EFFLUENT AND WASTE DISPOSAL

SEMIANNUAL REPORT

January 1, 1996 - June 30, 1996

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT No. 2

FACILITY OPERATING LICENSE NO. DPR-23

DOCKET NO. 50-261

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I. EXECUTIVE SUMMARY

A. Discussion

1. Protection Standards

The main objective in the control of radiation is to ensure that any exposure is kept not only within regulatory limits, but As Low As Reasonably Achievable (ALARA). The ALARA concept applies to reducing radiation exposure both to workers at H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2 and to the general public. "Reasonably achievable" means that radiation exposure reduction is based on sound environmental practices, economic decisions, and operating practices. By practicing ALARA, HBRSEP & Carolina Power and Light (CP&L) Company minimize health risk, environmental detriment, and ensure that exposures are maintained well below regulatory limits.

2. Sources of Radioactivity Released

During normal operations of a nuclear power station, most of the fission products are retained within the fuel and fuel cladding. However, small quantities of radioactive fission and activation products are present in the reactor coolant water. The types of radioactive material released are noble gases, iodines and particulates, and tritium.

The noble gas fission products in the primary coolant are given off as a gas when the coolant is depressurized. These gases are collected by a system designed for collection and storage for radioactive decay prior to release.

Small releases of radioactivity in liquids may occur from equipment associated with the reactor coolant system. These liquids are collected, processed for radioactivity removal, prior to and during release.

3. Noble Gas

Some of the fission products released in airborne effluents are radioactive isotopes of noble gases, such as krypton, argon, and xenon. Noble gases are by nature inert and do not concentrate in humans or other organisms. Their contribution to human radiation exposure is as an external exposure. The major isotopes released are Argon-41, Xenon-133, and Xenon-135 with half-lives of approximately two hours, five days, and nine hours, respectively. Half-life is defined as the time required for a radioactive isotope to lose 50 percent of its radioactivity by decay. Noble gases are readily dispersed in the atmosphere.

4. Iodines and Particulates

Annual releases of iodines, and those particulates with half-lives greater than eight days are small. Factors such as chemical reactivity and solubility in water, combined with high processing efficiencies, minimize their discharge. The main contribution of radioactive iodine to human exposure is to the thyroid gland, where the body concentrates iodine. The principal radioactive particulates are Cobalt-58 and Cobalt-60 which contribute to internal exposure of tissues such as the muscle, liver, and intestines. These particulates can also be a source of exposure if deposited on the ground.

5. Tritium

Tritium, a radioactive isotope of hydrogen, is the predominate radionuclide in liquid and gaseous effluents. Tritium is produced in the reactor coolant as a result of neutron interaction with deuterium (also a hydrogen isotope) and boron, both of which are present in the reactor coolant. Tritium contributes very little radiation exposure to the human body, and when it is inhaled or ingested is dispersed throughout the body until eliminated.

6. Processing and Monitoring

Effluents are strictly controlled and monitored to ensure that radioactivity released to the environment is minimal and within regulatory limits. Effluent control includes the operation of radiation monitoring systems, in-plant and environmental sampling and analyses, quality assurance programs for both in-plant and environmental sampling and analyses, and procedures that address effluent and environmental monitoring.

The plant radiation monitoring system provides monitors that are designed to ensure that all releases are below regulatory limits. Each instrument provides indication of the amount of radioactivity present and is equipped with alarms and indicators in the control room. The alarm setpoints are set lower than the regulatory limits, typically at less than 50 percent of the regulatory limit, to ensure that the limits are not exceeded. If a monitor alarms, a release from a tank is automatically suspended. Additionally, releases are sampled and analyzed in the laboratory prior to discharge. The sampling and analysis done in the laboratory provides a more sensitive and precise method of determining pre-effluent composition than in-plant monitoring instruments.

The plant has a meteorological tower which is linked to computers that record the meteorological data. The meteorological data and the release data is used to calculate to dose to the public.

In addition to in-plant equipment the company maintains a Radiological Environmental Monitoring Program which consists of devices used to sample the air and water in the environment. The samples collected from the surrounding environment are analyzed to determine the presence of radioactive material in the environs.

7. Exposure Pathways

Radiological exposure pathways are the methods by which people may become exposed to radioactive material. The major pathways of concern are those which could cause the highest calculated radiation dose. The projected pathways are determined from the type and amount of radioactive material that may have been released, the environmental transport mechanism, and the use of the environment.

Environmental transport mechanisms include, but are not limited to, hydrological (i.e.,water) and meteorological (i.e.,weather) characteristics of the area. Information on water flow, wind speed and direction, dietary intake of residents, recreational use of the area and location of homes and farms in the area are some of the many factors used to calculate the potential exposure to offsite personnel.

The release of radioactive gaseous effluents includes pathways such as external whole body exposure, deposition on plants and soils, and human inhalation. The release of radioactive material in liquid effluents includes pathways such as drinking water, fish consumption, and direct exposure from the lake at the shoreline and while swimming.

Even though radionuclides can reach humans by many different pathways, some radionuclides result in more exposure than others. The critical pathway is the exposure which will provide, for a specific radionuclide, the greatest exposure to a population, or a specific group of the population, called the critical group. The critical group may vary depending on the radionuclides involved, the age and diet of the group, and other cultural factors. The exposure may be received by to the whole body or to a specific organ, with the organ receiving the largest fraction of the exposure called the critical organ.

The exposures to the general public in the area surrounding HBRSEP, Unit No. 2 are calculated for gaseous and liquid releases. The exposure due to radioactive material released in gaseous effluents is calculated using factors such as the amount of radioactive material released, the concentration beyond the site boundary, weather conditions at the time of release, locations of exposure pathways, and usage factors. The exposures calculated due to radioactive materials released in liquid effluents are calculated using factors such as the total volume of liquid, the total volume of dilution water, field irrigation, and usage factors.

8. Results

The Radioactive Effluent Release Report is a detailed listing of the radioactivity released from the HBRSEP, Unit No. 2 during the period from January 1, 1996, through June 30, 1996.

During the period of January 1, 1996, through June 30, 1996, the estimated maximum individual offsite dose due to radioactivity released in effluents was:

Liquid Effluents:

- 0.00397 millirem, total body
- 0.00526 millirem, GI-LLI

Gaseous Effluents:

- Beta Air Dose 0.00201 millirad
- Gamma Air Dose 0.00319 millirad
- Critical Organ Dose 0.07640 millirem, thyroid

B. Significant Variances

The following are explanations of significant variances in this Semiannual Report:

2. Unit No. 2 ran at steady-state power operations for this entire reporting period. Consequently, variances in most effluent parameters are indicative of the steady-state operations. The most noticeable variance is the increase in particulate curies released in the second quarter as compared to the first quarter. The increase is attributable to particulate activity produced during chipping and painting in various rooms of the plant. Some of the gaseous and liquid release parameters for this reporting period are summarized below:

GASEOUS EFFLUENTS

	UNITS	1st QUARTER	2nd QUARTER
Fission & Act. Gas	Ci	2.35E-01	2.56E-01
I-131	Ci	4.95E-08	7.66E-08
Part. >8 Day Half-Lives	Ci	2.43E-08	3.84E-07
Tritium	Ci	2.87E+00	2.68E+00

3. Some of the liquid release parameters for this reporting period are shown below:

LIQUID EFFLUENTS

	UNITS	1st QUARTER	2nd QUARTER
Fission & Act. Products	Ci	8.81E-03	1.12E-02
Tritium	Ci	1.78E+02	3.04E+02
Dilution Volume	Liters	2.76E+11	2.85E+11
Waste Volume	Liters	9.48E+05	9.13E+05

C. Regulatory Compliance

1. When projected on a day-by-day basis utilizing conservative meteorological conditions, the dose commitment from gaseous and liquid effluents is a small fraction of the 10 CFR 50, Appendix I limits. The direct radiation assessment to the likely most exposed member of the public is reported in the Annual Radiological Environmental Operating Report. During 1995, the results of the direct radiation assessment demonstrated no measurable effect above background for plant operations. The onsite Independent Spent Fuel Storage Installation is evaluated in Addendum I to this report.

2. There was a change to the waste solidification Process Control Program (PCP) during this reporting period. See Enclosure 2 for details.

3. There was a change to the Liquid Radioactive Waste System during this reporting period. See Enclosure 2 for details.

4. There were no reportable instrumentation inoperability events during this reporting period.

5. There were no outside liquid holdup tanks that exceeded the ten curie limit during this reporting period.

6. There were no Waste Gas Decay Tanks that exceeded the 1.9E+04 curie limit during this reporting period.

7. There was a revision to the ODCM during this reporting period. See Enclosure 2 for details.

II. SUPPLEMENTAL INFORMATION

A. Regulatory Limits

1. Fission and Activation Gases:
   - 10 CFR 20 Limits (Instantaneous Release Rate)
     - Total Body Dose $\leq$500 mrem/yr
     - Skin Dose $\leq$3000 mrem/yr
   - 10 CFR 50, Appendix I
     - For Calendar Quarter
       - Gamma Dose $\leq$5 mrad
       - Beta Dose $\leq$10 mrad
     - For Calendar Year
       - Gamma Dose $\leq$10 mrad
       - Beta Dose $\leq$20 mrad

2. Iodine - 131 and 133, Tritium, and Particulates >8 day half-lives:
   - 10 CFR 20 Limits (Instantaneous Release Rate)
     - Dose from Inhalation (only) to a child to any organ $\leq$1500 mrem/yr
   - 10 CFR 50, Appendix I (Organ Doses)
     - For Calendar Quarter $\leq$7.5 mrem
     - For Calendar Year $\leq$15 mrem

3. Liquids:
   Concentrations are specified in 10 CFR 20, Appendix B, Table II, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.00E-04 μCi/ml total activity.
   - 10 CFR 50, Appendix I
     - For Calendar Quarter
       - Total Body Dose $\leq$1.5 mrem
       - Any Organ Dose $\leq$5 mrem
     - For Calendar Year
       - Total Body Dose $\leq$3 mrem
       - Any Organ Dose $\leq$10 mrem

B. Measurements and Approximations of Total Radioactivity

1. Continuous Gaseous Releases

   a. Fission and Activation Gases - The total activity released is determined from the net count rate of the gaseous monitor, its calibration factor, and the total exhaust flow. The activity of radioactive gas is determined by the fraction of that radioactive gas in the isotopic analysis for that period.

   b. Iodines - The activity released as Iodine-131, 133, and 135 is based on isotopic analysis of the charcoal cartridge and particulate filter and the total vent flow.

   c. Particulates - The activity released via particulates with half-lives greater than eight days is determined by isotopic analysis of particulate filters and the total vent flow.

d. Tritium - The activity released as tritium is based on weekly grab sample analysis and total vent flow.

2. Batch Gaseous Releases

a. Fission and Activation Gases - The activity released is based on the volume released and the activity of the individual nuclides obtained from an isotopic analysis of the grab sample taken prior to the release.

b. Iodines - The iodines from mixed mode batch releases are included in the iodine determination from the mixed mode continuous Reactor Auxiliary Building release.

c. Particulates - The particulates from mixed mode batch releases are included in the particulate determination from the mixed mode continuous Reactor Auxiliary Building release. Ground level batch particulates are reported in the batch mode accountability.

d. Tritium - The activity released as tritium is based on the grab sample analysis of each batch and the batch volume.

3. Liquid Releases

a. Fission and Activation Products - The total release values (not including tritium, strontium, Iron-55, and alpha) are comprised of the sum of the individual radionuclide activities in each release to the discharge canal for the respective quarter. These values represent the activity known to be present in the liquid radwaste effluent.

b. Tritium & Alpha - The measured tritium and alpha concentrations in a monthly composite sample are used to calculate the total release and average diluted concentration during each period.

c. Strontium-89, 90, and Iron-55 - The total release values are measured quarterly from composite samples.

C. <u>Estimated Total Errors</u>

1. Estimated total errors for gaseous effluents are based on uncertainties in counting equipment calibration, counting statistics, vent flow rates, vent sample flow rates, non-steady release rates, chemical yield factors, and sample losses for such items as charcoal cartridges.

2. Estimated total errors for liquid effluents are based on uncertainties in counting equipment calibration, counting statistics, non-steady release flow rate, sampling and mixing losses, and volume determinations.

3. Estimated total errors for solid waste are based on uncertainties in equipment calibration, dose rate measurements, geometry, and volume determinations.

III. GASEOUS EFFLUENTS

A. Batch Releases

1.	Number of Batch Releases	6.50E+01
2.	Total Time Period for Batch Releases	3.88E+04 Min
3.	Maximum Time Period for a Batch Release	1.18E+03 Min
4.	Average Time Period for Batch Releases	5.97E+02 Min
5.	Minimum Time Period for a Batch Release	1.40E+01 Min

B. Abnormal Releases

1.	Number of Releases	0.00E+00
2.	Total Activity Released	0.00E+00 Ci

C. Data Tables

The following tables provide the details of gaseous releases:

Table III-A Summation of all Releases
Table III-B Ground Level and Mixed Mode Releases
Table III-C Typical Lower Limits of Detection for Gaseous Effluents

TABLE III-A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1996
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	1ST QUARTER	2ND QUARTER
A. Fission and Activation Gases:			
1. Total Release	Ci	2.35E-01	2.56E-01
2. Estimated Total Error	%	3.63E+01	3.63E+01
3. Average Release Rate for Period	μCi/sec	2.99E-02	3.26E-02
4. Percent of 10 CFR 50, Appendix I			
Quarterly Limit			
Gamma Air	%	2.20E-02	4.18E-02
Beta Air	%	8.53E-03	1.15E-02
Annual Limit			
Gamma Air	%	1.10E-02*	3.19E-02*
Beta Air	%	4.27E-03*	1.00E-02*
B. Iodines, Particulates, and Tritium:			
Iodines			
1. Total Iodine - 131	Ci	4.95E-08	7.66E-08
2. Estimated Total Error	%	1.74E+01	1.74E+01
3. Average Release Rate for Period	μCi/sec	6.29E-09	9.75E-09
Particulates			
1. Particulates with Half-Lives >8 days	Ci	2.43E-08	3.84E-07
2. Estimated Total Error	%	1.05E+01	1.05E+01
3. Average Release Rate for Period	μCi/sec	3.09E-09	4.88E-08
4. Gross Alpha Radioactivity	Ci	<LLD	<LLD
Tritium			
1. Total Release	Ci	2.87E+00	2.68E+00
2. Estimated Total Error	%	2.31E+01	2.31E+01
3. Average Release Rate for Period	μCi/sec	3.65E-01	3.41E-01
Percent of 10 CFR 50, Appendix I			
Quarterly Limit			
Organ Thyroid	%	5.27E-01	4.92E-01
Annual Limit			
Organ Thyroid	%	2.64E-01*	5.09E-01*

*Cumulative total for the year-to-date using the methodology in the ODCM.

TABLE III-B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1996

GASEOUS EFFLUENTS - GROUND LEVEL AND MIXED MODE RELEASES

	UNITS	CONTINUOUS MODE 1ST QUARTER	CONTINUOUS MODE 2ND QUARTER	BATCH MODE 1ST QUARTER	BATCH MODE 2ND QUARTER
1.	FISSION GASES				
Ar-41	Ci	<LLD	<LLD	3.88E-02	8.12E-02
Xe-133	Ci	1.92E-01	1.48E-01	3.57E-03	2.69E-02
Xe-135	Ci	<LLD	<LLD	3.56E-05	2.41E-05
Total for Period	Ci	1.92E-01	1.48E-01	4.24E-02	1.08E-01
2.	IODINES[1]				
I-131	Ci	4.95E-08	7.66E-08	<LLD	<LLD
I-133	Ci	1.48E-06	1.44E-06	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	1.53E-06	1.52E-06	<LLD	<LLD
3.	PARTICULATES[1]				
Co-60	Ci	<LLD	<LLD	2.43E-08	9.61E-08
Cs-134	Ci	<LLD	<LLD	<LLD	1.50E-09
Cs-137	Ci	<LLD	<LLD	<LLD	2.86E-07
Total for Period	Ci	<LLD	<LLD	2.43E-08	3.84E-07

[1]Mixed Mode Continuous Accountability includes Mixed Mode Batch Accountability (excludes H-3).

TABLE III-C
TYPICAL LOWER LIMITS OF DETECTION FOR GASEOUS EFFLUENTS

NUCLIDE	LLD (μCi/cc)
H-3	1.00E-06
Ar-41	4.35E-09
Mn-54	1.00E-11
Co-58	1.00E-11
Fe-59	1.00E-11
Co-60	1.00E-11
Zn-65	1.00E-11
Kr-85	2.08E-06
Kr-85m	4.80E-09
Kr-87	1.00E-04
Kr-88	1.00E-04
Sr-89	1.00E-11
Sr-90	1.00E-11
Mo-99	1.00E-11
I-131	1.00E-12
I-133	1.00E-10
Xe-133	1.00E-04
Xe-133m	1.00E-04
Cs-134	1.00E-11
I-135	2.35E-10
Xe-135	1.00E-04
Xe-135m	1.65E-07
Cs-137	1.00E-11
Xe-138	1.00E-04
Ba-140	2.19E-14
La-140	6.36E-14
Ce-141	1.00E-11
Ce-144	1.00E-11
Gross Alpha	1.00E-11

IV. LIQUID EFFLUENTS

A. Batch Releases

1.	Number of Batch Releases	3.30E+01
2.	Total Time Period for Batch Releases	7.31E+03 Min
3.	Maximum Time Period for a Batch Release	8.92E+02 Min
4.	Average Time Period for Batch Releases	2.21E+02 Min
5.	Minimum Time Period for a Batch Release	1.30E+01 Min
6.	Average Stream Flow During Release Periods	5.66E+05 GPM

B. Abnormal Releases

1.	Number of Releases	0.00E+00
2.	Total Activity Released	0.00E+00 Ci

C. Data Tables

The following tables provide the details of liquid releases:

Table IV-A	Summation of all Releases
Table IV-B	Continuous Mode and Batch Mode Releases
Table IV-C	Typical Lower Limits of Detection for Liquid Effluents

TABLE IV-A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1996
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

		UNITS	1ST QUARTER	2ND QUARTER
A.	FISSION AND ACTIVATION PRODUCTS			
	1. Total Release	Ci	8.81E-03	1.12E-02
	2. Estimated Total Error	%	1.07E+01	1.07E+01
	3. Average Diluted Concentration	μCi/ml	3.19E-11	3.94E-11
B.	TRITIUM			
	1. Total Release	Ci	1.78E+02	3.04E+02
	2. Estimated Total Error	%	9.20E+00	9.20E+00
	3. Average Diluted Concentration	μCi/ml	6.47E-07	1.07E-06
C.	DISSOLVED AND ENTRAINED GASES			
	1. Total Release	Ci	1.73E-03	3.20E-03
	2. Estimated Total Error	%	9.60E+00	9.60E+00
	3. Average Diluted Concentration	μCi/ml	6.27E-12	1.12E-11
	4. Percent of Applicable Limit	%	3.14E-06	5.60E-06
D.	GROSS ALPHA RADIOACTIVITY			
	1. Total Release	Ci	<LLD	<LLD
	2. Estimated Total Error	%	1.83E+01	1.83E+01
E.	VOLUME OF WASTE RELEASED	Liters	9.48E+05	9.13E+05
F.	VOLUME OF DILUTION WATER	Liters	2.76E+11	2.85E+11
G.	PERCENT OF 10 CFR 50, APPENDIX I			
	Quarterly Limit			
	Organ GI-LLI	%	4.52E-02	6.00E-02
	Total Body	%	1.10E-01	1.55E-01
	Annual Limit			
	Organ GI-LLI	%	2.26E-02*	5.26E-02*
	Total Body	%	5.50E-02*	1.32E-01*

*Cumulative total for the year-to-date using the methodology in the ODCM.

TABLE IV-B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1996

LIQUID EFFLUENTS - CONTINUOUS MODE AND BATCH MODE RELEASES

		CONTINUOUS MODE		BATCH MODE	
PARTICULATES	UNITS	1ST QUARTER	2ND QUARTER	1ST QUARTER	2ND QUARTER
Fe-55	Ci	<LLD	<LLD	4.48E-04	9.04E-05
Co-58	Ci	<LLD	<LLD	1.53E-04	1.78E-05
Co-60	Ci	<LLD	<LLD	7.96E-03	1.01E-02
Nb-95	Ci	<LLD	<LLD	2.87E-06	<LLD
Ag-110m	Ci	<LLD	<LLD	2.86E-05	2.02E-05
Sb-125	Ci	<LLD	<LLD	1.73E-04	9.88E-04
I-133	Ci	<LLD	<LLD	<LLD	6.15E-06
Cs-134	Ci	<LLD	<LLD	<LLD	1.51E-06
Cs-137	Ci	<LLD	<LLD	4.24E-05	3.79E-05
Total for Period	Ci	<LLD	<LLD	8.81E-03	1.12E-02
2. GASES					
Xe-133	Ci	<LLD	<LLD	1.73E-03	3.18E-03
Xe-133m	Ci	<LLD	<LLD	<LLD	1.31E-05
Total for Period	Ci	<LLD	<LLD	1.73E-03	3.20E-03

TABLE IV-C

TYPICAL LOWER LIMITS OF DETECTION FOR LIQUID EFFLUENTS

NUCLIDE	LLD (μCi/ml)
H-3	1.00E-05
Cr-51	7.84E-08
Mn-54	5.00E-07
Fe-55	1.00E-06
Co-58	5.00E-07
Fe-59	5.00E-07
Co-60	5.00E-07
Zn-65	5.00E-07
Sr-89	5.00E-08
Sr-90	5.00E-08
Nb-95	1.70E-08
Zr-95	3.05E-08
Mo-99	5.00E-07
Tc-99m	1.28E-08
Ag-110m	1.56E-08
Sb-125	3.39E-08
I-131	1.00E-06
I-133	1.78E-08
Xe-133	1.00E-05
Xe-133m	1.00E-05
Cs-134	5.00E-07
Xe-135	1.00E-05
Cs-137	5.00E-07
Ba-140	5.23E-08
La-140	3.87E-08
Ce-141	5.00E-07
Ce-144	5.00E-07
Gross Alpha	1.00E-07

V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
REPORT TIME PERIOD JANUARY 1, 1996, THROUGH JUNE 30, 1996

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (not irradiated fuel)

WASTE CLASS A

Type of Waste	Unit	6-Month Period	Est. Total Error (%)	Solid. Agent	Cont. Type	Form	No. Ship.
a. Spent resins, filter sludges, evaporator bottoms, etc	m^3 Ci	6.50E-01 9.51E+00	2.20E+01 2.20E+01	NA	Type A and HIC	Compacted	2
b. Dry compressible waste, contaminated equip, etc	m^3 Ci	3.46E+00 1.69E-02	2.20E+01 2.20E+01	NA	STP	Compacted / Incinerable	13
c. Irradiated components, control rods, etc	m^3 Ci	NA	NA	NA	NA	NA	NA
d. Other (describe)	m^3 Ci	NA	NA	NA	NA	NA	NA

STP = Strong Tight Package
HIC = High Integrity Container

2. Estimate of major nuclide composition (by type of waste)

		%	Ci
a.	C-14	2.45E+00	2.33E-01
	Fe-55	4.73E+01	4.50E+00
	Co-60	3.86E+01	3.67E+00
	Ni-63	7.57E+00	7.20E-01
	Ag-110m	1.97E+00	1.87E-01
	* Others	2.11E+00	2.01E-01
b.	Mn-54	1.31E+00	2.22E-04
	Fe-55	6.27E+00	1.06E-03
	Co-58	1.03E+01	1.74E-03
	Co-60	3.82E+01	6.48E-03
	Ni-63	6.97E+00	1.18E-03
	Nb-95	1.54E+00	2.61E-04
	Ag-110m	1.35E+00	2.29E-04
	Cs-134	4.17E+00	7.07E-04
	Cs-137	2.96E+01	5.02E-03
	** Others	2.60E-01	4.24E-05
c.	NA	NA	NA
d.	NA	NA	NA

3. Solid Waste Disposition

Number of Shipments 15
Mode of Transportation Sole Use Vehicle
Destination Barnwell, S.C.

* Others include: Mn-54, Co-58, Sr-90, Nb-95, Sb-125, Cs-137, Pu-238, Am-241, Pu-241, Cm-242, Cm-243, Cm-244.

** Others include: C-14, Co-57, Zr-95, Ce-144, Am-241.

Total Curie Quantity and Principle Radionuclides were determined by Estimate.

CHANGES TO ODCM, PCP, AND RADIOACTIVE WASTE SYSTEMS

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Enclosure 2

I. <u>CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL(ODCM)</u>

There was a change to the ODCM during this reporting period. The justifications for the changes as well as the revised pages are included below.

JUSTIFICATIONS AND CHANGES FOR ODCM, REVISION 11

Page No.	Comments/Justifications for ODCM Revision 11
Cover Page	Changed to reflect new revision number, rev. 11.
i	Changed to reflect new revision number, rev. 11, for page D-3.
D-3	Revised to reflect the new Liquid Radwaste Process / Effluent System diagram. The new diagram is effective with the approval of MOD ESR 94-668.

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
OFF-SITE DOSE CALCULATIONAL MANUAL
(ODCM)

Revision 11

DOCKET NO. 50-261

EFFECTIVE DATE 2/20/96

Reviewed By: Dale E Young
PNSC Chairman
Date: 2/20/96

Accepted By: Dale E Young
PNSC Chairman
Date: 2/20/96

LIST OF EFFECTIVE PAGES

EFFECTIVE PAGES	REVISION
Cover Sheet	11
LEP	11
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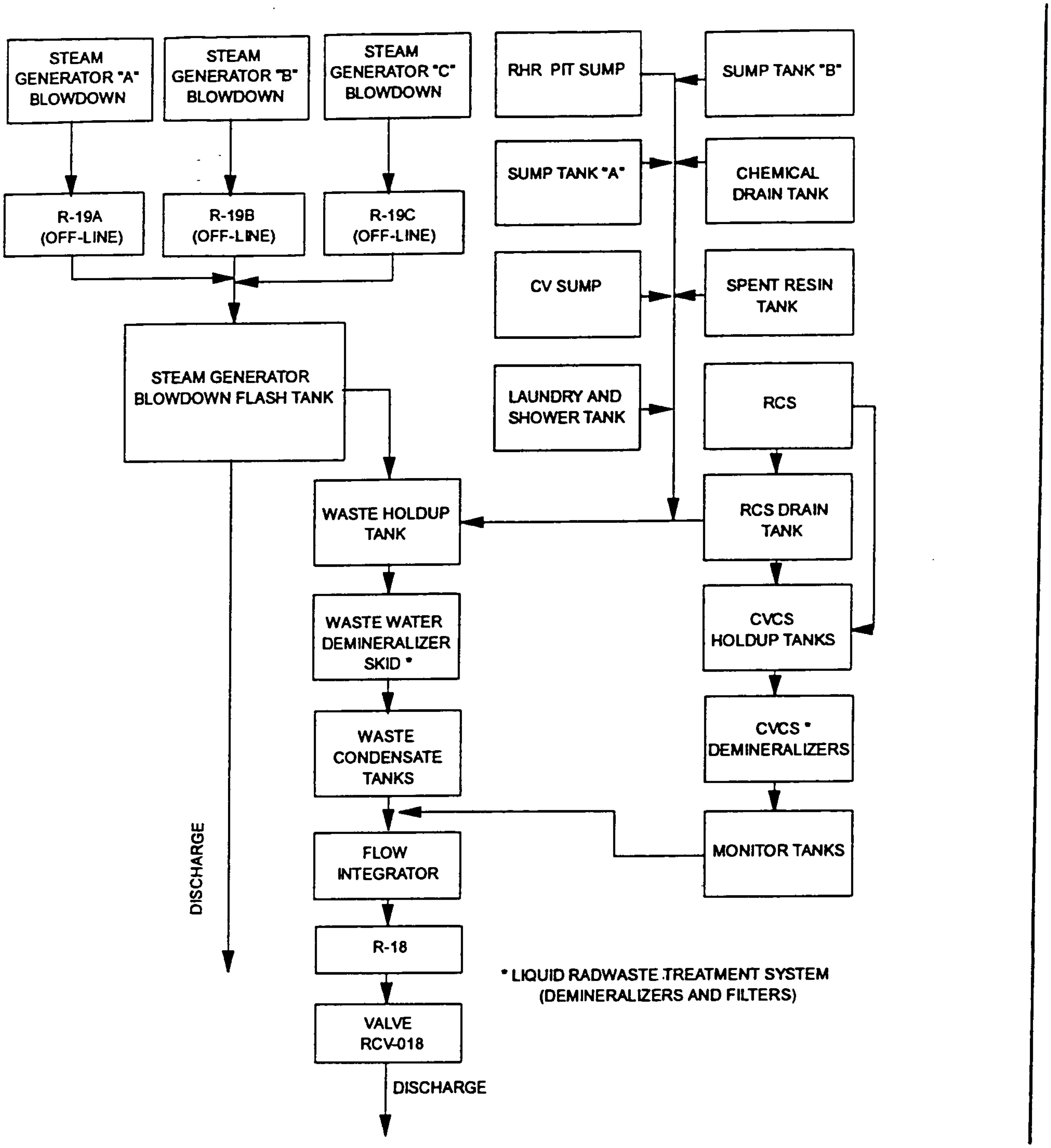
H. B. ROBINSON LIQUID RADWASTE PROCESS / EFFLUENT SYSTEM
FIGURE D-1



II. CHANGES TO THE RADIOACTIVE WASTE SYSTEMS

There was a change to the Radioactive Waste System during this reporting period. The change is discussed below pursuant to plant Technical Specification 6.9.1.3, part 7.

A. Summary

The basic function of this change is to transfer the status of the Waste Water Demineralization System (WWDS) from a temporary installation to a permanent plant operating system. This was accomplished by updating required procedures, drawings, data bases, etc., under plant project ESR 94-00668.

B. Safety Analysis Narrative

The WWDS is a subsystem of the Liquid Waste Disposal System. The major components of the WWDS are five filter vessels and four demineralizer vessels. The WWDS is non-safety related. The WWDS can not contribute to the initiation of an accident as analyzed in the Updated Final Safety Analysis Report (UFSAR). The WWDS is not used in any way to mitigate accidents, therefore, the consequences of accidents analyzed in the UFSAR will not be affected.

The WWDS has operated within the parameters (pressure, flow, etc.) Of plant procedures SP-724 and CP-100 since 1988. Equipment important to safety is not applicable for this change in WWDS status. A malfunction of equipment important to safety can not occur. Also, the result of a malfunction of equipment important to safety can not be affected by this change.

The most obvious difference between the WWDS and other plant systems is the extensive use of flexible hoses and the skids. Flexible hoses have a shorter life expectancy than metal piping. However, the hoses are inspected during the performance of CP-100 and replaced as necessary. The WWDS (including the locked wheel mounted skid and unanchored skids) are located in a room where there is no safety related equipment. Therefore, movement of the WWDS skids and equipment during a seismic event would not affect safety related equipment. A hose failure or seismic event could result in system leakage, however, system waste water would be safely collected in the floor drain of the room and could not exit the room because of curbing at the door. The normal flowrate of the WWDS is less than 30 gallons per minute. Assuming a blocked drain and curbed volume of approximately 360 cubic feet (2693 gallons), operators have ample time (approximately 90 minutes) to take corrective action before spillover.

Design engineers and operators of the system prefer the flexible hoses because of the versatility the hoses provide. Filters and demineralizers can be sequenced as desired. The hoses are hydrostatically tested after disconnection and reconnection of system couplings. System leakage and measured parameters (pressure, flow, etc.) Are monitored by procedure. The WWDS is operated approximately once a month during power operation and once a week during outages, typically for a 12 hour period during each run. Electrical loads on receptacle outlets, such as the chemical addition pump, are not controlled. Therefore, the chemical addition pump load does not need to be incorporated into plant documents.

Credible accidents of a different type than analyzed in the UFSAR can not occur as a result of using the WWDS as permanent plant equipment. The possibility of malfunction of equipment important to safety different than those scenarios evaluated in the UFSAR can not credibly occur as a result of processing with this non-safety related system. A change request for the UFSAR will be submitted to identify the components not used, to identify the components used, and to describe the operation of the WWDS. Technical Specification bases will not be affected by this change.

This change was reviewed and approved by the Plant Nuclear Safety Committee in a session held on February 20, 1996.

III. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

There was a change to the PCP during this reporting period. The justifications for the changes as well as the revised pages are included below.

JUSTIFICATIONS AND CHANGES FOR PCP, REVISION 2

Page No.	Comments/Justifications for PCP Revision 2
Cover Page	Changed to reflect new revision number, rev. 2.
2	Changed to add the List of Effective Pages.
3	Revised section 3.1.1 to change "Plant Manager" to "Plant General Manager."
4	Revised section 3.1.3 to change "Manager - E&RC Support" to "Superintendent - Radiation Control."
5	Revised section 4.2 to change "E&RC Supervisor" to "RC Supervisor."

CAROLINA POWER & LIGHT COMPANY

H.B. ROBINSON - UNIT 2

PROCESS CONTROL PROGRAM

(P C P)

REVISION 2

DOCKET NO. 50-261

EFFECTIVE DATE: 3/20/96

REVIEWED BY PNSC: Dale E. Young
PNSC CHAIRMAN
DATE 3/20/96

APPROVED BY PNSC: Dale E. Young
PNSC CHAIRMAN
DATE 3/20/96

LIST OF EFFECTIVE PAGES

EFFECTIVE PAGES	REVISION
Cover Sheet	2
LEP	2
3 through 5	2

H. B. ROBINSON

PROCESS CONTROL PROGRAM

1.0 SCOPE

This program establishes the management system and controls that the H. B. Robinson Steam Electric Plant (HBR) uses to ensure safe and effective solidification and dewatering of various low-level radioactive waste liquids and slurries for offsite disposal.

2.0 OBJECTIVES

It is the objective of this program that the solidification and/or dewatering of various low-level radioactive waste liquids and slurries (including oily wastes) for offsite disposal will be performed by qualified vendors. The quality of the solidified and/or dewatered product shall meet or exceed regulatory requirements and the disposal site criteria prior to release from the H. B. Robinson site for shallow disposal.

3.0 MANAGEMENT PROGRAM

3.1 Responsibilities

3.1.1 The Plant General Manager is responsible for ensuring that waste is shipped in accordance with the appropriate state and federal regulations.

3.1.2 The Manager - E&RC is responsible for:

a. Advising the Plant General Manager on the appropriate technical standards, regulations, and requirements as related to solidification, dewatering, and shipping.

b. Ensuring the vendor's process control program, operating procedures, and proposed contractual agreements are reviewed and advising the Plant General Manager as to their adequacy

c. Retaining vendor-supplied documentation for NRC inspection and review.

3.1 Responsibilities

d. Ensuring vendor operations are monitored for compliance with:

1. Section 3.16.6.1 HBR Technical Specifications. The Solid Radwaste System shall be used in accordance with a process control program (PCP) to process wet radioactive waste to meet shipping and burial ground requirements.
2. Section 3.16.6.2 HBR Technical Specifications. With the provisions of the PCP not satisfied, suspend shipments of defectively processed or defectively packaged solid radioactive waste from the site.
3. Section 3.16.6.3 HBR Technical Specifications. If any test specimen, as required by the PCP, fails to verify solidification, the solidification of the batch under test shall be suspended until such time as additional test specimens can be obtained, alternative solidification parameters can be determined in accordance with Section 6.15 of the Technical Specifications, and solidification of the batch may then be resumed using alternative solidification parameters as determined by the PCP.
4. Section 4.20.6 HBR Technical Specifications. The PCP shall be used to verify the solidification of one representative test specimen from every tenth batch of wet radioactive waste.

3.1.3 The Superintendent - Radiation Control is responsible for advising the Manager - E&RC on:

a. The appropriate technical standards, regulations, and requirements as related to solidification, dewatering, and shipping.

b. The adequacy of the vendor's process control program, operating procedures, and proposed contractual agreements.

3.2 Specification for Vendors

The qualified solidification vendor will:

3.2.1 Provide a qualified process control program or a program approved by:

a. NRC

b. Disposal site licensee

3.2.2 The vendor will perform the tests described in the process control program.

3.3.3 The vendor will supply the Manager- E&RC will all documentation required to demonstrate compliance with dewatering and/or solidification requirements.

3.3.4 The Manager - E&RC will retain documentation required to demonstrate compliance with solidification requirements and standards.

4.0 MANAGEMENT/CONTRACTOR INTERACTIONS

4.1 The vendor is accountable to the Manager - E&RC for the solidification and/or dewatering of liquid wastes.

4.2 The Radiation Control Supervisor responsible for radwaste shipping handles the shipping of solidification and dewatered wastes and maintains required documentation. The vendor and the Radiation Control Supervisor responsible for radwaste shipping may communicate on these matters as necessary.

5.0 ATTACHMENTS

5.1 None Applicable

IV. CHANGES TO THE LAND USE CENSUS

There were no changes to the environmental sampling program as a result of the Land Use Census performed in the first six months of 1995.

V. INSTRUMENT INOPERABILITY

There were no reportable instrumentation inoperability events during this reporting period.

VI. LIQUID HOLDUP TANK CURIE LIMIT

There were no outside liquid holdup tanks that exceeded the ten curie limit during this reporting period.

VII. WASTE GAS DECAY TANK CURIE LIMIT

There were no waste gas decay tanks with a curie content that exceeded the 1.90E+04 curie limit during this reporting period.

VIII. INDEPENDENT SPENT FUEL STORAGE INSTALLATION

The onsite Independent Spent Fuel Storage Installation, License No. SNM-2502/ Docket No. 72-3, became operational during the first six months of 1989. See Addendum I for reporting requirements concerning this facility.

SUPPLEMENTS TO PREVIOUS
SEMIANNUAL REPORTS

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Enclosure 3

I. DISCUSSION

There were no changes to previous reports during this reporting period.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT No. 2

SEMIANNUAL ENVIRONMENTAL REPORT

January 1, 1996 - June 30, 1996

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT No. 2

FACILITY OPERATING LICENSE NO. SNM-2502
DOCKET NO. 72-3

I. HISTORY OF THE FACILITY

The Independent Spent Fuel Storage Installation (ISFSI) is located within the Protected Area of HBRSEP, Unit No. 2. Currently, the installation contains eight (8) dry storage canisters. The initial canister was loaded on March 16, 1989 and other canisters were loaded on April 11, 1989, April 18, 1989, April 24, 1989, May 2, 1989, May 8, 1989, June 28, 1989, and July 3, 1989.

II. EFFLUENT LIMITS AND CONTROLS

This installation operates under effluent control limits as required by 10 CFR 72.44. However, there are, by design of the sealed storage canisters at the ISFSI, no effluent releases, and all HBRSEP, Unit No. 2 site cask loading and unloading operations and waste treatment will occur at the HBRSEP, Unit No. 2 under the Technical Specifications of its Operating License DPR-23.

III. RADIOLOGICAL EFFLUENT RELEASES

A review of the quarterly surveillance tests performed during this reporting period indicates that NO RADIOACTIVE LIQUID OR GASEOUS RELEASES OCCURRED DURING THIS REPORT PERIOD.

IV. THE ISFSI ENVIRONMENTAL PROGRAM

The ISFSI Environmental Program consists of two air samplers and three thermoluminescent dosimeters (TLD) about the installation plus an unaffected air sampler and TLD site 26 miles East-Southeast (ESE) of the facility. Two of the environmental TLDs are maintained at the air sampling sites adjacent to the plant boundary. These are located South at 0.2 miles and Southwest at 0.3 miles from the ISFSI. A third TLD site is located 0.1 miles North of the installation. The nearest residence is located south to the South-Southeast approximately 0.25 miles from the facility. Air samplers operate continuously and samples are changed weekly. TLDs are changed quarterly.

V. OTHER ENVIRONMENTAL PROGRAMS

In addition to the ISFSI Environmental Program, the HBRSEP, Unit No. 2 Environmental Program is described in Technical Specifications. Section 3.17 (see Carolina Power and Light Company, Technical Specifications and Bases for H. B. Robinson Steam Electric Plant, Unit No. 2, Appendix A to Facility Operating License No. DPR-23, Docket No. 50-261, Darlington County, S.C.). For a comprehensive summary of this program and its results, see also, "Environmental Surveillance Report," H. B. Robinson Steam Electric Plant, Unit No. 2 issued in compliance with the above referenced Technical Specification for this report period.

VI. ISFSI ENVIRONMENTAL MEASUREMENTS
(Milliroentgen per 90 days)

A. Environmental TLDs

TLD (Location)	1st Qtr.	2nd Qtr.
1 (26 miles ESE) (Control)	13.2	13.4
2 (0.2 miles S)	14.9	14.4
6 (0.3 miles SW)	17.1	14.6
56 (0.1 miles N)	16.8	13.0

B. Air Sampling

Gross Beta Measurements - 1st Qtr.
(picocuries per cubic meter)

Air Sampler (Location)	Average	Maximum
1 (26 miles ESE) (Control)	2.05E-02	2.78E-02
2 (0.2 miles S)	2.16E-02	2.99E-02
6 (0.3 miles SW)	1.98E-02	2.49E-02

Gross Beta Measurements - 2nd Qtr.
(picocuries per cubic meter)

Air Sampler (Location)	Average	Maximum
1 (26 miles ESE) (Control)	1.76E-02	2.13E-02
2 (0.2 miles S)	1.71E-02	2.18E-02
6 (0.3 miles SW)	1.85E-02	2.43E-02

A composite analysis of air samples detected no radionuclides from man-made sources for either quarter.

VII. CONCLUSIONS

Based on the above measurements performed during this reporting period, it is concluded that the dose issuing from the ISFSI to the most exposed MEMBER OF THE PUBLIC did not exceed 1 mrem. This is best estimated as presented in the ISFSI Final Safety Analysis Report.

VIII. SUMMARY

This report is submitted in compliance with ISFSI Technical Specification Section 1.4.1 as required pursuant to 10 CFR 72.44(d)(3). Paragraph III specifies liquid and gaseous releases to the environment. Paragraphs VI and VII are provided for estimation of potential radiation dose commitment to the public resulting from effluent release.