UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

AUG 31 1993

Report No: 50-400/93-16

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: August 2 - 6, 1993

Inspector: Thomas R Decker Jr 8/30/93
R. P. Carrion, Radiation Specialist Date Signed

Accompanied by: T. R. Volk, Physical Sciences Technician

Approved by: Thomas R Decker 8/30/93
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, announced inspection was conducted in the areas of organization of the Chemistry Department, the Radioactive Waste Shipping Unit, and the Radiochemistry Section; confirmatory measurements; plant water chemistry; the Semiannual Radioactive Effluent Release Report; the Radiological Environmental Monitoring Program (REMP); the Annual Environmental Operating Report; and the Spent Fuel Pool (SFP) status.

Results:

The licensee's organization of the Chemistry Department, Radioactive Waste Shipping Unit, and Radiochemistry Section was stable and satisfied requirements of the Technical Specifications (TSs) (Paragraph 2).

The licensee demonstrated that a good Counting Room radiochemical analysis program was in place (Paragraph 3).

The licensee's plant water chemistry was maintained well within required TS limits (Paragraph 4).

The Semiannual Radioactive Effluent Release Report met the requirements of the TSs (Paragraph 5).

The licensee had an effective Radiological Environmental Monitoring Program in place to monitor radiological effluents, direct radiation, etc. due to plant operations. In 1992, plant operations caused minimum impact to the environment and virtually no dose to the general public from those effluents. However, Unresolved Item 50-400/93-16-01 was identified (Paragraph 6).

The Annual Environmental Operating Report for 1992 was well written and complied with applicable regulations (Paragraph 7).

The SFPs were being adequately maintained (Paragraph 8).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*H. Barnes, Environmental and Chemistry (E&C) Specialist
M. Boone, Radiation Control (RC) Supervisor
*S. Johnson, E&C Supervisor
*S. Langdon, Sr. Chemistry Specialist
W. McKenzie, Chemistry Specialist
*A. Poland, Environmental and Radiation Control (E&RC) Support Manager
*W. Robinson, Harris Plant General Manager
K. Rogers, RC Technician I
*B. Templeton, E&RC Technician
*M. Wallace, Senior Specialist, Regulatory Compliance
B. White, E&RC Manager
M. Weissmann, Chemistry Technician I
*W. Wilson, Spent Nuclear Fuel Manager

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

North Carolina Department of Environment, Health, and Natural Resources

B. Dusenbury, Jr., Environmental Radiation Specialist

Nuclear Regulatory Commission

*D. Roberts, Resident Inspector
*J. Tedrow, Senior Resident Inspector

*Attended exit interview

Acronyms and Initialisms used throughout this report are listed in the last paragraph.

2. Organization (84750 and 86750)

TS 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 Shipping 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 structure of the E&RC Organization had been modified since the last inspection. At that time, the E&RC Organization was divided into four departments: Chemistry, ALARA, RC Operations, and E&RC Support. The new organization had been divided into three departments. The responsibilities of ALARA had been incorporated into the RC Operations

Department, while the Chemistry and E&RC Departments remained unchanged structurally. The Chemistry Department was organized into three groups; E&C Technical Support (which included procedures and administration), E&C Plant Operations (which included in-line instruments and calibrations), and the E&C Count Room (which included the labs, effluents, radwaste, and the Offsite Dose Calculation Manual (ODCM)). The former E&RC Manager had accepted another corporate assignment and his position had been filled by the former Chemistry Manager. The position of Chemistry Manager was vacant at the time of this inspection but was expected to be filled within the next few weeks. No other personnel changes in the E&RC Organization were noted by the inspector.

The Radiochemistry Section was located off site at the Harris Energy and Environmental (E&E) Center. Organizationally, it was part of the Laboratory and Facility Services Section (L&FSS) and had the responsibility of counting the environmental samples of all three Carolina Power and Light Company (CPL) nuclear power plants. The staff included the Supervisor (who reported to the Manager-L&FSS), a specialist, a member from Health Physics Support, and seven technicians. The inspector concluded that the licensee's Chemistry Department and the Radiochemistry Section satisfied TS requirements and noted that the respective organizations had maintained their ability to function effectively.

No violations or deviations were identified.

3. Confirmatory Measurements (84750)

10 CFR 20.201(b) requires the licensee to perform surveys as necessary to evaluate the extent of radiation hazards.

To evaluate the licensee's analytical capability to make consistently accurate radioactivity measurements, five samples were analyzed for radionuclide concentrations by the licensee and the NRC Region II mobile laboratory, including: a reactor coolant system (RCS) sample (which had been collected prior to the mobile laboratory's arrival and had decayed for several hours before analysis), a one-liter liquid NRC-spiked standard, a 1260 cc Waste Gas Decay Tank (WGDT), an NRC-spiked particulate filter, and an NRC-spiked charcoal cartridge. The purpose of these comparative measurements was to verify the licensee's capability to accurately detect and identify gamma-emitting radionuclides and to quantify their concentrations. The licensee analyzed all samples in the Chemistry Counting Room, which was equipped with three intrinsic Germanium gamma spectroscopy detectors, two alpha-beta counters, and a liquid scintillator. Discussions with cognizant licensee representatives determined that the existing computer system was about to be upgraded by a later-generation system, including a new software package with expanded capabilities.

The inspector reviewed several calibration curves for Detector No. 1 used for the confirmatory measurement exercise, including geometries of: a one-liter Marinelli beaker on shelf zero, a 47-millimeter filter on shelf one, a 125-milliliter bottle on shelf one, a 1260 cc gas beaker on shelf zero, and a charcoal cartridge on shelf two. The calibration curves were developed using mixed gamma sources (which typically contained Cd-109, Co-57, Ce-139, Hg-203, Sn-113, Sr-85, Cs-137, Co-60, and Y-88) plus Am-241. The licensee used twelve sources for various geometry calibrations. The inspector reviewed Certificates of Calibration for several of the sources used to generate the referenced calibration curves. Each source was prepared using an aliquot measured gravimetrically from a calibrated master radionuclide solution source. The calibration had been confirmed by the National Institute of Standards and Technology (NIST) in a Measurements Assurance Program as described in NRC Regulatory Guide 4.15, Rev. 1, dated February 1979. Confirmation was obtained for each gamma ray listed to within the limits stated on the certificate. The licensee had received thirteen new sources and planned to use them during the annual calibration of the detectors. The inspector noted that the last calibration had been performed in July 1992, more than a year earlier but still within the TS-allowed three-month grace period. (The licensee planned to install the previously-referenced new computer system before its annual detector calibration.)

Daily performance checks for the detectors were done using Eu-152 and Co-57 sources. The inspector reviewed the control charts for the month of July 1993 for Detector No. 1. Resolution of the Co-57 channel was noted to be low during several days late in the month. This was attributed to electronics problems which "locked up" the multi-channel analyzer (MCA), requiring "rebooting" of the system. Resolution of the Eu-152 channel showed no biases during the period. The channel gain for both Co-57 and Eu-152 spiked high for the July 18-21 period (attributed to the MCA "locking up") and low for the July 28-30 period. No drifting or biases had been experienced by the detector during the month for counts (intensity) or background. The electronics problems were expected to be resolved with the installation of the new system.

The inspector concluded that the calibration curves and Certificates of Calibration were current and sufficient.

Attachment 1 provides a comparison of the licensee's results to the NRC's results for each sample. Attachment 2 provides the criteria for assessing the agreement between the analytical results. As indicated in Attachment 1, all licensee results compared favorably with the NRC results, indicating that the licensee's analysis system was capable of identifying isotopes over a wide energy spectrum.

From the observations made during this inspection, the inspector concluded that the licensee demonstrated that a good Count Room radiochemical analysis program was in place.

No violations or deviations were identified.

4. Plant Water Chemistry (84750)

During this inspection, the Shearon Harris Nuclear Power Plant (SHNPP) was in its fifth fuel cycle at 100 percent power. (The fifth refueling outage is scheduled for March 1994.) The inspector reviewed the plant chemistry controls and operational controls affecting plant water chemistry since the last inspection in this area.

a. Primary Water Chemistry

TS 3.4.7 specifies that the concentrations of chloride and fluoride in the Reactor Coolant System (RCS) be maintained below 0.15 parts per million (ppm) and 0.15 ppm, respectively. TS 3.4.8 specifies that the specific activity of the primary coolant be limited to less than or equal to 1.0 microcurie/gram (μCi/g) dose equivalent iodine (DEI).

These parameters are related to corrosion resistance and fuel integrity. The chloride and fluoride parameters are based on providing protection from halide stress corrosion. The specific activity parameter is based on minimizing personnel radiation exposure during operation and maintenance.

Pursuant to these requirements, the inspector reviewed two monthly reports (April and May 1993) which summarized chloride and fluoride concentrations and specific activity of the reactor coolant and determined that the parameters were maintained well below TS limits. Typical values for chloride and fluoride were approximately two parts per billion (ppb). Typical DEI values at steady-state conditions ranged from 7.2E-3 μCi/g to 1.1E-2 μCi/g.

The licensee had confirmed that a small fuel defect had developed in one of the older fuel bundles and was tracking it. The confirmation was done in May during a shutdown which resulted in an iodine spike in which the DEI increased from 1.05E-2 μCi/g to 1.65E-1 μCi/g.

b. Secondary Water Chemistry

1. General Program

TS 6.8.4.c requires the licensee to establish, implement, maintain, and audit a Secondary Water Chemistry Program to inhibit steam generator tube degradation.

The inspector reviewed the licensee's program. The sampling schedule for critical variables and the control points for the variables, the procedures to measure the value of the critical variables, as well as the procedures for the recording and management of data and identification of the authority responsible for the interpretation of the data and sequence and timing of administrative events required to

initiate corrective action were identified in procedure CRC-001, "SHNPP Environmental and Chemistry Sampling and Analysis Program," Rev. 9, effective March 22, 1993. Procedure CRC-150, "Secondary System Chemistry Controls and Steam Generator Wet Layup," Rev. 5, effective January 19, 1993, identified process sampling points. Section 10.4 of the procedure was applicable for detection of condenser in-leakage and Section 11.3 provided methods to calculate the leak rate. Procedures CRC-002, "Chemistry Corrective Actions Program," Rev. 5, effective April 23, 1990 and AOP-033, "Chemistry Out of Tolerance," Rev. 5, effective October 27, 1992, defined action levels, and specified actions to be taken with respect to given action levels to remedy the adverse condition.

2. Records Review

The inspector reviewed records of the three steam generators for the months of April and May 1993 and determined that the required parameters were maintained within their respective limits. The unit operated at 100 percent of capacity for the period reviewed, except for one weekend when it was down due to a failure of a steam blowdown valve inside the containment.

TS 6.10.2.m requires that the licensee retain records of secondary water sampling and water quality "for the duration of the unit Operating License." The inspector requested records for Steam Generator "A" for the arbitrarily-chosen date of February 1, 1988. The information was produced (via the computerized Chemistry Data Management System (CDMS)) for the inspector's review in a timely manner. The records were complete, satisfying regulatory requirements.

The inspector concluded that the Plant Water Chemistry (both Primary as well as Secondary) was well-maintained and satisfied TS requirements.

No violations or deviations were identified.

5. Semiannual Radioactive Effluent Release Report (84750)

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 report for the second half of 1992. This review included an examination of the liquid and gaseous effluent results for the second half of 1992. Those results were added to the results of the first half of 1992 and the sum was compared to those of full years 1990 and 1991. The data are summarized on the next page.

Harris Radioactive Effluent Release Summary

		1990	1991	1992
Abnormal Releases				
a.	Liquid	0	1	0
b.	Gaseous	2	0	2
Activity Released (curies)				
a.	Liquid			
1.	Fission and Activation Products	7.31E-1	6.62E-1	3.14E-1
2.	Tritium	7.26E+2	2.92E+2	9.02E+2
3.	Gross Alpha	< LLD	< LLD	< LLD
b.	Gaseous			
1.	Fission and Activation Products	5.96E+2	8.63E+2	1.36E+2
2.	Iodines	0.00E-0	0.00E-0	7.05E-4
3.	Particulates	7.72E-5	4.71E-5	1.90E-4
4.	Tritium	1.56E+0	8.13E-1	4.37E-1
Dose Estimates				
a.	Gaseous Effluents*			
1.	Noble Gas Gamma Dose (mRad)	3.11E-2	2.49E-2	5.77E-2
2.	Noble Gas Beta Dose (mRad)	4.51E-2	5.70E-2	9.00E-2
3.	Child Skin (mrem)	4.32E-2	4.21E-2	8.28E-2
b.	Liquid Effluents (mrem)			
1.	Adult Liver	1.18E-1	5.50E-2	5.95E-2
2.	Adult Whole body	9.59E-2	4.45E-2	5.50E-2

*Estimated individual organ dose using the Land Use Census for the worst sector and existing pathways.

A comparison of the activity released from liquid fission and activation products, tritium, and gross alpha, as well as gaseous fission and activation products, iodines, particulates, and tritium data for 1990, 1991, and 1992 showed decreasing trends for gaseous tritium releases and liquid releases of fission and activation products. No significant changes were noted in the other results.

In addition, the dose estimates showed no significant changes. The maximum-exposed real member of the public due to releases of airborne I-131, tritium, and all radionuclides in particulate form with a half

life of greater than eight days was identified as a child, with the critical organ being the skin. The maximum-exposed organ of the public from radioactive materials in liquid effluents in unrestricted areas was identified as the liver of an adult, while the maximum whole body dose was that of an adult.

For 1992, Harris liquid, gaseous, and particulate effluents were maintained well within TS, 10 CFR 20, and 10 CFR 50 effluent limitations.

Two non-routine gaseous releases were recorded during the second half of 1992. (The details of these releases are detailed in Paragraph 6.c of IR 50-400/92-25.)

The report also included the results of solid radwaste shipments. The following table summarizes those shipments for the previous three years. The shipments typically included spent resins, filter sludge, dry compressible waste, and contaminated equipment.

Harris Solid Radwaste Shipments

	1990	1991	1992
Volume (cubic meters)	77.4	78.0	71.2
Activity (curies)	62.5	301.8	289.5

For solid radwaste, no significant changes were noted from the previous year.

There were no changes to the Process Control Program (PCP), the Land Use Census, or Offsite Dose Calculation Manual (ODCM) during this reporting period. However, the Environmental Monitoring Program was changed to reflect a change in the location of Sample Station 40 from the U. S. Geological Survey stream gauging station on the Cape Fear River to an upstream location at the Harnett County Metro water treatment plant. The change was made to improve the consistency of sampling and personnel safety.

No unprotected outdoor tanks and no gas storage tanks exceeded TS limits during this reporting period. Furthermore, no major modifications to the Radwaste System were made.

Three effluent radiation monitors (one liquid and two gaseous) were addressed in the report as being out of service for thirty days or more. The two gaseous monitors had been previously-identified and Plant Change Requests (PCRs) had been written to resolve their problems. The PCRs were completed and the monitors were returned to service during the reporting period. The liquid monitor was out of service while problems with a flow switch were resolved. It was placed back into service during the reporting period.

The inspector concluded that the Semiannual Radioactive Effluent Release Report was complete and satisfied TS requirements.

No violations or deviations were identified.

6. Radiological Environmental Monitoring Program (REMP) (84750)

TSs 3/4.12.1 specify that the licensee shall conduct a Radiological Environmental Monitoring Program to monitor radiation and radionuclides in the environs of the plant and define how the program shall be conducted. The REMP shall provide representative measurements of radioactivity in the highest potential exposure pathways and verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. Accumulation of radioactivity in the environment can thereby be measured and trends can be assessed to determine whether the radioactivity resulted from plant operations and to project the potential dose to off-site populations based on the cumulative measurements of any plant-originated radioactivity, as well as to detect unanticipated pathways for the transport of radionuclides through the environment. The SHNPP Environmental Monitoring Program is designed to detect the effects, if any, of plant operation on environmental radiation levels by monitoring radiation pathways in the area surrounding the plant site. It also verifies that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways. Indicator sampling stations are located where detection of the radiological effects of the plant's operation would be most likely, where the samples collected should provide a significant indication of potential dose to man, and where an adequate comparison of predicted radiological levels might be made with measured levels. Control stations are located where radiological levels are not expected to be significantly influenced by plant operation, i.e., at background locations. An environmental impact assessment of plant operation is made from the radiological measurements of the sampling stations.

a. Annual Radiological Environmental Operating Report

TS 6.9.1.3 requires that the Annual Radiological Environmental Operating 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 Report for calendar year 1992 to verify compliance with the TSs. The Report had been submitted in compliance with TS 6.9.1.3 on April 29, 1993, and the format and contents were as prescribed by the TS. The inspector determined that the Report was in compliance with the TSs.

Approximately 950 samples of twelve different media types from indicator stations were collected, analyzed, and compared to approximately 250 control samples during the year. Detectable

radioactivity attributable to plant activities was identified in five per cent of the measurements. All detectable radionuclides in the environmental samples were less than reportable levels, as defined in the TSs.

Overall, the radiological environmental data indicated that plant operations in 1992 had no significant impact on the environment or public health and safety. The only impact of the plant on the environment in its years of operation had been a slow, steady increase in the annual average tritium activity in Harris Lake from 3.4E+3 pCi/l in 1987 to 1.1E+4 pCi/l in 1992 as well as an accumulation of activation products (primarily cobalt and manganese) in bottom sediment near the cooling tower discharge point. No plant-related activity had been detected in fish collected from Harris Lake or in the community drinking water supply downstream at Lillington, North Carolina. The maximum radiation dose attributed to plant operations in 1992 to any off-site member of the public was well within the limits established by 10 CFR 50, Appendix I.

The Radiochemistry Laboratory at the Harris Energy and Environmental Center in New Hill, North Carolina, provides radioanalytical services for CPL's nuclear plant radiological environmental surveillance programs. The laboratory is a participant in the Environmental Protection Agency's (EPA's) cross-check program and uses its performance in the program as a major determinant for the accuracy and precision of its own analytical results. During 1992, a comparison of the laboratory's reported values with those of the EPA's known activity found 98 percent to be within three standard deviations. Specifically, one of 62 samples exceeded the three-sigma action level. A gross beta analysis of a water sample received in January 1992 fell outside the limit. The beta self-absorption curve was redone and the sample reanalyzed and the results were within one standard deviation of the known activity.

The inspector concluded that the report was complete and complied with TS requirements.

b. Observation of Sample Collection

The inspector accompanied a technician on her normal weekly rounds to collect samples to observe collection technique and to check the physical condition and operability of the sampling stations. Samples were taken at eight stations, including: #1, #2, #4, #5, #26, #38, #40, and #47. They included both indicator and control stations and various combinations of media (air only, water only, and/or both, plus generally a thermoluminescent dosimeter (TLD)). Some of the stations were co-located with sampling stations of the State of North Carolina. All air sampling stations were located in areas free of tall weeds/vegetation which might interfere with the taking of a representative sample. Generally, a TLD was also

placed at each of the air sampling stations; the exception being at Station #47, where none was required, per procedure. The inspector noted that all of the sampling units were within calibration and were well maintained. However, one of the water sampling stations (#26) was inoperable and a grab sample was taken. The inspector noted that the TLDs were properly located and that there was no evidence of vandalism, although comments by the technician indicated that vandalism was not uncommon despite efforts by the licensee to mitigate its effects.

The inspector concluded that the technician was knowledgeable, well-trained, and conducted her activities in a professional manner.

c. Comparison of State of North Carolina vs SHNPP Results

The North Carolina Division of Radiation Protection (NCDRP) entered into a contractual agreement with the NRC in May 1986 to measure the concentrations of radioactivity in the environs of three nuclear power plants within the state, including SHNPP. The principal objective of the contract is to provide reasonable assurance that environmental measurements made by NRC licensees are valid. To this end, the State of North Carolina:

- Coordinates sampling activities with those of the NRC licensees.
- Collects and analyzes environmental media samples.
- Takes appropriate action in the investigation of elevated levels of radioactivity in the environment.
- Participates in and reports results of the EPA's Intercomparison Studies Program.
- Reports the results of the State's and licensee's environmental radiological verification monitoring program.

The inspector compared several air particulate and air cartridge results as reported by the licensee to those listed in the "Report On Environmental Radiation Surveillance in North Carolina" for 1991, submitted by the North Carolina Department of Environment, Health and Natural Resources. The results compared favorably, with the exception of gross beta measurements of the air particulates. The reported results of both the control and indicator stations showed a bias in that the results of the state were consistently higher than those of the SHNPP, by a factor of about 1.7. Although the inspector was not concerned that there was an undue risk to the general public because of the small magnitude of the concentrations reported, which averaged 2.03E-2 picoCuries/cubic meter (pCi/m^3), a question of which set of

results is most representative was raised. The inspector discussed the comparisons with the Acting Radiochemistry Supervisor, members of the staff, and the Environmental Radiation Specialist from the State of North Carolina. Although no definite conclusions were reached, the Environmental Radiation Specialist suggested that the air flow characteristics of the air sampling units were sufficiently different to alter the results and that the results would become more consistent when the state placed new air samplers into service. Another possibility was that the counting techniques were different such that self-absorption of the betas were considered by one party but not the other. This issue will be addressed during a future inspection and will be tracked as Unresolved Item 50-400/92-16-01, "Air Particulate Beta Result Discrepancy."

The inspector concluded that the licensee had an effective program in place to monitor radiological effluents, direct radiation, etc. due to plant operations and that the Report was in compliance with the TSs. In 1992, plant operations caused minimum impact to the environment and virtually no dose to the general public from those effluents.

No violations or deviations were identified.

7. Annual Environmental Operating Report for 1992 (84750)

Section 5.4.1 of the Shearon Harris Environmental Protection Plan (EPP) requires the submittal of an annual report to the NRC describing the implementation of the plan during the previous year.

A report on aquatic and terrestrial monitoring programs as required by EPP Section 4.2 was submitted on April 30, 1993. The inspector reviewed the report to verify compliance with the referenced regulation. The State of North Carolina had reissued a National Pollutant Discharge Elimination System (NPDES) permit (No. NC0039586) to the SHNPP on November 1, 1991 which will remain in effect until March 31, 1996. The current permit reflects a reclassification of the SHNPP from a Class II to a Class III designation. The two principal consequences of becoming a Class III facility were (1) that the laboratory analyses performed on all effluent samples had to be performed by a state-certified laboratory and (2) that the sampling frequency for the analysis of biochemical oxygen demand (BOD), total suspended solids, and fecal coliform of the sanitary waste treatment plant be increased from twice per month to daily during 1992. The SHNPP Environmental and Chemistry Laboratory had been certified as a Waste Water Laboratory by the North Carolina Division of Environmental Management (NCDEM) during 1992, with the certificate becoming effective on January 11, 1993. Six occurrences of non-compliance to the NPDES permit were detailed in the area of effluent monitoring, including events such as an overflow of the normal service water strainer backwash surge basin, an overflow of the sewage pump station, and a broken sewage line. All non-compliances were corrected promptly and were not of an ongoing nature. Three other events unrelated to effluent monitoring were also detailed, including an oil

spill, a hydrazine release, and a waste sodium release. Furthermore, the licensee's biological monitoring results were included in the report and indicated that of the four species monitored (Asiatic clams, zebra mussels, bryozoans identified as *Plumaatella emarginata*, and hydrilla), only the bryozoans had an impact on operations due to biofouling and it was minimal. Specifically, during 1992, while performing maintenance activities on the service water strainer, significant quantities of the animal were found in the piping of the make-up pump which had fouled the screens of the normal service water. They had entered through the make-up piping of the cooling tower. Inspection of the piping found insignificant quantities of the organisms present. The licensee planned no remedial action but would monitor the situation.

No non-compliances under EPP Section 5.4, as determined by the licensee, were identified. No plant activities, as determined by the licensee under Section 4.1 of the EPP, caused significant environmental impact.

The inspector concluded that the report complied with applicable regulations.

No violations or deviations were identified.

8. 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. Pool A was used for storage of new fuel as well as some spent fuel and Pool B exclusively for the storage of spent fuel from all three CPL nuclear facilities. Pools C and D had been used for temporary storage of contaminated filters, scaffolding, etc.

The status of Pool C had not changed since the last inspection, i.e., it was empty of contaminated equipment and debris and filled with borated water to the same level of the Transfer Canal (to reduce stress on the isolation gates between the pool and the canal). Pool D was filled with borated water and contained some remaining miscellaneous items. However, the licensee had put movable lights on stainless steel wires in all pools, to avoid oxidation of the steel and its contribution to the undissolved solids. Also, the licensee had installed a locking device for items suspended in the pools. Water clarity, due to undissolved solids, in Pools C and D continued to be a problem. The licensee's plan to utilize a submersible filter system to remove the undissolved solids had been reversed and filtration of the "C" Pool has been discontinued upon consultation with the Chemistry Department which assured that the undissolved solids would have no deleterious effects on the stainless steel pool liner.

The PCR initiated by the licensee to provide a permanent vacuum pump system to pump out the spent fuel shipping casks to better control any crud which may be shed from the spent fuel assemblies during their transportation to SHNPP and to install permanent electrical and mechanical services on the "island" between Pools C and D had been

reviewed by management and it had been viewed as an enhancement because there were no safety or production concerns at issue. The original cost estimate was thought to be too high and it was returned for a review of the scope of the proposed work, with the idea of reducing it to its bare essentials. Upon completion of the review, management would consider it again.

The inspector toured the Spent Fuel Pools and observed that the area was clean and that good housekeeping and Health Physics practices were being followed.

The inspector concluded that the Spent Fuel Pools were being adequately maintained.

No violations or deviations were identified.

9. Exit Interview

The inspection scope and results were summarized on August 6, 1993, 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.

10. Acronyms and Initialisms

ALARA - As Low As Reasonably Achievable
AOP - Abnormal Operating Procedure
cc - cubic centimeter
CFR - Code of Federal Regulations
Ci - curie
CDMS - Chemistry Data Management System
CRC - Chemistry and Radiochemistry
DEI - Dose Equivalent Iodine
E&C - Environmental and Chemistry
E&E - Energy and Environmental
E&RC - Environmental and Radiation Control
EPA - Environmental Protection Agency
EPP - Environmental Protection Plan
g - gram
HP - Health Physics
IR - Inspection Report
L&FSS - Laboratory and Facility Services Section
LLD - Lower Limit of Detection
m - meter
MCA - Multi-Channel Analyzer
μCi - micro-Curie (1.0E-6 Ci)
mRad - milli-Rad
mrem - milli-rem
NCDEM - North Carolina Division of Environmental Management

NCDRP - North Carolina Division of Radiation Protection
NIST - National Institute of Standards and Technology
No. - Number
NPDES - National Pollutant Discharge Elimination System
NRC - Nuclear Regulatory Commission
ODCM - Off-site Dose Calculation Manual
pCi - pico-Curie (1.0E-12 Ci)
PCP - Process Control Program
PCR - Plant Change Request
ppb - parts per billion
ppm - parts per million
RC - Radiation Control
RCS - Reactor Coolant System
REMP - Radiological Environmental Monitoring Program
Rev - Revision
SFP - Spent Fuel Pool
SHNPP - Shearon Harris Nuclear Power Plant
TLD - Thermoluminescent Dosimetry
TS - Technical Specification
WGDT - Waste Gas Decay Tank

ATTACHMENT 1

COMPARISON OF NRC AND HARRIS ANALYTICAL RESULTS
AUGUST 2-6, 1993

Type of Sample: Reactor Coolant System (RCS)
Sample Container: NRC 50 ml bottle
Harris 125 ml bottle

Radio-nuclide	Licensee's Value (μCi/ml)	NRC Value (μCi/ml)	Reso-lution	Ratio	Compar-ison
Detector No. 1					
Cs-134	1.51 E-4	(1.45 +/- 0.08)E-4	18	1.04	Agree
Cs-137	1.85 E-4	(1.79 +/- 0.09)E-4	20	1.03	Agree
I-131	1.02 E-4	(9.89 +/- 0.74)E-5	13	1.03	Agree
I-133	9.35 E-4	(9.50 +/- 0.44)E-4	22	0.98	Agree
I-135	1.71 E-3	(1.67 +/- 0.21)E-3	8	1.02	Agree
Detector No. 2					
Cs-134	1.52 E-4	(1.45 +/- 0.08)E-4	18	1.05	Agree
Cs-137	1.81 E-4	(1.79 +/- 0.09)E-4	20	1.01	Agree
I-131	9.95 E-5	(9.89 +/- 0.74)E-5	13	1.01	Agree
I-133	9.52 E-4	(9.50 +/- 0.44)E-4	22	1.00	Agree
I-135	1.76 E-3	(1.67 +/- 0.21)E-3	8	1.05	Agree
Detector No. 3					
Cs-134	1.51 E-4	(1.45 +/- 0.08)E-4	18	1.04	Agree
Cs-137	1.96 E-4	(1.79 +/- 0.09)E-4	20	1.09	Agree
I-131	9.48 E-5	(9.89 +/- 0.74)E-5	13	0.96	Agree
I-133	9.58 E-4	(9.50 +/- 0.44)E-4	22	1.01	Agree
I-135	1.78 E-3	(1.67 +/- 0.21)E-3	8	1.07	Agree

Type of Sample: 1.0 Liter Liquid Marinelli (NRC Spike)

Radio-nuclide	Licensee's Value (μCi)	NRC Value (μCi)	Reso-lution	Ratio	Compar-ison
Detector No. 1					
Cd-109	1.65 E+0	(1.94 +/- 0.06)E+0	32	0.85	Agree
Ce-139	3.24 E-2	(3.02 +/- 0.11)E-2	27	1.07	Agree
Co-57	2.93 E-2	(2.97 +/- 0.11)E-2	27	0.99	Agree
Co-60	1.29 E-1	(1.30 +/- 0.04)E-1	32	0.99	Agree
Cs-137	9.68 E-2	(9.62 +/- 0.34)E-2	28	1.01	Agree
Hg-203	5.73 E-3	(5.90 +/- 0.56)E-3	11	0.97	Agree
Sn-113	4.25 E-2	(4.29 +/- 0.19)E-2	23	0.99	Agree
Detector No. 2					
Cd-109	1.56 E+0	(1.94 +/- 0.06)E+0	32	0.80	Agree
Ce-139	3.22 E-2	(3.02 +/- 0.11)E-2	27	1.07	Agree
Co-57	2.80 E-2	(2.97 +/- 0.11)E-2	27	0.94	Agree
Co-60	1.29 E-1	(1.30 +/- 0.04)E-1	32	0.99	Agree
Cs-137	9.56 E-2	(9.62 +/- 0.34)E-2	28	0.99	Agree
Hg-203	5.88 E-3	(5.90 +/- 0.56)E-3	11	1.00	Agree
Sn-113	4.21 E-2	(4.29 +/- 0.19)E-2	23	0.98	Agree
Detector No. 3					
Cd-109	1.62 E+0	(1.94 +/- 0.06)E+0	32	0.83	Agree
Ce-139	3.19 E-2	(3.02 +/- 0.11)E-2	27	1.06	Agree
Co-57	2.89 E-2	(2.97 +/- 0.11)E-2	27	0.97	Agree
Co-60	1.30 E-1	(1.30 +/- 0.04)E-1	32	1.00	Agree
Cs-137	9.53 E-2	(9.62 +/- 0.34)E-2	28	0.99	Agree
Hg-203	5.83 E-3	(5.90 +/- 0.56)E-3	11	0.99	Agree
Sn-113	4.32 E-2	(4.29 +/- 0.19)E-2	23	1.01	Agree

Type of Sample: Waste Gas Decay Tank, 1260 cc Gas Marinelli

Radionuclide	Licensee's Value (μCi)	NRC Value (μCi)	Resolution	Ratio	Comparison
Detector No. 1					
Kr-85M	6.95 E-3	(7.41 +/- 0.37)E-3	20	0.94	Agree
Kr-88	7.57 E-3	(9.08 +/- 0.73)E-3	12	0.83	Agree
Xe-133	9.50 E-1	(9.52 +/- 0.60)E-1	16	1.00	Agree
Xe-133M	1.51 E-2	(1.48 +/- 0.15)E-2	10	1.02	Agree
Xe-135	7.99 E-2	(8.46 +/- 0.34)E-2	25	0.94	Agree
Detector No. 2					
Kr-85M	6.40 E-3	(7.41 +/- 0.37)E-3	20	0.86	Agree
Kr-88	7.39 E-3	(9.08 +/- 0.73)E-3	12	0.81	Agree
Xe-133	8.92 E-1	(9.52 +/- 0.60)E-1	16	0.94	Agree
Xe-133M	1.42 E-2	(1.48 +/- 0.15)E-2	10	0.96	Agree
Xe-135	7.87 E-2	(8.46 +/- 0.34)E-2	25	0.93	Agree
Detector No. 3					
Kr-85M	6.64 E-3	(7.41 +/- 0.37)E-3	20	0.90	Agree
Kr-88	7.52 E-3	(9.08 +/- 0.73)E-3	12	0.83	Agree
Xe-133	9.34 E-1	(9.52 +/- 0.60)E-1	16	0.98	Agree
Xe-133M	1.36 E-2	(1.48 +/- 0.15)E-2	10	0.92	Agree
Xe-135	7.56 E-2	(8.46 +/- 0.34)E-2	25	0.89	Agree

Type of Sample: Particulate Filter (NRC Spike)

Radionuclide	Licensee's Value (μCi)	NRC Value (μCi)	Resolution	Ratio	Comparison
Detector No. 1					
Co-57	7.68 E-4	(7.83 +/- 0.66)E-4	12	0.98	Agree
Co-60	2.14 E-2	(2.23 +/- 0.08)E-2	28	0.96	Agree
Cs-137	2.37 E-2	(2.42 +/- 0.09)E-2	27	0.98	Agree
Detector No. 2					
Co-57	7.90 E-4	(7.83 +/- 0.66)E-4	12	1.01	Agree
Co-60	2.13 E-2	(2.23 +/- 0.08)E-2	28	0.96	Agree
Cs-137	2.32 E-2	(2.42 +/- 0.09)E-2	27	0.96	Agree
Detector No. 3					
Co-57	7.28 E-4	(7.83 +/- 0.66)E-4	12	0.93	Agree
Co-60	2.14 E-2	(2.23 +/- 0.08)E-2	28	0.96	Agree
Cs-137	2.29 E-2	(2.42 +/- 0.09)E-2	27	0.95	Agree

Type of Sample: F&J Charcoal Cartridge (NRC Spike)

Radio-nuclide	Licensee's Value (μCi)	NRC Value (μCi)	Reso-lution	Ratio	Compar-ison
Detector No. 1					
Cd-109	1.68 E+0	(1.70 +/- 0.08)E+0	21	0.99	Agree
Ce-139	3.50 E-2	(3.24 +/- 0.13)E-2	25	1.08	Agree
Co-57	3.19 E-2	(3.05 +/- 0.11)E-2	28	1.05	Agree
Co-60	1.35 E-1	(1.33 +/- 0.04)E-1	33	1.02	Agree
Cs-137	9.73 E-2	(9.38 +/- 0.33)E-2	28	1.04	Agree
Hg-203	6.34 E-3	(6.10 +/- 0.43)E-3	14	1.04	Agree
Sn-113	4.48 E-2	(4.20 +/- 0.18)E-2	23	1.07	Agree
Detector No. 2					
Cd-109	1.66 E+0	(1.70 +/- 0.08)E+0	21	0.98	Agree
Ce-139	3.30 E-2	(3.24 +/- 0.13)E-2	25	1.02	Agree
Co-57	3.02 E-2	(3.05 +/- 0.11)E-2	28	0.99	Agree
Co-60	1.35 E-1	(1.33 +/- 0.04)E-1	33	1.02	Agree
Cs-137	9.45 E-2	(9.38 +/- 0.33)E-2	28	1.01	Agree
Hg-203	6.51 E-3	(6.10 +/- 0.43)E-3	14	1.07	Agree
Sn-113	4.31 E-2	(4.20 +/- 0.18)E-2	23	1.03	Agree
Detector No. 3					
Cd-109	1.71 E+0	(1.70 +/- 0.08)E+0	21	1.01	Agree
Ce-139	3.42 E-2	(3.24 +/- 0.13)E-2	25	1.06	Agree
Co-57	3.06 E-2	(3.05 +/- 0.11)E-2	28	1.00	Agree
Co-60	1.37 E-1	(1.33 +/- 0.04)E-1	33	1.03	Agree
Cs-137	9.83 E-2	(9.38 +/- 0.33)E-2	28	1.05	Agree
Hg-203	6.47 E-3	(6.10 +/- 0.43)E-3	14	1.06	Agree
Sn-113	4.44 E-2	(4.20 +/- 0.18)E-2	23	1.06	Agree

ATTACHMENT 2

CRITERIA FOR COMPARISONS OF ANALYTICAL MEASUREMENTS

This attachment provides criteria for the comparison of results of analytical radioactivity measurements. These criteria are based on empirical relationships which combine prior experience in comparing radioactivity emission, and the accuracy needs of this program.

In these criteria, the "Comparison Ratio Limits"[1] denoting agreement or disagreement between licensee and NRC results are variable. This variability is a function of the ratio of the NRC's analytical value relative to its associated statistical and analytical uncertainty, referred to in this program as "Resolution".[2]

For comparison purposes, a ratio between the licensee's analytical value and the NRC's analytical value is computed for each radionuclide present in a given sample. The computed ratios are then evaluated for agreement of disagreement bases on "Resolution." The corresponding values for "Resolution" and the "Comparison Ratio Limits" are listed in the Table below. Ratio values which are either above or below the "Comparison Ratio Limits" are considered to be in disagreement, while ratio values within or encompassed by the "Comparison Ratio Limits" are considered to be in agreement.

TABLE

NRC Confirmatory Measurements Acceptance Criteria
Resolution vs.Comparison Ratio Limits

Resolution	Comparison Ratio Limits for Agreement
< 4	0.4 - 2.5
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
> 200	0.85 - 1.18

[1]Comparison Ratio = $\frac{\text{Licensee Value}}{\text{NRC Reference Value}}$

[2]Resolution = $\frac{\text{NRC Reference Value}}{\text{Associated Uncertainty}}$