5.0 QUALITY ASSURANCE

5.1 SAMPLE COLLECTION

EnRad Laboratories, Fisheries, and Aquatic Ecology performed the environmental sample collections as specified by approved sample collection procedures.

5.2 SAMPLE ANALYSIS

EnRad Laboratories performed the environmental sample analyses as specified by approved analysis procedures. EnRad Laboratories is located in Huntersville, North Carolina, at Duke Power Company's Environmental Center.

Duke Power Company's Environmental Center

5.3 DOSIMETRY ANALYSIS

The Radiation Dosimetry and Records group performed environmental dosimetry measurements as specified by approved dosimetry analysis procedures.

5.4 LABORATORY EQUIPMENT QUALITY ASSURANCE

5.4.1 DAILY QUALITY CONTROL

EnRad Laboratories has an internal quality assurance program which monitors each type of instrumentation for reliability and accuracy. Daily quality control checks ensure that instruments are in proper working order and these checks are used to monitor instrument performance.

5.4.2 CALIBRATION VERIFICATION

National Institute of Standards and Technology (NIST) standards that represent counting geometries are analyzed as unknowns at various frequencies ranging from weekly to annually to verify that efficiency calibrations are valid. The frequency is dependent upon instrument use and performance. Investigations are performed and documented should calibration verification data fall out of limits.

5.4.3 BATCH PROCESSING

Method quality control samples are analyzed with sample analyses that are processed in batches. These include gross beta in drinking water and all tritium analyses.

5.5 DUKE POWER INTERCOMPARISON PROGRAM

EnRad Laboratories participated in the Duke Power Nuclear Generation Department Intercomparison Program during 2002. Interlaboratory cross-check standards, including, Marinelli beakers, air filters, air cartridges, gross beta on smears, and tritium in water samples were analyzed at various times of the year by the four counting laboratories in Duke Power Company for this program. A summary of these Intercomparison Reports for 2002 is documented in Table 5.0-A.

5.6 DUKE POWER AUDITS

The Oconee Radiation Protection Section was audited by the Quality Assurance Group in February of 2002. There were no findings as a result of this 2002 audit.

EnRad Laboratories was audited by the Quality Assurance Group in June of 2002. Laboratory practices and procedures were reviewed. No significant problems were identified as a result of this 2002 audit.

5.7 U.S. NUCLEAR REGULATORY COMMISSION INSPECTIONS

The Oconee Nuclear Station Radiological Environmental Monitoring Program was audited by the NRC in November of 2002 (reference 6.12). The 2001 AREOR was reviewed. Air, broadleaf vegetation, and milk collections were inspected. No findings of significance were noted in the report. EnRad Laboratories was not audited by the NRC in 2002.

5.8 STATE OF SOUTH CAROLINA INTERCOMPARISON PROGRAM

Oconee Nuclear Station routinely participates with the Bureau of Radiological Health of the State's Department of Health and Environmental Control (DHEC) in an intercomparison program. Water, milk, vegetation, sediment, and fish samples collected by EnRad Laboratories are routinely split with DHEC for intercomparison analysis. DHEC collects air samples near two of the locations sampled for air by ONS. Results of the analyses performed on split and duplicate samples are sent to DHEC.

5.9 TLD INTERCOMPARISON PROGRAM

5.9.1 NUCLEAR TECHNOLOGY SERVICES INTERCOMPARISON PROGRAM

Radiation Dosimetry and Records participates in a quarterly TLD intercomparison program administered by Nuclear Technology Services, Inc. of Roswell, GA. Nuclear Technology Services irradiates environmental dosimeters quarterly and sends them to the Radiation Dosimetry and Records group for analysis of the

unknown estimated delivered exposure. A summary of the Nuclear Technology Services Intercomparison Report is documented in Table 5.0-B.

5.9.2 STATE OF NORTH CAROLINA INTERCOMPARISON PROGRAM

Radiation Dosimetry and Records routinely participates in a TLD intercomparison program. The State of North Carolina Radiation Protection Section irradiates environmental dosimeters and sends them to the Radiation Dosimetry and Records group for analysis of the unknown estimated delivered exposure. A summary of the State of North Carolina Environmental Dosimetry Intercomparison Report for 2002 is documented in Table 5.0-B.

5.9.3 INTERNAL CROSSCHECK (DUKE POWER)

Radiation Dosimetry and Records participates in a quarterly TLD intracomparison program administered internally by the Dosimetry Lab. The Dosimetry Lab Staff irradiates environmental dosimeters quarterly and submits them for analysis of the unknown estimated delivered exposure. A summary of the Internal Cross Check (Duke Power) Result is documented in Table 5.0-B.

TABLE 5.0-A

DUKE POWER COMPANY
INTERLABORATORY COMPARISON PROGRAM

2002 CROSS-CHECK RESULTS FOR ENRAD LABORATORIES

Cross-Check samples are normally analyzed a minimum of three times. A status of "3 Pass" indicates that all three analyses yielded results within the designated acceptance range. A status of "1 Pass" indicates that one analysis of the cross-check was performed.

Footnote explanations are included following this data table.

Gamma in Water 3.5 liters

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
3/15/2002	Q021GWSL	Cr-51	0.95 - 1.69 E5	1.27 E5	1.25 E5	3 Pass
		Mn-54	0.82 - 1.45 E5	1.09 E5	1.13 E5	3 Pass
		Fe-59	4.17 - 7.40 E4	5.56 E4	5.78 E4	3 Pass
		Co-60	5.75 - 10.20 E4	7.67 E4	7.68 E4	3 Pass
		Zn-65	0.80 - 1.43 E5	1.07 E5	1.12 E5	3 Pass
		Cs-134	4.46 - 7.91 E4	5.95 E4	5.36 E4	3 Pass
		Cs-137	0.97 - 1.72 E5	1.29 E5	1.24 E5	3 Pass
		Ce-139	0.00 - 0.00 E0	0.00 E0	1.82 E3	3 Pass[1]
		Ce-141	1.17 - 2.07 E5	1.56 E5	1.55 E5	3 Pass
5/14/2002	Q022GWR	Cr-51	6.77 - 12.01 E3	9.03 E3	9.32 E3	3 Pass
		Mn-54	1.38 - 2.45 E3	1.84 E3	1.98 E3	3 Pass
		Co-58	1.82 - 3.24 E3	2.43 E3	2.48 E3	3 Pass
		Fe-59	1.75 - 3.10 E3	2.33 E3	2.44 E3	3 Pass
		Co-60	1.71 - 3.04 E3	2.28 E3	2.38 E3	3 Pass
		Zn-65	2.66 - 4.71 E3	3.54 E3	3.73 E3	3 Pass
		Cs-134	1.68 - 2.98 E3	2.24 E3	2.10 E3	3 Pass
		Cs-137	1.24 - 2.20 E3	1.65 E3	1.60 E3	3 Pass
		Ce-141	2.32 - 4.11 E3	3.09 E3	3.13 E3	3 Pass
8/16/2002	Q023GWS	Cr-51	1.58 - 2.80 E5	2.10 E5	2.10 E5	3 Pass
		Mn-54	5.73 - 10.16 E4	7.64 E4	8.16 E4	3 Pass
		Co-58	4.47 - 7.93 E4	5.96 E4	6.20 E4	3 Pass
		Fe-59	4.76 - 8.44 E4	6.34 E4	6.85 E4	3 Pass
		Co-60	5.29 - 9.38 E4	7.06 E4	7.20 E4	3 Pass
		Zn-65	7.16 - 12.70 E4	9.55 E4	1.03 E5	3 Pass
		Cs-134	4.79 - 8.49 E4	6.39 E4	5.78 E4	3 Pass
		Cs-137	4.48 - 7.95 E4	5.98 E4	5.76 E4	3 Pass
		Ce-141	1.00 - 1.78 E5	1.34 E5	1.38 E5	3 Pass

Gamma in Water 3.5 liters continued

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
11/19/2002	Q024GWR	Cr-51	2.08 - 3.70 E4	2.78 E4	3.09 E4	3 Pass
		Mn-54	5.96 - 10.56 E3	7.94 E3	9.12 E3	3 Pass
		Co-57	0.00 - 0.00 E0	0.00 E0	6.65 E1	3 Pass[1]
		Co-58	6.54 - 11.60 E3	8.72 E3	9.79 E3	3 Pass
		Fe-59	3.72 - 6.60 E3	4.96 E3	5.95 E3	3 Pass
		Co-60	6.68 - 11.85 E3	8.91 E3	1.02 E4	3 Pass
		Zn-65	0.75 - 1.33 E4	1.00 E4	1.22 E4	3 Pass
		Cs-134	4.04 - 7.16 E3	5.38 E3	5.46 E3	3 Pass
		Cs-137	0.89 - 1.58 E4	1.19 E4	1.27 E4	3 Pass
		Ce-141	6.32 - 11.21 E3	8.43 E3	9.56 E3	3 Pass

Gamma in Water 1.0 liter

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
3/15/2002	Q021GWSL	Cr-51	0.95 - 1.69 E5	1.27 E5	1.28 E5	3 Pass
		Mn-54	0.82 - 1.45 E5	1.09 E5	1.16 E5	3 Pass
		Fe-59	4.17 - 7.40 E4	5.56 E4	5.85 E4	3 Pass
		Co-60	5.75 - 10.20 E4	7.67 E4	7.70 E4	3 Pass
		Zn-65	0.80 - 1.43 E5	1.07 E5	1.13 E5	3 Pass
		Cs-134	4.46 - 7.91 E4	5.95 E4	5.51 E4	3 Pass
		Cs-137	0.97 - 1.72 E5	1.29 E5	1.27 E5	3 Pass
		Ce-139	0.00 - 0.00 E0	0.00 E0	1.84 E3	3 Pass[1]
		Ce-141	1.17 - 2.07 E5	1.56 E5	1.60 E5	3 Pass
5/14/2002	Q022GWR	Cr-51	6.77 - 12.01 E3	9.03 E3	9.07 E3	3 Pass
		Mn-54	1.38 - 2.45 E3	1.84 E3	2.00 E3	3 Pass
		Co-58	1.82 - 3.24 E3	2.43 E3	2.43 E3	3 Pass
		Fe-59	1.75 - 3.10 E3	2.33 E3	2.57 E3	3 Pass
		Co-60	1.71 - 3.04 E3	2.28 E3	2.44 E3	3 Pass
		Zn-65	2.66 - 4.71 E3	3.54 E3	3.86 E3	3 Pass
		Cs-134	1.68 - 2.98 E3	2.24 E3	1.98 E3	3 Pass
		Cs-137	1.24 - 2.20 E3	1.65 E3	1.57 E3	3 Pass
		Ce-141	2.32 - 4.11 E3	3.09 E3	3.13 E3	3 Pass
8/16/2002	Q023GWS	Cr-51	1.58 - 2.80 E5	2.10 E5	2.11 E5	3 Pass
		Mn-54	5.73 - 10.16 E4	7.64 E4	8.09 E4	3 Pass
		Co-58	4.47 - 7.93 E4	5.96 E4	6.17 E4	3 Pass
		Fe-59	4.76 - 8.44 E4	6.34 E4	6.67 E4	3 Pass
		Co-60	5.29 - 9.38 E4	7.06 E4	7.02 E4	3 Pass
		Zn-65	7.16 - 12.70 E4	9.55 E4	1.01 E5	3 Pass
		Cs-134	4.79 - 8.49 E4	6.39 E4	5.82 E4	3 Pass
		Cs-137	4.48 - 7.95 E4	5.98 E4	5.76 E4	3 Pass
		Ce-141	1.00 - 1.78 E5	1.34 E5	1.37 E5	3 Pass

Gamma in Water 1.0 liter continued

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
11/19/2002	Q024GWR	Cr-51	2.08 - 3.70 E4	2.78 E4	3.15 E4	3 Pass
		Mn-54	5.96 - 10.56 E3	7.94 E3	9.12 E3	3 Pass
		Co-57	0.00 - 0.00 E0	0.00 E0	3.87 E1	3 Pass[1]
		Co-58	6.54 - 11.60 E3	8.72 E3	9.71 E3	3 Pass
		Fe-59	3.72 - 6.60 E3	4.96 E3	6.07 E3	3 Pass
		Co-60	6.68 - 11.85 E3	8.91 E3	1.01 E4	3 Pass
		Zn-65	0.75 - 1.33 E4	1.00 E4	1.22 E4	3 Pass
		Cs-134	4.04 - 7.16 E3	5.38 E3	5.24 E3	3 Pass
		Cs-137	0.89 - 1.58 E4	1.19 E4	1.29 E4	3 Pass
		Ce-141	6.32 - 11.21 E3	8.43 E3	9.53 E3	3 Pass

Gamma in Water 0.5 liter

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
3/15/2002	Q021GWSL	Cr-51	0.95 - 1.69 E5	1.27 E5	1.25 E5	3 Pass
		Mn-54	0.82 - 1.45 E5	1.09 E5	1.14 E5	3 Pass
		Fe-59	4.17 - 7.40 E4	5.56 E4	5.91 E4	3 Pass
		Co-60	5.75 - 10.20 E4	7.67 E4	7.65 E4	3 Pass
		Zn-65	0.80 - 1.43 E5	1.07 E5	1.14 E5	3 Pass
		Cs-134	4.46 - 7.91 E4	5.95 E4	5.06 E4	3 Pass
		Cs-137	0.97 - 1.72 E5	1.29 E5	1.23 E5	3 Pass
		Ce-139	0.00 - 0.00 E0	0.00 E0	1.76 E3	3 Pass[1]
		Ce-141	1.17 - 2.07 E5	1.56 E5	1.54 E5	3 Pass
5/14/2002	Q022GWR	Cr-51	6.77 - 12.01 E3	9.03 E3	9.29 E3	3 Pass
		Mn-54	1.38 - 2.45 E3	1.84 E3	1.96 E3	3 Pass
		Co-58	1.82 - 3.24 E3	2.43 E3	2.47 E3	3 Pass
		Fe-59	1.75 - 3.10 E3	2.33 E3	2.51 E3	3 Pass
		Co-60	1.71 - 3.04 E3	2.28 E3	2.40 E3	3 Pass
		Zn-65	2.66 - 4.71 E3	3.54 E3	3.76 E3	3 Pass
		Cs-134	1.68 - 2.98 E3	2.24 E3	2.03 E3	3 Pass
		Cs-137	1.24 - 2.20 E3	1.65 E3	1.62 E3	3 Pass
		Ce-141	2.32 - 4.11 E3	3.09 E3	3.11 E3	3 Pass
8/16/2002	Q023GWS	Cr-51	1.58 - 2.80 E5	2.10 E5	2.10 E5	3 Pass
		Mn-54	5.73 - 10.16 E4	7.64 E4	8.06 E4	3 Pass
		Co-58	4.47 - 7.93 E4	5.96 E4	6.02 E4	3 Pass
		Fe-59	4.76 - 8.44 E4	6.34 E4	6.77 E4	3 Pass
		Co-60	5.29 - 9.38 E4	7.06 E4	7.09 E4	3 Pass
		Zn-65	7.16 - 12.70 E4	9.55 E4	1.03 E5	3 Pass
		Cs-134	4.79 - 8.49 E4	6.39 E4	5.48 E4	3 Pass
		Cs-137	4.48 - 7.95 E4	5.98 E4	5.65 E4	3 Pass
		Ce-141	1.00 - 1.78 E5	1.34 E5	1.34 E5	3 Pass

Gamma in Water 0.5 liter continued

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
11/19/2002	Q024GWR	Cr-51	2.08 - 3.70 E4	2.78 E4	3.10 E4	3 Pass
		Mn-54	5.96 - 10.56 E3	7.94 E3	8.98 E3	3 Pass
		Co-57	0.00 - 0.00 E0	0.00 E0	6.61 E1	3 Pass[1]
		Co-58	6.54 - 11.60 E3	8.72 E3	9.64 E3	3 Pass
		Fe-59	3.72 - 6.60 E3	4.96 E3	5.92 E3	3 Pass
		Co-60	6.68 - 11.85 E3	8.91 E3	9.97 E3	3 Pass
		Zn-65	0.75 - 1.33 E4	1.00 E4	1.19 E4	3 Pass
		Cs-134	4.04 - 7.16 E3	5.38 E3	5.08 E3	3 Pass
		Cs-137	0.89 - 1.58 E4	1.19 E4	1.24 E4	3 Pass
		Ce-141	6.32 - 11.21 E3	8.43 E3	9.15 E3	3 Pass

Gamma in Filter

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/total	Reference Value pCi/total	Mean Reported Value pCi/total	Cross Check Status
6/13/2002	E3197-37	Cr-51	1.05 - 2.42 E2	1.59 E2	1.79 E2	3 Pass
		Mn-54	4.80 - 8.51 E1	6.40 E1	6.72 E1	3 Pass
		Co-58	5.03 - 8.91 E1	6.70 E1	6.78 E1	3 Pass
		Fe-59	3.89 - 7.51 E1	5.40 E1	6.46 E1	1/3 High[2]
		Co-60	6.30 - 11.17 E1	8.40 E1	8.70 E1	3 Pass
		Zn-65	0.91 - 1.61 E2	1.21 E2	1.30 E2	3 Pass
		Cs-134	6.08 - 10.77 E1	8.10 E1	7.99 E1	3 Pass
		Cs-137	4.58 - 8.11 E1	6.10 E1	5.73 E1	3 Pass
		Ce-141	4.58 - 8.11 E1	6.10 E1	6.84 E1	3 Pass
12/5/2002	E3459-37	Cr-51	1.80 - 3.28 E2	2.43 E2	2.55 E2	3 Pass
		Mn-54	0.75 - 1.33 E2	1.00 E2	1.01 E2	3 Pass
		Co-58	7.35 - 13.03 E1	9.80 E1	9.61 E1	3 Pass
		Fe-59	3.83 - 6.78 E1	5.10 E1	5.71 E1	3 Pass
		Co-60	0.87 - 1.54 E2	1.16 E2	1.19 E2	3 Pass
		Zn-65	0.95 - 1.68 E2	1.26 E2	1.28 E2	3 Pass
		Cs-134	5.25 - 9.31 E1	7.00 E1	6.50 E1	3 Pass
		Cs-137	1.16 - 2.06 E2	1.55 E2	1.45 E2	3 Pass
		Ce-141	5.85 - 10.37 E1	7.80 E1	8.05 E1	3 Pass

Iodine in Water

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
5/28/2002	Q022LIW1	I-131	1.38 - 2.59 E0	1.89 E0	2.31 E0	3 Pass
5/28/2002	Q022LIW2	I-131	2.03 - 3.60 E1	2.71 E1	3.87 E1	3/3 High[3]
5/28/2002	Q022LIW3	I-131	3.33 - 5.91 E2	4.44 E2	4.72 E2	3 Pass

Iodine in Milk

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
11/5/2002	Q024LIM1	I-131	2.80 - 4.97 E2	3.73 E2	3.52 E2	3 Pass
11/5/2002	Q024LIM2	I-131	0.00 - 0.00 E0	0.00 E0	0.00 E0	3 Pass

Iodine Cartridge

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi	Reference Value pCi	Mean Reported Value pCi	Cross Check Status
3/8/2002	A15502-04	I-131	1.47 - 2.61 E5	1.96 E5	2.31 E5	3 Pass
6/13/2002	E3198-37	I-131	6.98 - 12.37 E1	9.30 E1	10.7 E1	3 Pass
8/9/2002	A16102-04	I-131	1.89 - 3.35 E5	2.52 E5	2.95 E5	3 Pass
12/5/2002	E3460-37	I-131	7.28 - 12.90 E1	9.70 E1	1.12 E2	3 Pass

Beta in Water

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
6/13/2002	E3199-37	Beta	2.10 - 3.72 E2	2.80 E2	2.59 E2	3 Pass
6/13/2002	E3258-37	Beta	2.10 - 3.72 E2	2.80 E2	2.63 E2	3 Pass

Beta Air Particulate

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi	Reference Value pCi	Mean Reported Value pCi	Cross Check Status
2/15/2002	A15504-04	Gross Beta	5.64 - 10.00 E3	7.52 E3	7.97 E3	3 Pass

Tritium in Water

Reference Date	Sample I.D.	Nuclide	Acceptance Range pCi/l	Reference Value pCi/l	Mean Reported Value pCi/l	Cross Check Status
3/15/2002	Q021TWSL1	H-3	0.93 - 1.66 E4	1.25 E4	1.26 E4	3 Pass
3/15/2002	Q021TWSL2	H-3	0.00 - 0.00 E0	0.00 E0	0.00 E0	3 Pass
5/14/2002	Q022TWR1	H-3	4.25 - 8.20 E2	5.90 E2	5.60 E2	3 Pass
5/14/2002	Q022TWR2	H-3	0.00 - 0.00 E0	0.00 E0	0.00 E0	3 Pass
5/14/2002	Q022TWR3	H-3	2.06 - 3.66 E3	2.75 E3	2.84 E3	3 Pass
8/15/2002	Q023TWSL1	H-3	0.00 - 0.00 E0	0.00 E0	0.00 E0	3 Pass
8/15/2002	Q023TWSL2	H-3	2.94 - 5.21 E4	3.92 E4	3.37 E4	3 Pass
11/22/2002	Q024TWR1	H-3	0.00 - 0.00 E0	0.00 E0	0.00 E0	3 Pass
11/22/2002	Q024TWR2	H-3	1.65 - 2.93 E3	2.20 E3	1.89 E3	3 Pass

Table 5.0-A Footnote Explanations

(1) Gamma in Water, Sample ID Q021GWSL, Reference Date 3/15/2002: 3.5 L Marinelli, 1.0 L Marinelli, 0.5 L Marinelli,

Ce-139 was observed in cross-checks and was attributed to a contaminant arriving with the source. The nuclide was determined to be present, but there was no reference activity applicable to the results.

Gamma in Water, Sample ID Q024GWR, Reference Date 11/19/2002: 3.5 L Marinelli, 1.0 L Marinelli, 0.5 L Marinelli

Co-57 was observed in cross-checks and was attributed to a contaminant arriving with the source. The nuclide was determined to be present, but there was no reference activity applicable to the results.

(2) Gamma in Filter, Sample ID E3197-37, Reference Date 6/13/2002

Three results for Fe-59 [1099.2 keV] were reported, with one being above acceptance limit. Calibration verifications for detector 4 (SN: 35-P31076A) were evaluated and yielded acceptable results. General Office PIP G-02-00278 was written to record investigative actions.

(3) Iodine in Water, Sample ID Q022LIW2, Reference Date 5/28/2002

Three results were reported for this cross-check, all of which were above the cross-check acceptance limit. Investigation yielded the most likely cause for the high results was failure to shake resin dish prior to analysis. General Office PIP G-02-00254 was written to record investigative actions.

TABLE 5.0-B

2002 ENVIRONMENTAL DOSIMETER CROSS-CHECK RESULTS

Nuclear Technology Services

1st Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100141	88	88.1	0.11	<+/-15%	Pass
100157	88	92.8	5.45	<+/-15%	Pass
100215	88	91.1	3.52	<+/-15%	Pass
100145	88	91.2	3.64	<+/-15%	Pass
100463	88	90.7	3.07	<+/-15%	Pass
		Average Bias (B)	3.16		
		Standard Deviation (S)	1.93		
		Measure Performance |B|+S	5.09	<15%	Pass

2nd Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100340	99	93.9	-5.15	<+/-15%	Pass
101179	99	97.5	-1.52	<+/-15%	Pass
100349	99	96.3	-2.73	<+/-15%	Pass
100397	99	98.9	-0.10	<+/-15%	Pass
100022	99	98.5	-0.51	<+/-15%	Pass
		Average Bias (B)	-2.00		
		Standard Deviation (S)	2.03		
		Measure Performance |B|+S	4.03	<15%	Pass

3rd Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100601	66	64.0	-3.03	<+/-15%	Pass
100841	66	65.1	-1.36	<+/-15%	Pass
100868	66	65.3	-1.06	<+/-15%	Pass
100880	66	68.2	3.33	<+/-15%	Pass
100989	66	65.4	-0.91	<+/-15%	Pass
		Average Bias (B)	-0.61		
		Standard Deviation (S)	2.36		
		Measure Performance |B|+S	2.97	<15%	Pass

4th Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
101275	70	63.5	-9.29	<+/-15%	Pass
100478	70	64.2	-8.29	<+/-15%	Pass
100503	70	63.1	-9.86	<+/-15%	Pass
101011	70	64.6	-7.71	<+/-15%	Pass
100538	70	67.0	-4.29	<+/-15%	Pass
		Average Bias (B)	-7.89		
		Standard Deviation (S)	2.18		
		Measure Performance |B|+S	10.06	<15%	Pass

State of North Carolina, Division of Radiation Protection

Spring 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100008	90	80.8	-10.22	<+/-15%	Pass
100030	90	83.1	-7.67	<+/-15%	Pass
100050	90	81.3	-9.67	<+/-15%	Pass
100064	90	84.6	-6.00	<+/-15%	Pass
100117	90	82.6	-8.22	<+/-15%	Pass
100166	90	81.1	-9.89	<+/-15%	Pass
100208	90	79.9	-11.22	<+/-15%	Pass
101122	90	82.5	-8.33	<+/-15%	Pass
		Average Bias (B)	-8.90		
		Standard Deviation (S)	1.67		
		Measure Performance |B|+S	10.57	<15%	Pass

Fall 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100777	151.6	127.3	-16.03	<+/-15%	Fail
100704	151.6	127.9	-15.63	<+/-15%	Fail
100740	151.6	130.9	-13.65	<+/-15%	Pass
100680	151.6	132.4	-12.66	<+/-15%	Pass
101020	151.6	123.7	-18.40	<+/-15%	Fail
100747	151.6	131.3	-13.39	<+/-15%	Pass
100759	151.6	130.6	-13.85	<+/-15%	Pass
100103	151.6	128.6	-15.17	<+/-15%	Fail
		Average Bias (B)	-14.85		
		Standard Deviation (S)	1.85		
		Measure Performance |B|+S	16.70	<15%	Fail [1]

Internal Crosscheck (Duke Power)

1st Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
101102	40	37.0	-7.50	<+/-15%	Pass
100109	40	37.1	-7.25	<+/-15%	Pass
101122	40	38.4	-4.00	<+/-15%	Pass
100268	40	37.1	-7.25	<+/-15%	Pass
100807	40	39.8	-0.50	<+/-15%	Pass
100810	40	37.7	-5.75	<+/-15%	Pass
100169	40	37.3	-6.75	<+/-15%	Pass
100366	40	38.1	-4.75	<+/-15%	Pass
100815	40	37.2	-7.00	<+/-15%	Pass
100823	40	38.8	-3.00	<+/-15%	Pass
		Average Bias (B)	-5.38		
		Standard Deviation (S)	2.31		
		Measure Performance |B|+S	7.68	<15%	Pass

2nd Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100103	33	31.5	-4.55	<+/-15%	Pass
100740	33	31.6	-4.24	<+/-15%	Pass
100747	33	31.9	-3.33	<+/-15%	Pass
100770	33	31.3	-5.15	<+/-15%	Pass
100772	33	32.4	-1.82	<+/-15%	Pass
101017	33	31.7	-3.94	<+/-15%	Pass
101020	33	30.8	-6.67	<+/-15%	Pass
101025	33	32.3	-2.12	<+/-15%	Pass
101035	33	31.3	-5.15	<+/-15%	Pass
101036	33	32.3	-2.12	<+/-15%	Pass
		Average Bias (B)	-3.91		
		Standard Deviation (S)	1.57		
		Measure Performance |B|+S	5.48	<15%	Pass

3rd Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100792	106	100.8	-4.91	<+/-15%	Pass
101274	106	100.0	-5.66	<+/-15%	Pass
100314	106	100.0	-5.66	<+/-15%	Pass
100460	106	100.9	-4.81	<+/-15%	Pass
100101	106	101.9	-3.87	<+/-15%	Pass
100783	106	101.8	-3.96	<+/-15%	Pass
100760	106	100.8	-4.91	<+/-15%	Pass
101349	106	98.1	-7.45	<+/-15%	Pass
100794	106	101.1	-4.62	<+/-15%	Pass
100012	106	100.1	-5.57	<+/-15%	Pass
		Average Bias (B)	-5.14		
		Standard Deviation (S)	1.03		
		Measure Performance |B|+S	6.17	<15%	Pass

4th Quarter 2002

TLD Number	Delivered (mrem)	Reported (mrem)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
100389	66	64.5	-2.27	<+/-15%	Pass
101114	66	62.3	-5.61	<+/-15%	Pass
100114	66	66.6	0.91	<+/-15%	Pass
100649	66	63.0	-4.55	<+/-15%	Pass
100469	66	65.2	-1.21	<+/-15%	Pass
100763	66	62.0	-6.06	<+/-15%	Pass
100304	66	62.8	-4.85	<+/-15%	Pass
100068	66	67.2	1.82	<+/-15%	Pass
100203	66	65.0	-1.52	<+/-15%	Pass
100418	66	64.7	-1.97	<+/-15%	Pass
		Average Bias (B)	-2.53		
		Standard Deviation (S)	2.69		
		Measure Performance |B|+S	5.22	<15%	Pass

Table 5.0-B Footnote Explanations

(1) State of NC Division of Radiation Protection TLD Cross-Check, Fall 2002

There was an unusual amount of time between anneal, irradiation and readout for the Fall 2002 Environmental Crosscheck with the State of NC Division of Radiation Protection. Normal times between irradiation and readout are typically less than 7 days. In the Fall 2002 crosscheck, due to the ice storm and holiday season, the time between irradiation and readout was 18 days. Fading correction was not applied for the report results; fading correction is typically NOT USED.

When fading correction was applied, the cross-checks were within acceptance criteria. Fading correction will be applied to future cross-checks.

Additional information is documented in PIP G-03-00021.

6.0 REFERENCES

6.1 Oconee Selected License Commitments

6.2 Oconee Technical Specifications

6.3 Oconee Updated Final Safety Analysis Report

6.4 Duke Power Company Offsite Dose Calculation Manual

6.5 Oconee Annual Radiological Environmental Operating Report 1969-2001

6.6 Oconee Annual Radioactive Effluent Release Report 2002

6.7 Probability and Statistics in Engineering and Management Science, Hines and Montgomery, 1969, pages 287-293.

6.8 Practical Statistics for the Physical Sciences, Havilcek and Crain, 1988, pages 83-93.

6.9 Nuclear Regulatory Commission Regulatory Guide 1.109, Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purposes of Evaluating Compliance with 10CFR50, Appendix I.

6.10 EnRad Laboratories Operating Procedures

6.11 RETDAS, Radiological Effluent Tracking and Dose Assessment Software, Vertechs Version 3.5.0, Duke Power Revision # 3.0

6.12 NRC Integrated Inspection Report 50-269/02-05, 50-270/02-05, 50-287/02-05

6.13 Duke Power Company EnRad Laboratory Charcoal Cartridge Study, performed 2001

APPENDIX A

ENVIRONMENTAL SAMPLING
&
ANALYSIS PROCEDURES

APPENDIX A

ENVIRONMENTAL SAMPLING AND ANALYSIS PROCEDURES

Adherence to established procedures for sampling and analysis of all environmental media at Oconee Nuclear Station is required to ensure compliance with Station Selected Licensee Commitments. Analytical procedures were employed to ensure that Selected Licensee Commitments detection capabilities were achieved.

Environmental sampling and analyses were performed by EnRad Laboratories, Dosimetry and Records, and Fisheries and Aquatic Ecology.

Section IV of this appendix describes the environmental sampling frequencies and analysis procedures by media type.

I. CHANGE OF SAMPLING PROCEDURES

A new surface water site, 063.1 (0.78 miles E) was added to the REMP in the vicinity of the existing site 063 (0.8 miles ESE). The new site was added due to safety concerns and equipment reliability with the existing site 063 on the highway 183 bridge. Sampling from site 063 was suspended on 8/29/2002.

II. DESCRIPTION OF ANALYSIS PROCEDURES

Gamma spectroscopy analyses are performed using high purity germanium gamma detectors and Canberra analytical software. Designated sample volumes are transferred to appropriate counting geometries and analyzed by gamma spectroscopy. Perishable samples such as fish and broadleaf vegetation are ground to achieve a homogeneous mixture. Soils and sediments are dried, sifted to remove foreign objects (rocks, clams, glass, etc.) then transferred to appropriate counting geometry. Ten percent of samples receiving gamma analysis are analyzed as duplicate analyses.

Low-level iodine analyses are performed by passing a designated sample aliquot through an ion exchange resin to remove and concentrate any iodine in the aqueous sample (milk). The resin is then dried and transferred to appropriate counting geometry and analyzed by gamma spectroscopy.

Tritium analyses are performed quarterly by using low-level environmental liquid scintillation analysis technique on a Packard 2550 liquid scintillation system. Tritium samples are batch processed with a tritium spike to verify instrument performance and sample preparation technique are acceptable.

Gross beta analysis is performed by concentrating a designated aliquot of sample precipitate and analyzing by gas-flow proportional counters. Samples are batch processed with a blank to ensure sample contamination has not occurred.

III. CHANGE OF ANALYSIS PROCEDURES

No analysis procedures were changed during 2002.

IV. SAMPLING AND ANALYSIS PROCEDURES

A.1 AIRBORNE PARTICULATE AND RADIOIODINE

Airborne particulate and radioiodine samples at each of six locations were composited continuously by means of continuous air samplers. Air particulates were collected on a particulate filter and radioiodines were collected in a charcoal cartridge positioned behind the filter in the sampler. The samplers are designed to operate at a constant flow rate (in order to compensate for any filter loading) and are set to sample approximately 2 cubic feet per minute. Filters and cartridges were collected weekly. A weekly gamma analysis was performed on each charcoal cartridge and a weekly gross beta analysis was performed on each filter. Filters were segregated by location and a quarterly gamma analysis was performed on the filter composite. The continuous composite samples were collected from the locations listed below.

Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 074	=	Keowee Key Resort (2.3 mi. NNW)
Location 077	=	Skimmer Wall (1.0 mi. SW)
Location 078	=	Recreation Site (0.6 mi. WSW)
Location 079	=	Keowee Dam (0.5 mi. NE)
Location 081	=	Clemson Operations Center (9.3 mi. SE)

A.2 DRINKING WATER

Monthly composite samplers were operated to collect an aliquot at least every two hours. Gross beta and gamma analysis was performed on the monthly composites. Tritium analysis was performed on the quarterly composites. The composites were collected monthly from the locations listed below.

Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 064	=	Seneca (6.7 mi. SSW)
Location 066	=	Anderson (19.0 mi SSE)

A.3 SURFACE WATER

Monthly composite samplers were operated to collect an aliquot at least every two hours. Gamma analysis was performed on the monthly composites. Tritium analysis was performed on the quarterly composites sample. The composites were collected monthly from the locations listed below.

Location 062	=	Lake Keowee/Hydro Intake (0.8 mi. ENE)
Location 063	=	Lake Hartwell Hwy 183 Bridge (0.8 mi. ESE)
Location 063.1	=	Lake Hartwell Hwy 183 Bridge (0.78 mi. E)

A.4 MILK

Semimonthly grab samples were collected at each dairy. A gamma and low-level Iodine-131 analysis was performed on each sample. The semimonthly grab samples were collected from the locations listed below.

Location 071	=	Clemson Dairy (10.3 mi. SSE)
Location 080	=	Martin's Dairy (17.2 mi. SE)
Location 082	=	Oakway Dairy (17.8 mi SSW)

A.5 BROADLEAF VEGETATION

Monthly samples were collected and a gamma analysis was performed on each sample. The samples were collected from the locations listed below.

Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 077	=	Skimmer Wall (1.0 mi. SW)
Location 079	=	Keowee Dam (0.5 mi. NE)
Location 081	=	Clemson Operations Center (9.3 mi. SE)

A.6 FISH

Semiannual samples were collected and a gamma analysis was performed on the edible portions of each sample. The samples were collected from the locations listed below.

Location 060	=	New Greenville Water Intake Rd. (2.6 mi. NNE)
Location 063	=	Lake Hartwell - Hwy 183 Bridge (0.8 mi. ESE)
Location 067	=	Lawrence Ramsey Bridge, Hwy 27 (4.2 mi. SSE)

A.7 SHORELINE SEDIMENT

Semiannual samples were collected and a gamma analysis was performed on each sample following the drying and removal of rocks and clams. The samples were collected from the locations listed below.

Location 063	=	Lake Hartwell - Hwy 183 Bridge (0.8 mi. ESE)
Location 067	=	Lawrence Ramsey Bridge, Hwy 27 (4.2 mi. SSE)
Location 068	=	High Falls County Park (2.0 mi. W)

A.8 DIRECT GAMMA RADIATION (TLD)

Thermoluminescent dosimeters (TLD) were collected quarterly at forty-two locations. A gamma exposure rate was determined for each TLD. The TLDs were placed as indicated below.

* An inner ring of 17 TLDs, one in each meteorological sector in the general area of the site boundary.

* An outer ring of 16 TLDs, one in each meteorological sector in the 6 to 8 kilometer range.

* The remaining TLDs were placed in special interest areas such as population centers, residential areas, schools, and control locations.

TLD Locations are listed in Table 2.1-B.

A.9 ANNUAL LAND USE CENSUS

An annual Land Use Census was conducted to identify within a distance of 8 kilometers (5.0 miles) from the station, the following locations in each of the sixteen meteorological sectors:

* The Nearest Residence
* The Nearest Meat Animal
* The Nearest Milk-giving Animal (cow, goat, etc.) where milk is used for human consumption

The census was conducted during the growing season from 7/16 to 7/18/2002. Results are shown in Table 3.9. No changes were made to the sampling procedures during 2002.

APPENDIX B

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SUMMARY OF RESULTS

2002

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Air Particulate (pCi/m3)						081 (9.3 mi SE)	
BETA	310	1.00E-02	1.91E-2 (257/258)	074	2.01E-2 (52/52)	1.84E-2 (52/52)	0
			4.36E-3 - 2.85E-2	(2.3 mi NNW)	8.42E-3 - 2.68E-2	6.60E-3 - 2.60E-2	
CS-134	24	5.00E-02	0.00 (0/20)		0.00 (0/4)	0.00 (0/4)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
CS-137	24	6.00E-02	0.00 (0/20)		0.00 (0/4)	0.00 (0/4)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
I-131	24	7.00E-02	0.00 (0/20)		0.00 (0/4)	0.00 (0/4)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled	Type and Total Number of	Lower Limit of Detection	All Indicator Locations	Location with Highest Annual Mean Name, Distance, Direction		Control Location	No. of Non-Routine Report Meas.
Unit of Measurement	Analyses Performed	(LLD)	Mean (Fraction) Range	Location Code	Mean (Fraction) Range	Mean (Fraction) Range	
Air Radioiodine (pCi/m3)						081 (9.3 mi SE)	
	CS-134 310	5.00E-02	0.00 (0/258)		0.00 (0/52)	0.00 (0/52)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137 310	6.00E-02	0.00 (0/258)		0.00 (0/52)	0.00 (0/52)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	I-131 310	7.00E-02	0.00 (0/258)		0.00 (0/52)	0.00 (0/52)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Drinking Water (pCi/liter)							064 (6.7 mi SSW)	
	BALA-140	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	BETA	39	4	1.44 (25/26)	066	1.61 (13/13)	1.21 (12/13)	0
				0.63 - 2.27	(19.0 mi SSE)	1.06 - 2.09	0.72 - 1.96	
	CO-58	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-60	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	39	18	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	FE-59	39	30	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	H-3	15	2000	338 (5/10)	066	338 (5/5)	0.00 (0/5)	0
				213 - 444	(19.0 mi SSE)	213 - 444	0.00 - 0.00	
	I-131	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	MN-54	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	NB-95	39	15	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZN-65	39	30	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZR-95	39	30	0.00 (0/26)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Surface Water (pCi/liter)							062 (0.8 mi ENE)	
	BALA-140	26	15	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-58	26	15	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-60	26	15	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	26	15	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	26	18	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	FE-59	26	30	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	H-3	10	2000	9498 (5/5)	063	10000 (3/3)	0.00 (0/5)	0
				5060 - 13700	(0.8 mi ESE)	5060 - 13700	0.00 - 0.00	
	I-131	26	15	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	MN-54	26	15	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	NB-95	26	15	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZN-65	26	30	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZR-95	26	30	0.00 (0/13)		0.00 (0/13)	0.00 (0/13)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269, 270, 287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Milk (pCi/liter)							080 (17.2 mi SE)	
	BALA-140	78	15	0.00 (0/52)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	78	15	0.00 (0/52)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	78	18	0.00 (0/52)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	I-131	78	15	0.00 (0/52)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	LLI-131	78	1	0.00 (0/52)		0.00 (0/26)	0.00 (0/26)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled	Type and Total Number of	Lower Limit of Detection	All Indicator Locations	Location with Highest Annual Mean Name, Distance, Direction		Control Location	No. of Non-Routine Report Meas.
Unit of Measurement	Analyses Performed	(LLD)	Mean (Fraction) Range	Location Code	Mean (Fraction) Range	Mean (Fraction) Range	
Broadleaf Vegetation (pCi/kg-wet)						081 (9.3 mi SE)	
	CS-134 48	60	0.00 (0/36)		0.00 (0/12)	0.00 (0/12)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137 48	80	84.4 (1/36)	077	84.4 (1/12)	0.00 (0/12)	0
			84.4 - 84.4	(1.0 mi SW)	84.4 - 84.4	0.00 - 0.00	
	I-131 48	60	0.00 (0/36)		0.00 (0/12)	0.00 (0/12)	0
			0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Fish (pCi/kg-wet)							060 (2.6 mi NNE)	
	CO-58	12	130	0.00 (0/8)		0.00 (0/4)	0.00 (0/4)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CO-60	12	130	0.00 (0/8)		0.00 (0/4)	0.00 (0/4)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-134	12	130	0.00 (0/8)		0.00 (0/4)	0.00 (0/4)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	12	150	83.7 (8/8)	063	93.7 (4/4)	21.0 (1/4)	0
				59.1 - 110	(0.8 mi ESE)	69.0 - 110	21.0 - 21.0	
	FE-59	12	260	0.00 (0/8)		0.00 (0/4)	0.00 (0/4)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	MN-54	12	130	0.00 (0/8)		0.00 (0/4)	0.00 (0/4)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	ZN-65	12	260	0.00 (0/8)		0.00 (0/4)	0.00 (0/4)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled Unit of Measurement	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (Fraction) Range	Location with Highest Annual Mean Name, Distance, Direction Location Code	 Mean (Fraction) Range	Control Location Mean (Fraction) Range	No. of Non-Routine Report Meas.
Shoreline Sediment (pCi/kg-dry)							068 (2.0 mi W)	
	CS-134	6	150	0.00 (0/4)		0.00 (0/2)	0.00 (0/2)	0
				0.00 - 0.00		0.00 - 0.00	0.00 - 0.00	
	CS-137	6	180	49.6 (4/4)	067	69.6 (2/2)	0.00 (0/2)	0
				22.5 - 83.3	(4.2 mi SSE)	56.0 - 83.3	0.00 - 0.00	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

Environmental Radiological Monitoring Program Summary

Facility: Oconee Nuclear Station **Docket No. 50-269,270,287**

Location: Oconee County, South Carolina **Report Period: 01-JAN-2002 to 31-DEC-2002**

Medium or Pathway Sampled	Type and Total Number of	Lower Limit of Detection	All Indicator Locations	Location with Highest Annual Mean Name, Distance, Direction		Control Location	No. of Non-Routine Report Meas.
Unit of Measurement	Analyses Performed	(LLD)	Mean (Fraction) Range	Location Code	Mean (Fraction) Range	Mean (Fraction) Range	
Direct Radiation TLD (mR/standard quarter)						058 (9.4 mi WSW) 081 (9.3 mi SE)	
	166	0.00E+00	20.3 (158/158)	048	26.0 (4/4)	27.0 (8/8)	0
			13.0 - 28.5	(4.0 mi W)	22.7 - 28.5	18.7 - 34.7	

Mean and range based upon detectable measurements only
Fraction of detectable measurements at specified locations is indicated in parentheses, (Fraction)
Zero range indicates no detectable activity measurements

APPENDIX C

SAMPLING DEVIATIONS
&
UNAVAILABLE ANALYSES

APPENDIX C

OCONEE NUCLEAR STATION
SAMPLING DEVIATIONS & UNAVAILABLE ANALYSES

DEVIATION & UNAVAILABLE REASON CODES			
BF	Blown Fuse	PO	Power Outage
FZ	Sample Frozen	PS	Pump out of service / Undergoing Repair
IW	Inclement Weather	SL	Sample Loss/Lost due to Lab Accident
LC	Line Clog to Sampler	SM	Motor / Rotor Seized
OT	Other	TF	Torn Filter
PI	Power Interrupt	VN	Vandalism
PM	Preventive Maintenance		

C.1 SAMPLING DEVIATIONS

Air Particulate and Air Radioiodines

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
079	8/26 – 9/3/02	8/26 – 8/26/02	PI	Power to sampling equipment was interrupted. Work request 2019480 was written to restore power.
078	9/16 – 9/23/02	9/16 – 9/18/02	PO	Power to sampling equipment was interrupted. Work request 2020926 was written to restore power.
081	9/16 – 9/23/02	9/16 – 9/19/02	PO	Power to sampling equipment was interrupted. Work request 2020913 was written to restore power.
078	9/23 – 9/30/02	9/25 – 9/30/02	PO	Power to sampling equipment was interrupted. Work request 2020926 was written to restore power.

Drinking Water

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
066	1/21 – 2/18/02	2/18 – 2/18/02	OT	Sampling equipment did not collect sufficient volume. A grab sample was collected. Sampling equipment was reset and verified operable.
060	5/13 – 6/10/02	6/10 – 6/10/02	PO	Power to sampling equipment was lost during the composite period. Loss suspected due to plant maintenance. A grab sample was collected. Power was restored and normal sampling resumed on 6/10/2002.

Drinking Water, continued

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
064	5/13 – 6/10/02	6/10 – 6/10/02	PO	Power to sampling equipment was lost during the composite period. Loss suspected due to plant maintenance and construction. A grab sample was collected. Power was restored and normal sampling resumed on 6/10/2002.

Surface Water

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
063*	12/26 – 1/21/02	12/26 – 1/17/02	PS	Reservoir pump not sampling at time of collection. Suspected cause was a line clog to intake line. Work request 98218295 was written.
063*	1/21 – 2/18/02	1/22 – 2/13/02	OT	Sampling equipment was inoperative from previous collection period due to intake line clog. Grab samples were collected from 1/22/02 through 1/25/02. Sampling equipment was returned to normal operation on 1/26/02. During operation the sampling equipment tripped internal float after 22 days, 22 hours of operability. Sampling equipment was verified operable at time of collection and normal sampling resumed.
062	2/18 – 3/18/02	3/18 – 3/18/02	PI	Power supply to sampling equipment was interrupted and insufficient sample volume was available. Sampler tubing was replaced and sampling equipment recalibrated. A grab sample was collected and normal sampling resumed.
062	5/13 – 6/10/02	6/10 – 6/10/02	OT	Sampling equipment was not functional at time of collection. A grab sample was collected and normal sampling resumed.
063*	5/13 – 6/10/02	5/13 – 6/10/02	PS	Reservoir pump was not functional at time of collection. Work request 98234702 was written to restore equipment. Daily grabs were collected from 5/13 – 5/19/02. The reservoir pump was repaired and normal sampling resumed on 5/20/02.
063*	6/10 – 7/8/02	6/11 – 7/8/02	PS	The reservoir pump was not functional at time of collection. Work request 98238830 was written to restore the equipment. Daily grab samples were collected from 6/11 – 6/17/02. Normal sampling was resumed on 6/17/02.
063*	7/8 – 8/5/02	7/8 – 8/5/02	PS	Sampling equipment was not functional at start of collection period. The reservoir pump was not functional. Daily grab samples were collected from 7/8 – 7/9/02. Normal sampling was resumed 7/10/02.

Surface Water, continued

Location	Scheduled Collection Dates	Actual Collection Dates	Reason Code	Corrective Action
063*	8/5 – 9/3/02	8/5 – 9/3/02	PS	The reservoir pump was removed from service due to safety concerns. Composite sample was obtained from 8/3 – 8/29/02. Daily grab samples were collected from 8/29 – 9/3/02.

** A new surface water site, 063.1 (0.78 miles E), was added to the REMP in the vicinity of the existing site 063 (0.8 miles ESE). The new site was added due to safety concerns and equipment reliability with the existing site 063 on the highway 183 bridge. The existing site 063 was removed from service effective 8/29/2002. The new site 063.1 began operation effective 7/12/2002.*

C.2 UNAVAILABLE ANALYSES

Air Particulate and Air Radioiodines

Location	Scheduled Collection Dates	Reason Code	Corrective Action
079	9/3 – 9/9/02	PI	Power to sampling equipment was interrupted during previous sampling period and had not been restored. Work request 2019480 was written to restore power.

TLD

Location	Scheduled Collection Dates	Reason Code	Corrective Action
040	3/18 – 6/17/02	VN	TLD was found on ground and had been tampered with. The TLD case was open. TLD examination lead to the conclusion the subsequent data would not be reliable. TLD considered unavailable.
029	9/16 – 12/16/02	VN	TLD missing. 1st quarter 2003 TLD placed in field.

APPENDIX D

ANALYTICAL DEVIATIONS

D.1 ANALYTICAL DEVIATIONS

Air Particulate and Air Radioiodines

Location	Scheduled Collection Dates	Reason Code	Corrective Action
			This sample was determined to be unavailable for analysis. The air particulate filter was returned to the laboratory and appeared clean. Conversation with the sample collector for the end date of the composite period (4/29/2002) revealed that the clean filter was observed by the collector. No indication of the clean filter was recorded in writing on the transmittal or sample envelope. The clean filter was returned to the lab and gross beta analysis was not possible since the filter could not achieve detection limit for gross beta. It is unknown why the filter was returned clean. The secondary filter was discarded by laboratory personnel prior to the discovery of the clean filter by laboratory personnel. The filter [LIMS # 22013248] and the corresponding cartridge [LIMS # 22013249] were considered ANALYTICAL DEVIATIONS since the analysis of the secondary samples could have prevented this unavailable sample.
078	4/22 – 4/29/02	OT	This information is identified in GO PIP G-02-00160.

APPENDIX E

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM RESULTS

This appendix includes all of the sample analysis reports generated from each sample medium for 2002. Appendix E is located separately from this report and is permanently archived at Duke Power Company's Environmental Center radiological environmental master file, located at the McGuire Nuclear Station Site in Huntersville, North Carolina.