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

JUN 20 1991

Report No.: 50-400/91-10

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

Docket No.: 50-400 License No.: NPF-63

Facility Name: Harris

Inspection Conducted: May 6-10, 1991

Inspector: J. W. Hufham 6/18/91 Date Signed

Accompanying Personnel: G. B. Kuzo

Approved by: John P. Potter, Chief 6/18/91 Date Signed
Facilities Radiation Protection Section
Radiological Protection and Emergency
Preparedness Branch
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This unannounced inspection included a review of the licensee's spent fuel program and the radiation protection program. The inspection of the spent fuel program included a review of the spent fuel program organization and management, operational procedures, fuel shipment operations, and engineering design. The inspection of the radiation protection program included a review of the radiation protection organization and recent changes to the organization, proposed enhancements to the radiation protection program, radiation protection staffing for the spent fuel program, training of contractor personnel, radiation management controls and radiation protection controls for the "B" spent fuel pool rerack project.

Results:

No programmatic weaknesses were identified in the spent fuel program or the radiation protection program and no violations or deviations were identified. The licensee's spent fuel program was effectively implemented. The radiation protection program for supporting the spent fuel program was technically adequate and effective in protecting the health and safety of the occupational radiation worker and members of the public.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

W. Battes, Fuel Shipment Director
*A. Boone, Radiation Control Foreman, Operations
K. Burns, Harris Nuclear Engineering Support Section
D. Elkins, Fuel Shipment Director
C. Gibson, Manager, Programs and Procedures
*J. Gunn, I&C Foreman
*C. Hinnant, Plant General Manager
*J. Kiser, Radiation Control Manager
*E. Martin, Project Assessment
J. McLean, Engineer, Brunswick Nuclear Engineering
*B. Meyer, E&RC Manager
E. Morgan, Corporate Chemistry
*C. Olexik, Manager of Regulatory Compliance
*A. Poland, E&RC Support Manager
*R. Richey, Vice President Harris Nuclear Project
*F. Stahle, QA Engineering Manager
R. Stewart, Harris Nuclear Engineering Department
B. Van Meter, Manager, Harris Engineering Support Section
*M. Wallace, Regulatory Compliance Specialist
*W. Wilson, Manager, Spent Fuel Program
*S. Young, Security Specialist

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*J. Potter, Chief, Facilities Radiation Protection Section
M. Shannon, Resident Inspector
*J. Tedrow, Senior Resident Inspector

*Attended exit interview

2. Spent Fuel Program Organization and Management (83750)

The inspector discussed the corporate organization and management of the CP&L spent fuel program and reviewed interagency agreements between the various CP&L organizations that are responsible for implementing the program. The inspector specifically reviewed the spent fuel program organization and management of the Harris program. This organization is responsible for handling the spent fuel from the Harris facility, as well as, shipments of spent fuel from the H. B. Robinson and Brunswick facilities. The organization and management inspection included a review of the spent fuel program overview, current spent fuel activities, planned activities, structure of the Management Oversight Committee and the Crud Task Force, minutes of the committee meetings, committee changes to the program direction, management's plans for cleaning the fuel before shipments, shipment schedules, and the staffing at the Harris facility to

manage the shipments. As part of the organization and management inspection, the inspector reviewed spent fuel program goals and objectives and their present status.

The current spent fuel inventory as of May 8, 1991, included 164 Harris spent fuel assemblies stored at the Harris site, 28 H. B. Robinson spent fuel assemblies, and 306 Brunswick spent fuel assemblies. The inspector reviewed proposed shipping schedules. The final shipment from H. B. Robinson will be in the year 2009 and the final Brunswick shipment is scheduled for the year 2015.

The inspector reviewed minutes of the committee meetings and verified that the committees meet regularly and appear to be involved with the ongoing activities, as well as, the direction for the future spent fuel activities. The committees were involved with the present engineering design and design changes for the fuel assembly cleaning equipment that may eventually be installed at Brunswick.

The inspector reviewed the spent fuel program goals and objectives that included production goals, nuclear safety goals (radiation exposure, radiation safety violations, personnel contaminations, personnel error), industrial safety goals, financial goals, total quality goals, nuclear performance, and nuclear production.

The inspector also reviewed a report from an outside agency for a special assistance visit that was requested by the Harris management. The assistance visit concentrated on the entire Harris spent fuel program but emphasized the effectiveness of job controls and procedures, industrial safety, and communications among working groups. The outside agency concluded that the coordination of spent fuel modifications, fuel shipments, and fuel handling activities were affected.

From the organization and management review, the inspector verified that CP&L has developed corporate and site organizations that are effective in managing and implementing the spent fuel program. The review also verified that the goals and objectives for 1991 are being accomplished.

No violations or deviations were identified.

3. Spent Fuel Program Procedure Review (83750)

The Harris spent fuel program was supported by numerous procedures (operations, maintenance, radiation protection). The inspector performed a cursory review of several procedures but performed a detailed review of the following:

- Corrective Maintenance Procedure CM-M0303 Cask and Equipment Skid Annual Inspection, Revision 2, dated February 28, 1991

- Fuel Management Procedure FMP-504 Work Control Practices in the Fuel Handling Building, Revision 0, dated March 21, 1991

Procedure CM-M0303 provided instructions for the annual inspection of the spent fuel casks and the equipment skid. The procedure included steps that begin with the entry of the spent fuel cask railcar and continue through preparing the cask for shipment. The inspector concentrated on the cask closure head removal in the decontamination area, cask head removal in the unloading pool, vacuum cleaning the interior of the cask and basket, cleanup of the cask with the submersible pump, and basket installation.

Procedure FMP-504 established work control and storage practices for the fuel handling building which included the operating deck, associated pools, transfer canals, new fuel inspection area, cask decontamination area, decontamination equipment area, and the equipment unloading area.

Within the procedure review, the inspector concentrated on the sections relating to the underwater storage of equipment and materials in the spent fuel pools and canals. The inspector also concentrated on sections relating to the inventory of equipment and material stored underwater in the pools and canals.

Both procedures were adequate and contained the necessary information, diagrams, attachments, and data sheets. The inspector interviewed the individual who is primarily responsible for implementing the procedure for the annual cask inspection and another licensee representative who is responsible for ensuring work control of activities in the fuel handling building. Both individuals were knowledgeable of their respective responsibilities, and both have had experience in performing the tasks defined in the procedures.

No violations or deviations were identified.

4. Spent Fuel Shipment Operations (83750)

Inspection Report No. 50-400/90-22 reported that the cleanup of the crud in the spent fuels pools and transfer canals would be reviewed during subsequent inspections. During this review the inspector made thorough tours of the fuel handling building and throughout the tours the main emphasis was directed toward crud receipt and crud control. The tours concentrated on the following areas:

- Railcar bay area
- Cask decontamination area
- Cask head removal area
- Cask basket removal and crud vacuuming
- Cask unloading pool
- Crud control in the 2x3 transfer canal
- Crud control in the 1x4 transfer canal

- Crud control in "A" spent fuel pool
- Crud control in "B" spent fuel pool
- Crud control in "C" spent fuel pool
- Crud control in "D" spent fuel pool
- Crud control between "A" pool and "B" pool
- Reracking of "B" pool

The licensee had discussed options of cleaning the spent fuel, either prior to, or after shipment. In discussing these options, the licensee had indicated that the fuel cleaning equipment would be used on the next scheduled shipments from Brunswick in June 1991. On May 3, 1991, the licensee informed the NRC that the cleaning equipment would not be used for the June 1991 shipments because it was still in the design phase and had to be installed and tested. The installation and testing is expected to be completed in late 1991. The licensee has also discussed the possibility of the fuel being cleaned upon receipt at the Harris facility.

After in depth discussions with the Harris spent fuel program management, detailed tours of the fuel handling building, and observations of crud control which included isolation of the spent fuel in the "B" spent fuel pool and the crud vacuuming system for the fuel pools and transfer canals, the inspector determined that the Harris spent fuel program was capable of managing future shipments that have not been cleaned prior to receipt.

No violation or deviations were identified.

5. Design Review (83750)

The inspector met with managers of the Harris Nuclear Engineering Group from the CP&L Nuclear Engineering Department. The purpose of the meeting was to determine the status of the design review for the fuel handling building and the safety evaluation for the increased activity in the fuel pool water. The Harris Nuclear Engineering Group explained that they had completed a determination of the affect of crud on the Harris spent fuel pool heat exchangers, had recommended operational standards for the fuel pool activity and water limits, and had evaluated the radiological consequences of transferring additional uncleaned BWR spent fuel bundles from the Brunswick facility to the Harris facility. While meeting with the Department of Nuclear Engineering, the inspector was provided a review of the engineering design for the fuel cleaning equipment to be installed and tested at the Brunswick facility. The equipment is still in the design phase. The inspector discussed the original design of the equipment and the recent design changes.

The nuclear engineering managers explained the status of the safety evaluation to provide FSAR maximum design basis limits of activity in the Harris fuel pools, and they indicated that this review would be completed before the next shipment of spent fuel from the Brunswick. They informed the inspector that the evaluation was presently in the review process, and the Department of Nuclear Engineering had scheduled the evaluation to be completed by June 30, 1991. The CP&L nuclear engineering managers also

discussed their support to recommend acceptable fuel pool activity concentrations which could be processed by radwaste systems without exceeding the 10 CFR 20 discharge limits and 10 CFR 50 design criteria. These recommendations are scheduled for completion by June 30, 1991.

No violations or deviations were identified.

6. Radiation Protection Organization and Management/Management Controls and Radiation Protection Controls for Supporting the "B" Spent Fuel Pool Rerack Project (83750)

The inspector reviewed the Harris radiation protection organization and the recent changes to the organization. The inspector discussed the most recent organizational change which was the new Environmental and Radiation Control Manager. The new manager has been with CP&L since the early 1980s and has spent most of this time in the CP&L corporate office. While assigned to the corporate office, he worked on special radiation protection projects at Brunswick and the H. B. Robinson facilities. From his past experience with the corporate office and his radiation protection support to the other CP&L nuclear facilities, he has a good understanding of the company and the goals he desires to obtain for the radiation protection program at Harris. The inspector met with the new E&RC Manager and the Radiation Control Manager for Operations, and the purpose of this meeting was to review the E&RC organization at Harris, the proposed enhancements to the existing program, and the radiation protection support for the spent fuel program. During the meeting, the inspector discussed any enhancements that were being considered for the radiation protection program. Since the new E&RC Manager has only been at the Harris site since March 1991, some of the enhancements were only conceptional and he and his staff have not had the time to implement them. The managers were very informative about the following enhancements that were being considered: dry active waste specifications, dose goals, radiation safety violations vs. occurrences, radioactive material storage areas, health physics job standards, work area housekeeping, radwaste reduction effort, spent fuel building management, local leak rate testing, ISI program ALARA reviews, breathing air system, steam generator chemistry, dose reduction program, and 10 CFR 20 implementation.

In order to verify that the E&RC organization is effectively implementing management controls and radiation protection controls at the Harris facility, the inspector reviewed the "B" spent fuel pool rerack project. The work activities for this project began in June 1990 and continued through March 1991. The inspector considered this project a good indicator of management controls and radiation protection controls because it included welding repairs of spent fuel pools gates and liners and it included the reconfiguration and the addition of racks for the additional BWR fuel shipments. The project had many radiological consequences because all work surfaces were exposed to a highly contaminated work environment (the spent fuel pool water), it involved significant abrasive work on contaminated surfaces (gates, racks, pool floors), it required draining the "B"pool with significant crud depositions on the pool floors and rack surfaces, and it required movement of contaminated fuel racks between fuel pools above the

fuel pool water. With the above considerations for the projects, the inspector reviewed staffing for the project, training of the contractor staffing, training of personnel supporting the project, surveys, procedures, prejob plans, radiation work permits, respiratory protection, other protection measures, post job reviews, and the fuel handling building contamination event during the draindown of the "B" pool.

The inspector verified through record reviews and discussions with the managers that the radiation protection staffing was adequate. There were 93 permanent employees in the organization and this number included both CP&L and contractor employees. Twelve of these employees were dedicated to the spent fuel handling program. Dedicated contractor technicians were hired for the spent fuel pool modifications projects and additional staffing is being considered for the Radiation Control Operations Section to support the spent fuel handling activities. The inspector reviewed some of the training of the personnel assigned to the reracking project. The inspector specifically reviewed documentation of the training for the contractors assigned to the project and verified that certification of the tasks and the training for each task that would be involved. Special training was given for the task of bagging and unbagging racks for their movement in and out of the spent fuel pools. Additionally, the inspector reviewed training of the individuals involved with the underwater rack flushing, training for those required to wear bubble suits and supplied air, job sequence and job mechanics, experience with crud, and anticipated radiological problems with crud.

The inspector reviewed project contamination surveys and surveys during each sequence of the project. After reviewing the surveys, the inspector reviewed the radiation work permits (RWPs) that supported the various phases of the projects. The RWPs were very detailed with special radiological protection requirements defined for each job task. The RWPs required special briefings for all individuals who signed the RWP.

The inspector verified through discussions that daily meetings were held between health physics, plant services, and plant modification personnel to discuss the ongoing tasks and review the short term plans. Also, through discussions the inspector verified that the licensee held weekly fuel handling procedure coordination meetings with the project coordination management and the site management.

For this project the licensee installed a portable breathing air compressor for the pool draindown, decontamination, modifications, and repairs. The inspector verified formal training and qualifications for the compressor operators.

The inspector reviewed other radiation control protective measures implemented during the reracking project. The additional protective measures included the following:

- Use of strippable coating in "A" and "B" Pools transfer canals to contain and remove high surface contamination levels off the fuel pool floor surfaces and up to eight feet on the vertical surfaces.
- Vacuuming of "B" pool to eliminate gross concentrations of crud prior to the draindown.
- Extensive use of HEPA filtration.
- Tenting following reracking removal prior to the final draindown.
- Fuel rack containment devices.
- Use of a water spray system to maintain highly contamination surfaces wet.
- Immediate bagging of contaminated waste from the project and designation as hot particle potential.
- Mopping of the floor surfaces during each shift to reduce the potential of the spread of contamination.
- Dedication of radiation control personnel to the project.

During the review, the inspector verified records of the the prejob planning for the reracking project, the use of respiratory protection equipment used during the project, selected procedures, and formal ALARA job evaluations. Additionally, the inspector discussed in detail the fuel handling building contamination during the draindown of the "B" pool. During this discussion the inspector questioned the evaluation of the initiating conditions, the root cause of the event, and the corrective actions. In answering the questions, the managers explained that one of the most significant corrective actions of the event was the engineering design and development by the radiation protection staff of the fuel rack processing facility. This processing facility contributed significantly to the dose reduction of the project and improved bagging of the fuel racks for movement.

After reviewing the radiation protection organization, changes to the organization, proposed enhancements to the organization, existing staffing and supplementary staffing, training, radiation controls, management of the "B" spent fuel pool reracking project, and the the management of the fuel handling building contamination event during the "B" spent fuel pool project, the program is technically adequate, effectively supports the spent fuel handling program, and is effective in protecting the health and safety of the occupational worker and members of the public.

No violations or deviations were identified.

7. Action of Previous Inspection Findings

(Open) Violation 50-400/90-21-04: Safety Evaluation for increased activity in spent fuel pools.

A previous inspection identified a violation of 10 CFR 50.59 requirements for maintaining changes to a facility from the described safety analysis report and that the records for these changes must include a written safety evaluation which provides the bases for the determination that the change does not involve an unreviewed safety question. The corrective actions committed to an additional review of the design bases for the fuel handling building and a safety evaluation for the increased activity in the field pool water. The actions taken by the licensee to close this violation are discussed in Section 5 of this report. The safety evaluation is scheduled for completion by June 30, 1991.

8. Exit Interview

The inspection scope and results were summarized on May 10, 1991, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results as listed in the summary. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

The inspector discussed the status of the previous inspection finding-Violation 50-400/90-21-04 and the pending safety evaluation. No new issues were identified during the inspection.

9. Acronyms and Initialisms

ALARA - As Low As Reasonably Achievable
BWR - Boiling Water Reactor
CFR - Code of Federal Regulation
CM - Corrective Maintenance
CP&L - Carolina Power and Light
E&RC - Environmental and Radiation Control
FMP - Fuel Management Procedure
FSAR - Final Safety Analysis Report
HEPA - High Efficiency Particulate Air
I&C - Instrument and Control
ISI - In Service Inspection
NRC - Nuclear Regulatory Commission
QA - Quality Assurance
RWP - Radiation Work Permit