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

OCT 11 1991

Report No: 50-400/91-22

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

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

Facility Name: Shearon Harris Nuclear Power Plant

Inspection Conducted: September 16 - 20, 1991

Inspector: J R Moore for 10/10/91
R. P. Carrion Date Signed

Approved by: J R Moore 10/10/91
T. R. Decker, Chief Date Signed
Radiological Effluents and Chemistry Section
Radiological Protection and Emergency
Preparedness Branch
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of radiological effluent releases, plant water chemistry, the post accident sampling systems (PASS), shipping of spent fuel, environmental monitoring, and organization of the Environmental and Radiation Control (E&RC) Department and the Radwaste Unit, Spent Fuel Pool clean up status, radwaste facilities, training of Radwaste Operators, semi-annual effluent reports, and the annual radiological environmental monitoring report.

Results:

The licensee has taken adequate corrective action to close Violation 50-400/91-03-01 and Deviation 50-400/91-03-02, in reference to the PASS. Also, the licensee is trying to resolve the problem with the gas stripper (Paragraph 3).

The clean up of the SFPs and Transfer Canal have progressed well (Paragraph 4).

The licensee is making a concerted effort to put the TS radiation monitors back into service (Paragraph 5.b).

Plant operations had no significant radiological/environmental impact on public health and safety in 1990 (Paragraphs 5.a and 7).

Releases are effectively executed by a competent Environment and Chemistry (E&C) staff (Paragraph 6).

Plant water chemistry was maintained well within TS limits (Paragraph 8).

Licensee radwaste facilities were well-maintained and will be upgraded (Paragraph 9).

The training program was adequate to maintain a pool of knowledgeable, well-qualified Radwaste Operators (Paragraph 10).

The Radiation Control (RC) staff involved with the spent fuel shipments is competent and carries out its duties in a competent, professional manner (Paragraph 11).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

M. Boone, Supervisor, Radiation Control (RC)
*A. Bostic, Supervisor, OPS/Radwaste
*J. Collins, Manager of Operations
C. Hinnant, Plant General Manager
*S. Johnson, Chemistry Supervisor
J. Leonard, Project Specialist - Radwaste
*J. McKay, NAD
*B. Meyer, Manager, Environmental and Radiation Control (E&RC)
*A. Poland, Manager, E&RC Support
B. Sears, Foreman, E&RC
*M. Staton, Power Agency
*F. Strehle, Manager, QA Engineering
*M. Verrilli, Specialist, Regulatory Compliance
M. Wallace, Senior Specialist, Regulatory Compliance

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

NRC Inspectors

M. Shannon, Resident Inspector

*Attended exit interview

2. Organization (84750)

Technical Specification 6.2 describes the licensee's organization.

The inspector reviewed the licensee's organization, staffing levels, and lines of authority as they related to the Chemistry Department and Radioactive Waste Group to verify that the licensee had not made organizational changes which would adversely affect the ability to control radiation exposures or radioactive material.

The organization was stable, with limited turnover. Overtime was used sparingly during normal work scenarios but more heavily during outages.

The Chemistry Department was part of the Environmental and Radiation Control (E&RC) Department. The entire E&RC Department consisted of 85 people and was divided into three functional areas: ALARA, Radiation Control (RC), and Environmental and Chemistry (E&C). There were no vacancies in the organization at

the time of this inspection. Normal chemistry operational activities were done by two groups of ten people each, headed by the Supervisor of Plant Operations and the Supervisor of the Count Room, respectively. The E&RC Technical Support Group, composed of eleven members, assisted the Chemistry Section for procedures, administrative issues, and special projects. The Manager of E&RC Technical Support, as well as the two Chemistry Supervisors, reported directly to the Manager of the E&RC Department, who, in turn, reported directly to the Plant Manager.

The Radwaste Shipping Section is one of four sections in the Health Physics Operations Branch. It is composed of ten technicians and a supervisor, who reported to the Manager of Radiation Control, who, in turn, reported to the E&RC Manager. In addition to preparing the normal radwaste shipments, this group was also responsible for receiving the spent fuel casks from the Brunswick and Robinson plants and assuring that they may be released from the Harris site upon removal of the spent fuel.

The use of overtime is addressed in TS 6.2.2.f. The inspector discussed this issue with the E&RC Manager, who provided the inspector a copy of the overtime log for his department for the month of August. The log was arranged by functional group on a weekly basis. It also included the cumulative number of overtime hours worked prior to those shown in the monthly report since the beginning of the year. The inspector was told that the overtime goal was to use less than ten percent during normal plant operations. The inspector reviewed the log and found that, as a Department, the goal was met. However, the inspector noted that certain individuals had worked as much as fifty percent overtime for a given week. When asked about this item, the Manager explained that the individuals in question were involved with the spent fuel shipments from Brunswick and Robinson. When the shipments arrive, those individuals work long hours to properly handle and manipulate the spent fuel to it repository in the Spent Fuel Pool (SFP). Furthermore, the work was structured such that it was done during five twelve-hour shifts, thereby guaranteeing two consecutive days at the end of the week to recuperate.

Radwaste processing was done by the Operations Department, specifically by the Radwaste/Fire Protection Section, which was composed of 47 members, including operations and support staff.

No violations or deviations were identified.

3. Post Accident Sampling System (PASS) (84750)

NUREG-0737 requires that the licensee be able to obtain a sample of the reactor coolant and containment atmosphere. Furthermore, the sample must be promptly obtained and analyzed (within three

hours total) under accident conditions without incurring a radiation exposure to any individual in excess of 3 and 18 3/4 rem to the whole body or extremities, respectively.

TS 6.8.4.e requires that a program be established, implemented, and maintained to ensure the capability to obtain and analyze, under accident conditions, reactor coolant, radioactive iodides and particulates in plant gaseous effluents, and containment atmosphere samples. The PASS should provide these capabilities and should enable the licensee to obtain information critical to the efforts to assess and control the course and effects of an accident.

The inspector reviewed the Violation and Deviation identified in Inspection Report 50-400/91-03 and discussed the corrective actions taken by the licensee to resolve these issues.

For Violation 50-400/91-03-01, concerning the lack of a written procedure for the removal of post-accident, undiluted, reactor coolant sample from the shielded container ("pig") from which it is collected, the inspector reviewed Chemistry and Radiochemistry Procedure CRC-821, Revision (Rev.) 8, entitled "Postaccident RCS/RHR Sampling." Section 10.8, entitled "Sample Preparation and Analysis," had been modified to include instructions on removing the sample from the "pig." The instructions were detailed and clear. Therefore, the inspector closed the violation.

For Deviation 50-400/91-03-02, concerning the licensee's commitment to NRR for semiannual retraining of the chemistry technicians qualified to operate the PASS, the inspector reviewed Chemistry and Radiochemistry Procedure CRC-830, Rev. 4, entitled "Periodic Maintenance and Operability Verification of the PASS." Section 10.5, entitled "Semiannual Retraining," had been added to specifically define the retraining requirements for designated "PASS Operators."

The inspector reviewed training records of the ten designated PASS Operators. Three had received retraining on June 26 while the other seven had received retraining on July 1. The incorporation of the retraining into the procedure and its implementation satisfied the licensee's commitment to NRR. Therefore, the inspector closed the deviation.

The inability of the stripped gas isotopic results to meet NUREG-0737 acceptance criteria has been a problem since the plant was originally started up. The inspector discussed this issue with the PASS Foreman and was told that a recent INPO recommendation was to send an engineering team to a utility which has the same PASS but has not experienced the problems with the gas stripper. The recommended utility was contacted and was receptive to the idea. Harris Management was evaluating the

proposal but had not made a decision as of the conclusion of this inspection.

No violations or deviations were identified.

4. Spent Fuel Pool (SFP) Facility (84750)

The inspector met with cognizant licensee representatives to discuss the status of the clean up effort of the SFPs. They showed the inspector the layout of the SFPs and associated transfer canals, Spent Fuel Cask Loading Pool, and the Decontamination Enclosure. Using Flow Diagram CPL-2165 S-0805, Rev. 5, CPL-2165 S-0561, Rev. 7, and CPL-2165 S-0562, Rev. 5, the licensee representative discussed the SFP cooling and clean up systems with the inspector. At the time of the inspection, there was only one demineralizer system for the four pools, and it was constantly running for Pools A and B. (Future plans call for the installation of an additional clean up system for Pools C and D.) Pool A was used for new fuel storage and Pool B for the storage of spent fuel from all three CP&L nuclear facilities. Pools C and D had been used for temporary storage of contaminated filters, scaffolding, etc.

The licensee wanted to drain Pools C and D but did not have a temporary storage location for the contaminated water. The idea of discharging the water to the radwaste system for processing and then discharging it to Harris Lake was investigated. Because the FSAR did not address liquid discharge to radwaste from the SFPs, Plant Change Request (PCR) 5984 was initiated to evaluate this possibility, as a one-time event. (FSAR, Chapter 11, was being revised via PID-H0100, entitled "Long Term Shutdown of Radwaste Equipment," to account for the fact that Radwaste was using demineralizers to process all liquids. The revision was to include the SFP as a source of activity but was not scheduled for completion until the end of October of this year.)

The PCR concluded that such a discharge would result in minimal dose to the public and was, therefore, approved. However, the approval was conditioned upon the floor of the SFP being vacuumed of any settled crud or, if the water is transferred prior to the vacuuming of the settled crud, using a one-micron (or smaller) absolute filter to filter the liquid as it is transferred to Radwaste to mitigate the potential of discharging the crud to Radwaste which could increase dose in the radwaste to unacceptably high levels.

The inspector discussed the current status of the SFPs and Transfer Canals with the licensee's representative. The inspector also reviewed graphical presentations of the concentrations of the various contaminants (chlorides, fluorides, sulfates, silicates, boron, etc.) in the different SFPs for the period of June 1991 to the date of this inspection. The

chemistry of all of the pools was acceptable. Various operations were readily apparent from the graphs. For example, the sulfate level declined linearly when a portable filter was introduced to SFP C, from about 340 ppb in late August to about 40 ppb at the time of this inspection. Also, the silicon dioxide levels for SFPs A and B and the 1-4 Transfer Canal clearly illustrated reaching an equilibrium condition shortly after the isolation gates between them were opened in mid-August. The clean up of the SFPs and Transfer Canals had progressed well and the licensee's program is adequate to ensure future success.

No violations or deviations were identified.

5. Radiological Effluents (84750)

a. Semiannual Radioactive Effluent Release Reports

TS 6.9.1.4 requires the licensee to submit a Semiannual Radiological Effluent Release Report within the time periods specified in TS 6.9.1.4 covering the operation of the facility during the previous six months of operation. The inspector reviewed the semiannual radioactive effluent release reports for 1990 and the first half of 1991. This review included an examination of the liquid and gaseous effluents for 1990 and the first half of 1991 as compared to those of 1989. The data are summarized below.

Harris Radioactive Effluent Release Summary

	1989	1990	1991*
Abnormal Releases			
a. Liquid	0	0	1
b. Gaseous	1	2	0
Activity Released (curies)			
a. Liquid			
1. Fission and Activation Products	2.42E-1	7.31E-1	5.66E-1
2. Tritium	4.58E+2	7.26E+2	2.28E+2
3. Gross Alpha	0.00E+0	< LLD	< LLD
b. Gaseous			
1. Fission and Activation Products	1.15E+2	5.96E+2	3.68E+2
2. Iodides	9.47E-7	0.00E-0	0.00E-0
3. Particulates	6.56E-7	7.72E-5	3.13E-5
4. Tritium	0.00E+0	1.56E+0	8.09E-1

*First half only.

A comparison of the listed data for 1989, 1990, and the first half of 1991 showed no significant trends.

For 1990 and the first half of 1991, Harris liquid, gaseous, and particulate effluents were well within TS, 10 CFR 20, and 10 CFR 50 effluent limitations.

One unplanned liquid release was made on April 8, 1991, when approximately 350 gallons of water containing 3.37 E-7 uCi/ml of Co-58 was inadvertently pumped from an area surrounding the Refueling Water Storage Tank to the storm drain system, resulting in a release of about 0.45 uCi (4.5 E-7 Ci). The release was monitored. The doses attributed to this release were calculated and were negligible.

The following table summarizes solid radwaste shipments for the previous few years. These shipments typically include spent resins, filter sludges, dry compressible waste, and contaminated equipment.

Harris Solid Radwaste Shipments

	1989	1990	1991*
Volume (cubic meters)	160.4	77.4	45.0
Activity (curies)	25.4	62.5	135.5

* First half of 1991 only.

For solid radwaste, the only noted trend was that the total annual activity appeared to increase for the period reviewed.

b. Out of Service Monitors

Appendix 6 listed 18 liquid effluent monitors which had been Out of Service for more than thirty days during the reporting period. Ten of the referenced monitors had been fixed and returned to service. The remaining monitors were being addressed via various Plant Change Requests (PCRs). Specifically, monitors FT-21WL-6119 and FT-*1WL-6193 were addressed by PCR 4746 and involved correcting the size of the orifice/transmitter. The Flow Rate Monitors for the RAB Vent Stack 1, Waste Processing Building Vent Stack 5, and Waste Processing Building Vent Stack 5A were all addressed by PCR 3170, which was initiated to correct the flow instrumentation problem. Waste Gas Monitors OAI-21WG-1101, HAIC-21WG-1118A, OARC-21WG-1119A, and OARC-21WG-1119B were all addressed by PCR 2290, which involved a revamping of the Waste Gas System to upgraded technology. The Flow Rate

Monitor for the Turbine Building Vent Stack 3A was addressed by PCR 5107, which involved modification of the flow measurement system to correct moisture interferences which resulted in discrepancies between actual and expected flow rates.

No violations or deviations were identified.

6. Liquid Effluent Processing and Monitoring (84750)

TS 3.11.1.1 states the requirements for liquid effluent concentrations released to Unrestricted Areas. TSs 4.11.1.1.1 and 4.11.1.1.2 define the surveillance requirements for the sampling and analysis program. The inspector reviewed six Release Permits (91-0195, 91-0202, 91-0237, 91-0277, 91-0278, and 91-0282) for the period since the last inspection (March, 1991) to verify compliance. The releases included batch liquid as well as batch and continuous gaseous releases from various sources including vent stacks, Waste Monitor Tanks (WMTs), and from Waste Gas Decay Tanks. The permits included both release information and projected dose calculations. No unusual items were noted.

The inspector observed the activities associated with Liquid Release 91-0382, from the Secondary Waste Sample Tank (SWST). The inspector reviewed Operating Procedure (OP) OP-120.01.02, Rev. 5, entitled "Secondary Waste Sample Tank," effective April 11, 1990, and verified that Release Permit 91-0382 was being completed as required by the procedure. The technician had determined the operability status of Radiation Monitor REM 3542, calculated the minimum recirculation time for the SWST, and verified the proper valve and pump configuration for the tank recirculation. After recirculating the tank volume as required by procedure, a sample was taken for analysis by a technician. The inspector observed the technician as he obtained the sample in accordance with Section 10.1.3 of Chemistry and Radiochemistry (CRC) Procedure CRC-260, Rev. 3, entitled "Secondary Waste Treatment System Chemistry Control," effective June 19, 1989, and noted that he followed the procedure closely and completed his work in a competent manner, without incident. The technician took the sample directly to the laboratory to be analyzed. The sample analysis showed that the contents of the SWST did not exceed 10 CFR 20 or 10 CFR 50 requirements and, therefore, could be released to an Unrestricted Area. The dilution flow rate and high alarm setpoints for REM 3542 were established. The release was ready to be executed except that another release had been previously initiated and was not yet finished. Rather than wait for that release to be completed, flush the lines, etc. before actually commencing the release whose preparation the inspector had observed, the inspector requested a copy of the documentation of the release upon its completion and left to pursue other activities. The requested documentation was supplied to the inspector the following day. It indicated that the release had

been successfully completed, discharging 21000 gallons of tank volume.

No violations or deviations were identified.

7. Annual Radiological Environmental Operating Report (84750)

TS 6.9.1.3 requires that the Report be submitted prior to May 1 of the following year of the Report. TS 6.9.1.3 also states format and content requirements for the Report.

The inspector reviewed the Annual Environmental Operating Report for calendar year 1990 to verify compliance with the TSs. The Report had been submitted in compliance with TS 6.9.1.3 on April 22, 1991, and the format and contents were as prescribed by the TS. There were no changes to the environmental monitoring network during 1990. The inspector determined that the Report was in compliance with the TSs.

A review of the 1990 environmental data indicates some changes in the parameters monitored when compared to the 1989 data. Cs-137 was present in some forage indicator samples and bottom and shoreline sediment. The surface water tritium levels were greater than those of 1989. The external gamma radiation values were virtually identical to TLD measurements of 1989. No significant changes were indicated in gross beta in air, iodine in air, milk, drinking water, ground water, game fish, bottom-feeding fish, shoreline sediment, or bottom sediment. Data obtained during the 1990 sampling year demonstrate that there was no adverse impact on the surrounding environs of the Shearon Harris Nuclear Power Plant as a result of its operation.

No violations or deviations were identified.

8. Plant Water Chemistry (84750)

TS 3.4.7 specifies the limits within which the reactor coolant system must be maintained for dissolved oxygen, fluorides, and chlorides. TS 3.4.8 specifies the limits for the specific activity of the reactor coolant. These parameters are related to corrosion resistance and fuel integrity.

Pursuant to these requirements, the inspector reviewed graphical summaries which correlated reactor power output to chloride, fluoride, and dissolved oxygen concentrations, and specific activity of the reactor coolant for the period of March 1, 1991 through September 17, 1991. All of the reviewed parameters satisfied the TS requirements.

No violations or deviations were identified.

9. Radwaste Facilities (86750)

The Radwaste Project Specialist described the liquid and solid radwaste systems and their capabilities to the inspector with the aid of flow diagrams of the systems.

The inspector and the Radwaste Project Specialist walked down the radwaste facilities and saw the actual hardware (pumps, valves, tanks, etc.) associated with the radwaste systems. They were located in a building constructed exclusively for the processing of radioactive materials. It had its own well-staffed control room from which releases (and other processes) were controlled and monitored in coordination with the main control room. The inspector noted a general "spaciousness," which would allow ample room for maintenance of system components. The inspector was shown the area where a major system modification will be made, i.e. the reverse osmosis unit will be replaced in favor of a filtration and demineralizer unit consisting of three pre-filters to remove particles of 25, 10, and 1 micron successively, a demineralizer system composed of four 20-cubic foot demineralizer beds (three of cations and one of anions), and a final filter before release to a storage tank. Future inspections will follow up on the installation status and performance of the new unit. The inspector also saw the Spent Resin Tanks and the area where resin dewatering is accomplished. No shipments were made during the period that the inspector was on site and, therefore, no observation of the actual activities involved therein could be made to evaluate the effectiveness of training, activities of personnel, etc.

No violations or deviations were identified.

10. Training and Qualification (86750)

TS 6.4 requires the licensee to maintain a training program for the plant staff to assure that the minimum education and experience requirements and recommendations of the September 1979 draft of ANS-3.1, with the exceptions and alterations noted in the FSAR, and Appendix A of 10 CFR 55 and the supplemental requirements specified in Sections A and C of Enclosure 1 of the March 28, 1980 NRC letter to all licensees are met before a person can be considered to be qualified to perform his duties independently. The program shall include familiarization with the relevant operational experience.

The inspector discussed the training and qualification requirements for Radwaste Operators with the Radwaste Project Specialist and reviewed the Harris Training Unit Training Instruction (TI) Manual, Volume I, TI No. TI-107, Rev. 6, entitled, "Radwaste Operator Training," approved on November 29, 1990. The TI described the Radwaste Training and Qualification Program for Radwaste Operations personnel and implemented the

training commitment in FSAR Chapter 13, Section 13.2, and Regulatory Guide 1.8, "Personnel Selection and Training."

The program provided a means for training personnel to become safe Radwaste Operators. Requirements for Radwaste Operations personnel, managers, and evaluators were defined. Personnel qualification procedures outlined the steps to be taken by a candidate to become a Radwaste Operator, including required training/classes. The use of Qualification Checkout Cards was explained as a method to assure that a candidate's level of knowledge and skill is adequate to perform a given task. Continuing education was also required to reinforce, maintain, and improve job-related skills and knowledge of previously-qualified operators and could be accomplished via numerous means, including self-study, job-related courses offered through technical schools or colleges, classroom sessions conducted by the Harris Training Unit, etc. The responsibilities of the evaluators, foremen, and managers were also defined.

The training program was adequate to maintain a pool of knowledgeable, well-qualified Radwaste Operators.

No violations or deviations were identified.

11. Transportation (86750)

10 CFR 71.5(a) requires each licensee who transfers licensed material outside of the confines of its plant or other place of use, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the regulations appropriate to the mode of transport of DOT in 49 CFR Parts 170 through 189.

Pursuant to these requirements, the inspector reviewed the licensee's activities affiliated with these requirements, to determine whether the licensee effectively processes, packages, stores, and ships radioactive solid materials.

The inspector reviewed Health Physics Procedure (HPP) 151, Rev. 3, entitled "Shipment of Empty Spent Fuel Cask," and observed the shipment of two empty spent fuel casks off site and their pick up by the CSX Railroad for transport to the Robinson site, where additional spent fuel awaits shipping to Harris. The procedure was detailed and complete. It addressed prerequisites, precautions, limitations, special tools and equipment, and acceptance criteria to be utilized in conjunction with the main activities of the procedure. Each cask was treated as a separate shipment (S-75-91 IF-304 and S-74-91 IF-303, respectively) and were configured such that there was a "buffer" car between each other and between them and the locomotive and caboose. Before leaving the site, the inspector and the responsible RC technician boarded both cars containing the empty casks to verify radiation

levels as shown on the survey sheet, to check the condition of the packaging, and to check the locks and seals of the cask cage. These items were found to be acceptable for both shipments. The licensee hauled the shipment from the protected area to a rail siding outside the protected area where CSX took possession. The inspector accompanied the RC technician when she delivered the shipment documentation, including emergency response information, Engineer/Conductor Instructions for Exclusive Use Transport Vehicles, Bill of Lading, etc., to the engineer of the locomotive, who was briefed on the contents of the shipment and his responsibilities, with emphasis on who to contact in the event of an emergency.

No violations or deviations were identified.

12. Exit Interview

The inspection scope and results were summarized on September 20, 1991, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed the inspection results, including likely informational content of the inspection report with regard to documents and/or processes reviewed during the inspection. The licensee did not identify any such documents or processes as proprietary. Dissenting comments were not received from the licensee.

13. Acronyms and Initialisms

ALARA - As Low As Reasonably Achievable
ANS - American National Standard
Ci - curie
CFR - Code of Federal Regulations
cm - centimeter
CP&L - Carolina Power and Light
CRC - Chemistry and Radiochemistry
DAW - Dry Activated Waste
DEI - Dose Equivalent Iodine
DOT - Department of Transportation
E&RC - Environmental and Radiation Control
FSAR - Final Safety Analysis Report
gpm - gallons per minute
HP - Health Physics
INPO - Institute of Nuclear Power Operations
LLD - Lower Limit of Detection
ml - milli-liter
No. - Number
NRC - Nuclear Regulatory Commission
NRR - Nuclear Reactor Regulation
OP - Operating Procedure
PASS - Post Accident Sampling System
PCN - Plant Change Notice
ppb - parts per billion

RAB - Reactor Auxiliary Building
RC - Radiation Control
RCS - Reactor Coolant System
Rev - Revision
SHNPP - Shearon Harris Nuclear Power Plant
SWST - Secondary Waste Storage Tank
TLD - Thermoluminescent Dosimetry
uCi - micro-Curie