



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

JUL 25 1991

Report Nos.: 50-325/91-20 and 50-324/91-20

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

Docket Nos.: 50-325 and 50-324 License Nos.: DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: June 17-21 and 25-28, 1991

Inspector: R. B. Shortridge 7/24/91  
R. B. Shortridge Date Signed

Accompanied by: E. B. Pharr

Approved by: J. P. Potter 7/23/91  
for J. P. Potter, Chief Date Signed  
Facilities Radiation Protection Section  
Radiological Protection and Emergency  
Preparedness Branch  
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the area of occupational radiation safety and included an examination of: audits and appraisals, training and qualification, external exposure control, internal exposure control, control of radioactive materials and contamination, surveys and monitoring, and maintaining occupational exposures ALARA. In addition, Information Notices and licensee response to previously identified inspection findings were reviewed. The following week the inspector observed replacement of gamma Traversing Incore Probes (TIPs).

Results:

In the areas inspected, no violations or deviations were identified. Based on interviews with licensee management, supervision, personnel from station departments, records review, and observation of training and work in progress, the inspector found the radiation protection program to be managed adequately. The licensee's programs for external and internal radiation

exposure controls were effective and functioning adequately to protect the health and safety of radiation workers. Inspector concerns were identified to plant management that corporate led audits be improved in both purview and documentation; and that consistency be maintained in TIP procedures regarding cautions and warnings, and crew qualifications. The inspector noted that performance of the ALARA Committee had improved regarding ALARA suggestions and overall effectiveness.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*K. Ahern, Manager, Regulatory Compliance
- \*M. Bradley, Manager, Nuclear Audits Department (NAD)
- \*S. Callis, On-Site Representative, Licensing
- \*R. Creech, Manager, Regulatory Programs
- \*J. Cribb, Manager, Quality Control
- \*M. Foss, Manager, NRC Compliance
- \*R. Helm, Manager, Technical Support
- J. Henderson, Manager, Radiation Controls, Environmental and Radiation Control (E&RC)
- \*J. Holder, Manager, Outage Management and Modifications
- \*J. Moyer, Manager, Operations
- \*J. Simon, Manager/Unit 1, Operations
- \*W. Simpson, Manager, Control and Administration
- \*J. Sipp, Corporate Health Physicist
- \*R. Smith, Manager, Radiation Controls, E&RC
- \*P. Snead, ALARA Supervisor, E&RC
- \*J. Spencer, General Manager
- \*R. Tart, Manager/Unit 2, Operations
- \*J. Terry, Radiation Control Project Specialist
- \*H. Wall, Operations
- \*D. Ward, Instructor, Training
- \*R. Warden, Manager, Maintenance
- \*K. Williamson, Manager, Nuclear Engineering Department

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

#### Nuclear Regulatory Commission

- \*D. Nelson, Resident Inspector
- \*Attended the June 21, 1991 exit meeting

### 2. Audits and Appraisals (83750)

#### a. Audits

The inspector discussed with licensee representatives and reviewed 1990 and 1991 corporate-led audits of the radiation protection program. The inspector found the 1990 audits, report numbers QAA/0021-90-02 and 90-02A, to be well planned and documented and most importantly they appeared to adequately assess the radiation protection program. The audits contained items of substance relating to the program and valid

nonconformances were identified. The reports of audit findings to management were also reviewed and were found to contain responsive commitments by management to effect corrective actions for the deficiencies noted.

The inspector, however, found that the 1991 corporate-led assessment, report number QAA/0021-91-01, was not very intensive, nor probing. The audit did not result in any findings or recommendations which would enhance the station's radiation protection program. Throughout the audit only one strength was identified, that being the locked High Radiation Area Program. The audit also did not adequately inform the reader as to what led the auditors to identification of strengths and/or weaknesses.

The inspector expressed concern to licensee management that such audits would not prove to be beneficial in that a limited audit program would not result in identifying radiological technical issues for correction and E&RC program improvements. Cognizant licensee representatives acknowledged the inspector's concerns as well as informed the inspector that the 1991 audit was the first audit performed by a newly formed group, the Nuclear Assessment Department (NAD), under NAD procedure 300-02, Management of Work Items, Revision (Rev.) 0, dated May 1, 1991. Licensee representatives stated that they fully expected future audits to be more intensive and detailed.

b. Licensee's Self-Identification Program

The inspector also reviewed the licensee's program for self-identification of weaknesses related to the radiation protection program and the appropriateness of corrective action taken.

Cognizant licensee representatives informed the inspector that a new Environmental and Radiation Control (E&RC) self-identification program was initiated during April 1991. The idea was to implement a self-identification program that did not carry such negative connotations as the previous program. E&RC-0023, Chemical/Radiological Action Program, Rev. 3, dated March 25, 1991 established an E&RC corrective action program for investigation, resolution, tracking, and trending of negative as well as positive work practices in the area of E&RC responsibilities.

From January 1, to March 31, 1991, only four deficient work practices were identified using the previous, stricter program. However, during April and May 1991,

31 exemplary and deficient chemical or radiological events were identified, investigated, corrected when needed, and tracked. Following review of the event reports, the inspector noted that continued use of this self-identification program should be beneficial in raising worker awareness of good and bad work practices.

The inspector also noted that during April 1991 the radiation protection group initiated radiological tours which are performed daily by each of the 3 Health Physics (HP) foremen. During walkdowns of the Radiation Controlled Area (RCA), each foreman documented any deficiencies identified and each deficiency was considered an open item until corrective actions were fully implemented. The inspector also concluded this to be a strength to the licensee's self-identification program.

No violations or deviations were identified.

3. Training and Qualifications (83750)

10 CFR 19.12 requires the licensee to instruct all individuals working or frequenting any portions of the restricted areas in the health protection aspects associated with exposure to radioactive material or radiation, in precautions or procedures to minimize exposure, and in the purpose and function of protection devices employed, applicable provisions of the Commission Regulations, individuals responsibilities, and the availability of radiation exposure data.

The inspector reviewed audits and assessments, plant training data, extended classroom training, and discussed training with licensee representatives to determine program effectiveness. The inspector noted that weaknesses had been identified in the process and content for training HP technicians in that, (1) the licensee did not routinely incorporate some industry events into training, (2) some training subjects requested by line management were not included in HP training, and (3) continuing training scheduled for 1990 had not been completed due to demands to work at the plant. The inspector reviewed the licensee's corrective actions and found that industry events were now included in continuing training as well as line management's content request. Also that all continuing training for 1990 was completed by June 1991.

In reviewing the curriculum for HP technicians for 1990, the inspector found that HP technicians did not routinely receive training on plant systems. Licensee representatives stated that all but 10 HP technicians had received a 160 hour course in basic systems training and that this was

required in the first three years of performing as a HP technician but systems were not included in annual continuing training. A review of line management's request for HP technician training in 1991 showed a course in Radiological Aspects of Plant Systems. Licensee management stated that they were currently in the process of selecting courses for 1991 and that Radiological Aspects for Plant Systems would be included in the curriculum.

The inspector attended a course on industry events presented by the training department in continuing training to seven HP technicians/supervisors. The content included a number of problems that had been identified in audits and had been corrected as well as several major industry events. One involving a substantial potential for exposure during Traversing Incore Probe operations and one administrative overexposure during installation of a Transfer Tube Flange. The course objectives were to review the problem as it related to Brunswick Steam Electric Plant, the root cause of the event, and the corrective actions taken with the focus on the lessons learned. The inspector noted good class participation and that the material was covered comprehensively.

No violations or deviations were identified.

4. External Exposure Control (83750)

a. Program Implementation

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

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

The inspector discussed the January 1, through June 14, 1991 cumulative whole body exposures for CP&L employees. Licensee representatives indicated that all whole body exposures were within 10 CFR 20 limits. Following review of records of employees signed on Radiation Work Permit (RWP) 91-1744 associated with a dry well entry at power, the inspector verified that for those records reviewed no exposures were in excess of 10 CFR 20 limits.

The inspector reviewed RWP 91-1744 for appropriateness of the radiation protection requirements based on work scope, location, and conditions. The inspector determined that the RWP was adequately prepared so as to protect the health and safety of the personnel making the entry. The inspector also reviewed selected standing RWPs for routine site activities for the appropriateness of the radiation protection requirements. During tours of the plant, the inspector observed plant workers wearing their dosimetry properly and adhering to their RWP requirements.

b. Form NRC-4

10 CFR 20.101(b)(3) requires the licensee to determine an individual's accumulated occupational dose to the whole body on a Form NRC-4 or equivalent record prior to permitting the individual to exceed the limits of 20.101(a).

The inspector reviewed selected records for the existence of the individual's Form NRC-4. Records of workers signed on an RWP associated with potentially high dose rates were reviewed. The inspector noted a Form NRC-4 on file for all selected individuals.

c. Termination Reports

10 CFR 20.408(b) and 20.409(b) require that the licensee make a report to the Commission, and notify the individual involved, of the radiation exposure of each individual who has terminated employment. The report is to be furnished within 30 days after the individual's exposure was determined by the licensee or 90 days after the date of termination of employment or work assignment, whichever is earlier.

E&RC-0464, Termination/Deactivation of Employees, Rev. 7, dated August 23, 1989 states that for non-CP&L employees a termination list is completed and along with other termination information is then routed to the Harris Energy and Environmental Center (HE&EC) for termination processing. The inspector reviewed outage contractor HP technicians termination records and noted timely readings of thermoluminescent dosimeters (TLDs) by the onsite dosimetry group following the employee's termination, timely forwarding of the termination information to the HE&EC, and timely issuance of letters with an exposure report to the terminated individuals by the HE&EC.

d. Skin Dose Evaluation

E&RC-0213, Determining Skin Dose from Contamination, Rev. 6, dated December 10, 1990 details instructions for calculating skin dose from external contamination. Assessments are required whenever skin contaminations could lead to a dose equivalent to the skin of 100 milliRem (mRem) or greater.

The inspector reviewed and discussed with cognizant licensee representatives skin dose calculations conducted for selected personnel from January 1, 1991 through June 14, 1991. The inspector noted that for the period reviewed only one skin dose assessment due to a hot particle had been identified with an assigned skin dose of 532 mRem. For all the personnel contamination events (PCEs) and hot particle logs reviewed skin dose evaluations were initiated as appropriate.

e. Licensee Control of Incore Detector Systems

The inspector reviewed operation procedures, maintenance procedures, and testing procedures related to the licensee's Traversing Incore Probe System (TIPS). The inspector noted that the only consistency throughout the selected procedures reviewed was that the Shift Foreman had to grant permission for the TIPS to be run and that he must be notified when the run was complete. The inspector was concerned that only two procedures required HP's knowledge prior to moving the TIPS and that none of the reviewed procedures offered guidance to personnel utilizing the procedures as to the radiological hazards associated with the TIPS nor that workers be properly trained prior to their particular TIPS operations.

Cognizant licensee representatives informed the inspector that they felt E&RC maintained control over TIPS operations in that E&RC-0261, Drywell Entry, Rev. 8, dated May 30, 1990, requires TIPS be under the Shift Foreman's clearance if the Drywell is open for personnel access. Also E&RC-0040, High Radiation Area Key Control, Rev. 6, dated January 28, 1991 requires that workers in a restricted high radiation area, which includes the TIP room/boxes, complete the High Radiation Area Key Checkout Form which demands approval for entry by RC Supervision, have continuous HP coverage, obtain a special RWP, and attend a documented pre-job briefing.

The inspector maintained that procedures related to TIPS operations could be more effective in guarding against unplanned personnel exposure to radiation if all were consistent in that the Shift Foreman as well as HP were notified prior to TIPS operations, all personnel were adequately trained to perform the job prescribed by the procedure, and each procedure effectively heightened worker awareness of the radiological hazards associated with TIP movements. The licensee acknowledged the inspector's concerns and committed to reviewing TIPS procedures to determine if more consistent procedures should be developed to most effectively protect personnel from unplanned exposures.

f. June 25-28, 1991 Replacement of Gamma TIPS

To assist the resident inspector, the region-based inspector returned June 25-28, 1991, to observe replacement of gamma TIPS. A, B, C, and D gamma TIPS were removed without problems with the highest TIP reading 4 Rem/hr. During the installation phase of the operation, the inspector noted that the Instrument and Control technicians identified and repaired minor manufacturer defects in the new gamma TIPS. The inspector attended job planning and crew briefings and observed that the operational and radiological aspects of the replacement were comprehensively discussed and well documented. To prevent an unplanned exposure the licensee installed additional alarming radiation monitors and warning lights that would signal the TIP entering the TIP room and exiting the TIP room toward the drive box. The TIP replacement went well. During the operation, which was video taped for future training purposes, the maintenance crew identified a step in the procedure that required each TIP to be manually cranked to full core position and later another step that required the same operation with a torque wrench as redundant. The step requiring manual installation was deleted for each of the four gamma TIPS and the eight or nine positions for installation. This reduced collective dose for the operation by 25 percent. The inspector noted that the average time that each TIP was in the fuel region of the core was approximately one minute.

The inspector informed licensee management that the modification procedure PM-87-099, Gamma TIP Retrofit, Revision 10, dated June 14, 1991, was well written and followed by the crew, that planning and briefings for

the operation was comprehensive, engineered controls were good, and no radiological concerns were identified.

No violations or deviations were identified.

5. Internal Exposure Control (83750)

a. Program Implementation

10 CFR 20.103(a)(1) states that no licensee shall possess, use, or transfer licensed material in such a manner as to permit any individual in a restricted area to inhale a quantity of radioactive material in any period of one calendar quarter greater than the quantity which would result from inhalation for 40 hours per week for 13 weeks at uniform concentrations of radioactive material in air specified in Appendix B, Table 1, Column 1.

10 CFR 20.103(a)(3) requires, in part, that the licensee, as appropriate, use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as may be necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals.

E&RC-0420, Personnel Bioassay Methods, Rev. 26, dated June 3, 1991 requires that all personnel issued permanent TLD badges be whole body counted at least once every calendar year. The inspector reviewed selected records of CP&L HP technicians and verified that they were being whole body counted every year. For those records reviewed the inspector noted the results of the licensee's internal dose assessment efforts. No exposures in excess of the 40 Maximum Permissible Concentration-hours (MPC-hr) control measure had occurred since January 1, 1991.

b. Respiratory Protection Program

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

use of respirators and at least every 12 months thereafter, that the individual is physically able to use respiratory protective equipment.

A&RC-0220, Respiratory Protection Program. Rev. 24, dated November 5, 1990 states that respiratory qualification, which includes classroom training, fit-testing, and a medical examination, are valid for 15 months. This procedure also states that the medical examinations are to be administered at an interval of every 9 to 15 months, with the total time over any three consecutive examination periods not to exceed 39 months.

The inspector noted that the length of time between medical examinations was contrary to the requirements of 10CFR20.103(c)(2) which require annual examinations. Licensee representatives informed the inspector that an exemption from the requirement had been granted to Brunswick by the NRC in 1990.

The inspector reviewed current respiratory protection program records to verify training, completion of medical physicals, and fit-testing for selected individuals involved in activities requiring use of respiratory protective equipment as specified for a selected RWP utilized during a recent drywell entry made at power. For those records reviewed, the inspector verified that all personnel were trained to use respiratory protective equipment, fit-tested, and medically qualified in accordance with procedural requirements.

c. Breathing Air Quality

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

E&RC-0135, Sampling of Breathing Air to Meet Grade D Specifications, Rev. 3, dated November 16, 1990 prescribes requirements and controls to ensure supplied breathing air for respirator use meets or exceeds Grade D air specifications, as specified by the Compressed Gas Association, Inc. Standard, ANSI/CGA G7.1-1989. The procedure also states that the Service Air System and Breathing Air Compressors will be sampled at least

quarterly and whenever maintenance is performed that could affect the quality of air to ensure a minimum of Grade D quality.

The inspector reviewed 1991 first and second quarter supplied air system sampling records. The reviewed records indicated that for each sample location the supplied air system was sampled and verified as meeting Grade D quality air, at minimum, on a quarterly basis.

No violations or deviations were identified.

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

10 CFR 20.201(b) requires each licensee to make to cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations and (2) are reasonable under the circumstances to evaluate the extent of radioactive hazards that may be present.

The inspector examined licensee radiation and contamination surveys and performed surveys in various areas of the Reactor Building. There were no major differences in the surveys made by the inspector to those posted by the licensee.

The inspector reviewed personnel contamination events (PCEs) and noted that to date for 1991, the licensee had experienced 87. This is approximately one half of the PCEs experienced in the first six months of the two previous years. Licensee representatives attributed the reduction in the rate of PCEs to improved housekeeping, better investigations of PCEs and more management involvement to reduce PCEs. To date, the licensee has reduced contaminated area of the plant from 59,000 square feet (ft<sup>2</sup>) to 38,000 ft<sup>2</sup>.

During tours of the plant, the inspector performed radiation surveys in the radiologically controlled area (RCA). The inspector noted that the licensee had taken the initiative to place signs in many areas of the plant to warn personnel of dose rates non-uniform to the area. Since there are no regulations governing the placement of radiation, warnings, postings between radiation area (2.5 mrem/hr) and high radiation area (100 mrem/hr), licensee's have developed supplemental postings in an effort to heighten personnel awareness of higher than normal background dose rates. The inspector found areas that indicated this practice be

expanded to be included. Licensee representatives stated that they would perform specific radiation surveys for this purpose and post these areas in an effort to improve dose reduction.

No violations or deviations were identified.

7. Maintaining Exposures As Low As Reasonably Achievable (ALARA) (83728)

10 CFR 20.201(c) states that persons engaged in activities under licenses issued by the NRC should make every reasonable effort to maintain radiation exposures as low as reasonably achievable. The recommended elements of an ALARA program are contained in Regulatory Guide 8.8, Information Relevant in Ensuring that Occupational Radiation Exposure at Reactor Plants will be ALARA, and Regulatory Guide 8.10, Operating Philosophy for Maintaining Occupational Radiation Exposures ALARA.

The inspector reviewed licensee documentation for station collective dose and interviewed ALARA personnel to determine current program status. The licensee was projecting 291 person-rem through June 14, 1991, but actual collective station person-rem was 302. Licensee representatives stated that the reason for being slightly over projection was an unscheduled dual unit 40 day diesel generator outage which cost 12 person-rem. However, at the current rate of exposure accumulation, the licensee expected to be within projection by the end of June. The licensee has a scheduled 77 day refueling/maintenance outage starting in September and plans to be below the annual goal of 1100 person-rem at years end.

The inspector noted that source term data showed that average contact dose rates on recirculation piping in Unit 2 were approximately 100 mR/hr prior to the piping replacement in 1989/90. After five months of operation a slight increase in recontamination was noted; however, from April 1990 to April 1991 contact dose rates on the recirculation piping survey points has increased to 1200 mrem/hr on the average. The licensee has attributed the inordinate increase in piping contact dose rates to a hard scram during shutdown and high levels of cobalt in the primary system. Licensee representatives stated that chemical decontamination of the recirculation piping was scheduled for first week of the outage with a first time attempt at removing crud from the annulus areas of the reactor.

The inspector reviewed Committee meeting minutes to determine the effectiveness of the ALARA Committee to reduce collective dose. The inspector found the Committee to be

proactive in seeking ways to both reduce source term and collective dose. To improve ALARA Committee performance of the members selected annually, the licensee developed a training course that provided instruction in the philosophy, content, and elements of the ALARA program. Through a review of the minutes, discussions with ALARA Committee members, and a review of disposition of ALARA suggestions by the Committee, the inspector determined that the ALARA Committee has been proactive in actions to reduce collective dose and source term in the plant.

ALARA suggestions and their dispositioning have improved. Incentives are offered to plant personnel and awards are frequently made. During attendance at the June ALARA Committee meeting, the inspector noted a large improvement in member attitudes, attendance, and general performance over previous plant ALARA Committees. Also, the substance of ALARA suggestions have improved markedly.

Some methods to reduce collective dose at the plant currently utilized are: reduction of hot spots (hot spots in the RHR pump rooms have been reduced from 3-7 rem/hr to 1 rem/hr or less), management of dose on a monthly frequency by the Committee, replacement for valves containing stellite with non-stellite valves, and utilization of closed circuit television cameras to aid operators making rounds. Future plans call for implementing a surrogate tour (a video disc system) that will project on a video monitor all areas of the plant, components, and systems, and chemical decontamination of the RHR system, Reactor Water Cleanup System, and Recirculation Pipe System for Unit 1 outage scheduled for 1992.

The inspector determined that the plant's ALARA program has shown a great improvement over the past and that plant management was fully supportive of the program. Progress of the Corporate Dose Reduction and Dose Reduction Steering Committees was not reviewed during this inspection.

No violations or deviations were identified.

8. Information Notices (92701)

The inspector determined that the following Information Notices (INs) had been received by the licensee, reviewed for applicability, distributed to appropriate personnel, and that action, as appropriate was taken or scheduled:

89-13: Alternative Waste Management Procedures in Case of Denial of Access to Low-Level Waste Disposal Sites

- 89-27: Limitations on the Use of Waste Forms and High Integrity Containers for the Disposal of Low-Level Radioactive Waste
- 89-47: Potential Problems with Worn or Distorted Hose Clamps on Self-Contained Breathing Apparatus
- 90-01: Importance of Proper Response to Self-Identified Violations by Licensees
- 90-08: Kr-85 Hazards from Decayed Fuel
- 90-09: Extended Interim Storage of Low-Level Radioactive Waste By Fuel Cycle and Materials Licensees
- 90-31: Update of Waste Form and High Integrity Container Topical Report Review Status, Identification of Problems with Cement Solidification, and Reporting of Waste Mishaps
- 90-33: Sources of Unexpected Occupational Radiation Exposures at Spent Fuel Storage Pools
- 90-35: Transportation of Type A Quantities of Non-Fissile Radioactive Materials
- 90-44: Dose-Rate Instruments Underresponding to the True Radiation Fields
- 90-47: Unplanned Radiation Exposures to Personnel Extremities Due to Improper Handling of Potentially Highly Radioactive Sources
- 90-48: Enforcement Policy for Hot Particle Exposures
- 90-50: Minimization of Methane Gas in Plant Systems and Radwaste Shipping Containers
- 88-63, Supp. 1: High Radiation Hazards from Irradiated Incore Detectors and Cables
- 90-66: Incomplete Draining and Drying of Shipping Casks
- 90-75: Denial of Access to Current Low-Level Radioactive Waste Disposal Facilities
- 90-78: Previously Unidentified Release Path from BWR Control Rod Hydraulic Units
- 90-81: Fitness-for-Duty

90-82: Requirements for Use of NRC Approved Transport Packages for Shipment of Type A Quantities of Radioactive Material

91-10: Summary of Semiannual Program Performance Reports on Fitness-for-Duty in the Nuclear Industry

No violations or deviations were identified.

9. Licensee Actions on Previously Identified Inspector Findings (92701 and 92702)

- a. (Closed) VIO 50-325, 324/90-43-01: Inadequate control of high radiation areas. Previous incidents of high radiation areas, locked doors (greater than 1,000 mrem/hr at 18 inches) being left open, have been the result of personnel not adequately verifying the doors were closed upon exiting the area.

To correct the problem, the licensee is replacing the metal cage type doors with heavy steel bar doors that are self-closing. A total of 10 doors are being replaced. This item is considered closed.

- b. (Closed) VIO 50-325, 324/90-25-01: Failure to adequately evaluate the radiological hazards associated with Traversing Incore Probe (TIP) modifications. A worker did not receive a sufficient briefing or training to perform the task assigned. Also, the worker was not aware that the TIP could be withdrawn into the drive box or the radiological hazards associated with the operation.

To correct the problems, the licensee made the following changes. The changes were verified by the inspector. Procedure changes were made to the modification package 87-079 through Revision 10, dated June 14, 1991. These changes provided clear, concise radiation hazard warnings, as well as, a concern that the TIP could be withdrawn out of the drive box. Warning interlocks were provided in the form of a light at the drive box when the TIP entered the TIP room and an alarm if the TIP came out of the TIP room toward the drive box. Briefings were held throughout the next TIP replacement operation that thoroughly discussed the operation radiologically and technically. Restricted area locks have been placed on the TIP drive boxes for both units to increase requirements for access control. This item is closed.

- c. (Closed) VIO 50-325, 324/90-25-02: Failure to establish adequate modification and maintenance procedures. The licensee failed to establish adequate maintenance and modification procedures with necessary controls to prevent radiation exposures in excess of 10 CFR 20 limits.

As discussed in the previous violation, procedure changes were made to include specific radiological warnings and that the potential existed for the TIP to be withdrawn into the drive box. The licensee revised designated procedures to express that one aspect of correct preplanning work included resources of prior industry events for application to the work activity. Also, the plant general manager discussed with first and second line supervision accountabilities and associated consequences if they fail to exercise their responsibilities. This item is closed.

- d. (Closed) VIO 50-325, 324/90-2-33: TR- licensee failed to provide the vendor I&C technician necessary training on the operation and maintenance of the TIP system and precautions or procedures to minimize personnel exposure during operation and maintenance of the TIP system.

The inspector verified that to correct this problem, the licensee revised maintenance instruction 16-42, Replacing TIP Detector, Revision 001, dated December 9, 1987, to reflect the following: a special radiation work permit shall be issued and specific health physics coverage arranged; only personnel with the required indoctrination, training, and skills will perform this instruction, communications must be maintained between the drive box and control room, and specific cautions regarding tension on the Gleeson Reel in the drive box. This item is closed.

See Paragraph 4.e for results of inspector reviews of associated TIP procedures and licensee commitment.

#### 10. Exit Meeting

The inspector met with licensee representatives included in Paragraph 1 at the conclusion of the inspection on June 21, 1991. 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 by the inspector during the inspection. The licensee did not identify any such documents or processes as proprietary. Dissenting comments were not received from the licensee.