Radwaste Building, noticed several wire storage baskets of assorted scaffolding materials. Survey of a selected sample of the materials found that three of the first five scaffold pipes selected had contamination above the free release levels. One of the scaffold pipes had contamination levels of approximately 15,000 disintegrations per 100 square centimeters (dpm). All the contamination on the scaffolding was subsequently determined to be fixed (nonremovable) by additional measurements.

Section 10.1 of Procedure HPP-007, Handling and Storage of Contaminated and Radioactive Materials, Rev. 9, dated October 1, 1993, requires that containers be labeled if they contain licensed material in quantities greater than applicable quantities listed in Appendix C of 10 CFR 20. Following identification, the licensee determined by additional measurements that there were greater than Appendix C quantities of fixed contamination on the material in the containers. The licensee immediately labeled the material and provided appropriate postings.

The inspector informed the licensee that the failure to label the containers in accordance with procedural requirements was a violation of TS 6.11. However, based on the minor safety significance and the licensee's prompt corrective actions, this issue would be considered non-cited because the criteria specified in Section VII.B of the Enforcement Policy were met (NCV 50-261/93-26-02).

In addition, on October 26, 1993, the inspector toured the fuel handling building and observed what appeared to be a bucket suspended from the side of the spent fuel pool by a rope. A licensee health physics representative was questioned as to what was in the basket. The individual responded that he believed the bucket to be empty; however, it had at one time held a bolt measuring approximately 650 rem/hour on contact with the bolt. The inspector requested that the basket be verified empty, and the licensee subsequently determined that the bolt was still in place in the basket. At the time of observation by the inspector, the bolt had not been moved back to a storage location at the bottom of the spent fuel pool.

Upon review, the inspector determined that Fuel Management Procedure (FMP)-021, Control of Materials in the Spent Fuel Pool, Rev. 0, dated December 29, 1990, governed the control of materials located in the spent fuel pool. Specifically, Section 6.8 states "Store or relocate the materials to the specified location and log in the Local Spent Fuel Pool Storage Log," and a subsequent note states that "Materials suspended from the side of the SF Pool shall be tied off/attached to stainless steel material and shall be connected to a locking device with a lock that is controlled by the HP Group. This is to avoid inadvertent removal of these materials from the SF Pool." The inspector determined that the local SF Pool Storage Log was not appropriately maintained up-to-date with the bolt location information, the material was not tied off/attached to stainless steel material, and there was no locking device controlled by HP as required by the procedure.

ACR 93-203, dated October 15, 1993, identified that a highly irradiated bolt was found during inspection of the reactor vessel core plate on October 13, 1993. On the evening of October 18, 1993, the bolt was moved to the spent fuel pool storage location under RWP 93-0829 and Procedure FMP-021. After about 24 hours, the bolt was transferred under Procedure FMP-021 to a filter in the spent fuel pool. On October 20, 1993, the bolt was removed from the storage filter and stored in the

suspended basket for several days to perform inspection activities. This work was performed under RWP 93-0851-01, and approved on October 20, 1993. Doses for the personnel involved with RWPs showed about 35 mrem to complete the transfers. On October 26, 1993, the bolt was determined to still be in the basket. The bolt was moved that day back to the storage pit in the spent fuel pool and was properly secured. Based on the above, the bolt was stored in the spent fuel pool in the basket from about October 20-26, 1993, without procedural control. In addition, the bolt was apparently stored in the refueling cavity from retrieval until October 18, 1993, without any procedural control.

This latter fact was unknown by the inspectors at the conclusion of the inspection and was reported in ACR 93-235, dated October 28, 1993.

Although the bolt was not properly secured to prevent unauthorized removal nor was the basket labeled to inform workers of the potential hazard, several controls were in-place. Specifically, the door to the spent fuel pool was posted with a sign which stated "Health Physics Coverage is required for any work which involves removing or moving of equipment/tools from or in the spent fuel pit." This same posting was also present on all four sides of the spent fuel pool around the barrier at the edge of the pool. In addition, the inspector observed that the R-5 Spent Fuel Building Radiation Monitor which monitored the area around the spent fuel pool (0-10,000 mr/hr range) was within calibration dates, with a due date of November 4, 1993. This monitor undergoes monthly source checks, and the monitor was considered operational during this time.

The inspector also reviewed the security logs detailing the number of personnel accessing and exiting the door to the spent fuel pool area who were not performing work under the RWP. For the period during which the bolt was suspended by the rope and not under procedural control about 170 personnel accessed the area. The inspector noted that these individuals were present in the area without sufficient information to inform them of the hazard present or the required procedural controls to preclude access to the hazard (i.e. locking device).

The inspector informed licensee representatives that the failure to control the highly irradiated bolt in accordance with Section 6.8 of FMP-021 was a violation of TS 6.5.1.1.1 for failure to follow procedures (VIO 50-251/93-26-03).

One non-cited violation for the failure to properly label radioactive material and one violation for the failure to control highly irradiated material in the spent fuel pool were identified.



9. Program for Maintaining Exposures As Low As Reasonably Achievable (83729 and Draft TI)

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 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.

a. Total Effective Dose Equivalent (TEDE) ALARA Program

The inspector reviewed the following procedures and correspondence related to the TEDE ALARA Program:

- Procedure HPP-006, Radiation Work Permits, Rev. 25
- Procedure PLP-017, ALARA Program, Rev. 8
- Radiation Control and Protection Manual, Rev. 21
- October 25, 1993, memo from W.M. Bedenbaugh to J.L. Harrison concerning the E&RC Program Assessment Report
- July 9, 1993 E&RC Program Assessment Report Attachment 6.3 on "Internal Exposure Control"

Based on review and discussions, the inspector determined that the licensee had implemented the TEDE ALARA requirement of the revised 10 CFR Part 20 by means of its training programs, its radiation protection policy, and its policy implementing procedures. RWP Procedure HPP-006 included provisions for the performance of a TEDE Evaluation in cases where there is a significant potential for worker intake of radioactive material by inhalation. The evaluation process included consideration and quantification of radiation doses associated with alternatives to respiratory protection.

The inspector reviewed TEDE ALARA evaluations performed by the licensee associated with RWPs 93-0679, 93-0626, and 93-0689. The evaluations were performed in accordance with the licensee's procedure and were judged adequate. In one case, the inspector was initially unable to confirm the "Average Dose Rate" data used in the licensee's TEDE evaluation on the basis of the RWP covering the work and its associated radiation survey maps. However, through interviewing the individual who performed the evaluation, the inspector determined that the dose rate used in the calculation had been determined by means of specific surveys of the work area performed to better define the radiation exposure

conditions. The inspector discussed the need for required evaluations to include references to the source documents that define the bases for the evaluation. Although no concerns were noted regarding the evaluations, the inspector discussed one item with the licensee. Specifically, inspector determined that although the licensee's RWP procedure recognizes the loss in efficiency resulting from the use of respiratory protective equipment, and includes consideration of this factor in the TEDE ALARA evaluation form, only very broad guidance was provided to the person preparing the evaluation. The guidance provided on the RWP was not specific to the type of respirator or the type of work.

As discussed in Paragraph 4, a recent licensee-performed assessment found that the RC function had not been performing the required evaluations. As a result of the assessment, the evaluations were retrospectively performed. The final assessments supported the licensee's earlier decisions with respect to TEDE, ALARA, and the use of respirators.

For the current refueling outage, the inspector noted that approximately 1280 respirators had been utilized of which about 225 were issued for non-radiological work. This number represented a two thirds reduction from the previous outage, with no apparent increase in personnel contaminations or intakes of radioactive material.

The inspector conducted in-depth interviews of two RC technicians and two maintenance workers. The workers demonstrated an adequate level of knowledge of the TEDE ALARA concept and the licensee's methods for controlling airborne radioactive materials and making determinations with respect to the use of respirators. A particular observation noted by the inspector was one worker's view that the reduction in respirator usage had increased the worker resource pool by making individuals who were not "respirator qualified" available for the performance of work for which respiratory protective equipment was previously required. The view was also generally expressed that limiting the use of respirators significantly increased worker efficiency and comfort without significantly increasing worker facial contaminations. The inspector noted that the latter was apparently due to the increased use of face shields. Overall, all the interviewees seemed comfortable with the licensee's implementation of the TEDE ALARA policy and the training that they had received on the revised Part 20.

Based on the review, the inspector determined that the licensee was making appropriate progress in implementing the TEDE ALARA concept, and the reduction in respirator usage during the current outage was noted as a program strength.

No violations or deviations were identified.

## b. ALARA Program Implementation and Facility Statistics

Collective Dose: Through September 30, 1993, the licensee had expended approximately 172 person-rem as compared to an annual 1993 annual goal of 325. For RFO-15, the licensee had expended approximately 244 person-rem, by SRD, through October 27, 1993. This dose was above the targeted goal of 225; however, the licensee anticipated that the final outage dose would be less than their previous best performance of 298 person-rem. Significant dose activities for RFO-15 included: 20 percent eddy current testing of steam generators, sludge lancing, reactor coolant pump work on all three pumps, service water system modification, and Modification 1104 for the moving, repairing, and installing of hanger and hanger supports. The inspector noted that ALARA personnel appropriately monitored acquired dose to effect needed dose reduction techniques, as appropriate. In addition, the inspector was informed that the licensee was conducting ALARA focus group meetings with the various onsite disciplines and was moving toward zero based dose budgeting, both of which should increase management's attention to the ALARA area.

Personnel Contamination Events: As of October 27, 1993, the licensee had experienced approximately 81 personnel contamination events for the outage. This was slightly above the goal of 80; however, the rate of occurrence was noted to be below the licensee's target of 1 event per 1000 RCA entries. The overall 1993 goal was established at 130. Although the licensee had experience some fuel failure, significant hot particle problems were not experienced during the outage.

Contaminated Area: Since reclamation of the contaminated process equipment areas in March 1993, the licensee had been maintaining an average contaminated floor space area of approximately 4000 square feet. This equates to about 5 percent of the RCA. The licensee's 1993 goal for contaminated floor space is 2000 square feet. As of October 21, 1993, during RFO-15, the inspector noted that the licensee was tracking approximately 8 percent of the RCA as contaminated. Based on the stage of the outage and considerable material movement, the inspector did not note any concerns. During facility tours, the inspector generally noted adequate housekeeping practice and appropriate implementation of contamination controls.

ALARA Initiatives: For RFO-15, licensee representatives stated that approximately 880 curies of cobalt (18 curies of cobalt-60) were removed during early boration. Although dose rate reductions were not realized for the steam generator bowls, the licensee noted that reactor coolant piping dose rates decreased in many locations up to 50 percent. Other initiatives implemented by the licensee included use of water shields in containment, use of remote welding equipment, and increased use of remote cameras. The latter equipment was currently being installed in the

Auxiliary Building for use by operators during non-outage periods. Discussions with licensee personnel regarding long-term dose reduction initiative revealed that a revised Exposure Reduction Plan was currently under development. This plant included various dose reduction efforts including the performance of a residual heat removal system and spent fuel pool heat exchanger decontamination during RFO-16. Licensee pursuit of these areas was considered a positive program initiative.

Overall, the inspector concluded that the licensee's ALARA program was effective in controlling collective dose.

No violations or deviations were identified.

10. Licensee Actions on Previously Identified Inspector Findings (92701)

(Closed) Inspector Follow-up Item (IFI) 50-261/92-03-03: Evaluate the effectiveness of ALARA licensee corrective actions to prevent recurrence for an improperly latched control rod event during the RFO-13. This item was associated with a February 8, 1991, event in which a control rod drive shaft at core location C-7 was found not to be latched to its control assembly, following removal of the reactor vessel head. ACR 91-099 was written to document the event and to determine adequate corrective actions.

As detailed in IR 50-261/93-16, the licensee had implemented various corrective actions for this event and had successfully performed refueling operations during RFO-14; however, several corrective actions had not yet been completed and the ACR remained open. During this inspection, the inspector noted that the licensee had completed additional procedure changes to Procedure EST-030, Fuel Handling Equipment and Interlock Operation and Testing, and Procedure OMM-032, Operations Contractor Qualification Program, as stated in the ACR. Based on the review of completed corrective actions, ACR closure, and implementation during RFO-14, the inspector informed licensee representatives that the open item would be considered closed as there were no ALARA implications related to this event.

11. Exit Meeting

The inspection scope and results were summarized on October 29, 1993, with those persons indicated in Paragraph 1 above. The general program areas reviewed and the inspection findings listed below were discussed in detail. In addition, the licensee was informed the previously identified IFI was considered closed. Licensee representatives acknowledged the inspector's comments, and no dissenting comments were received. Although proprietary information was reviewed during the inspection such information is not contained in the report.

<u>Item Number</u>	<u>Description and Reference</u>
50-261/93-26-01	Violation of TS 6.11 for the failure to follow procedures for administratively controlling keys to LHRAs (Paragraph 5).
50-261/93-26-02	NCV of TS 6.11 for the failure to follow procedures for labeling containers of radioactive material whose contents exceeded 10 CFR Part 20, Appendix C limits (Paragraph 8).
50-261/93-26-03	Violation of TS 6.5.1.1.1 for the failure to follow procedures for controlling an irradiated bolt with contact dose rates of 650 Rem/hour while stored in the spent fuel pool (Paragraph 8).