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DENTON,H.R. OFFICE OF NUCLEAR REACTOR REGULATION

SUBJECT: FORWARDS LICENSE AMEND INCORPORATING RADIOLOGICAL EFFLUENT SPECS INTO TECH SPECS.OFFSITE DOSE CALCULATION MANUAL ENCL.

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WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

March 29, 1979

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. R. W. Reid, Chief
Operator Reactors Branch #4

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Sir:

In letters dated July 11 and November 15, 1978 the Staff requested a license amendment application be submitted to incorporate the requirements of 10CFR50, Appendix I into the Oconee Nuclear Station Technical Specification. In response to this request, please find attached a proposed license amendment to the Oconee Nuclear Station Facility Operating License to incorporate Radiological Effluent Specifications into the Oconee Nuclear Station Technical Specifications. Also, provided in the Offsite Dose Calculation Manual for Oconee.

This submittal is considered to consist of one Class III license amendment applicable for all three Oconee Units. Inasmuch as this proposed is being submitted at the request of the Commission, no license fees are provided.

Very truly yours,

William O. Parker, Jr.

RLG:scs
Attachment

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P

WILLIAM O. PARKER, JR., being duly sworn, states that he is Vice President of Duke Power Company; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this request for amendment of the Oconee Nuclear Station Technical Specifications, Appendix A to Facility Operating Licenses DPR-38, DPR-47 and DPR-55; and that all statements and matters set forth therein are true and correct to the best of his knowledge.

William O. Parker, Jr., Vice President

Subscribed and sworn to before me this 29th day of March, 1979.

Notary Public

My Commission Expires:

February 15, 1982

ATTACHMENT 1

OCONEE NUCLEAR STATION
PROPOSED TECHNICAL SPECIFICATION REVISION

RADIOLOGICAL EFFLUENT CONTROL

Pages

1-5	3.10-4	4.11-5
3.5-31	3.10-5	4.11-6
3.5-32	4.1-1	4.11-7
3.5-33	4.1-2	4.21-1
3.5-34	4.1-5	6.1-5
3.5-35	4.1-10	6.4-1
3.5-36	4.1-11	6.4-2
3.9-1	4.1-12	6.5-2
3.9-2	4.1-13	6.6-1
3.9-3	4.1-14	6.6-2
3.9-4	4.1-15	6.6-3
3.9-5	4.1-16	6.6-4
3.10-1	4.11-1	6.6-5
3.10-2	4.11-2	6.6-6
3.10-3	4.11-3	6.6-7
	4.11-4	6.7-1

1.8 RADIOLOGICAL EFFLUENT CONTROL

1.8.1 Source Check

A source check is the qualitative assessment of channel response when the channel sensor is exposed to a radioactive source.

1.8.2 Channel Calibration

The initial channel calibration for radioactivity measurement instrumentation shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards should permit calibrating the system over its intended range of energy and rate capabilities. For subsequent channel calibration, sources that have been related to the initial calibration should be used, at intervals of at least once per eighteen months. This can normally be accomplished during refueling outages.

1.8.3 Offsite Dose Calculation Manual

The Offsite Dose Calculation Manual (ODCM) is a manual containing the methodology and parameters to be used in the calculation of offsite doses due to radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring instrumentation alarm/trip setpoints.

3.5.5 Radioactive Effluent Monitoring Instrumentation

Applicability

Applies to radioactive liquid effluent, gaseous effluent, and gaseous process monitoring instrumentation.

Specifications

3.5.5.1 Liquid Effluents

a. The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.5.5-1 shall be operable with their alarm/trip setpoints set to actuate before the limits of Specification 3.9.1 are exceeded.

b. If a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint is less conservative than required, promptly suspend the release of radioactive liquid effluents monitored by the affected channel, or declare the channel inoperable.

c. In the event that the number of operable radioactive liquid effluent monitoring instrumentation channels falls below the limit given under Table 3.5.5-1, Column A, action shall be as shown in Column B.

3.5.5.2 Gaseous Process and Effluents

a. The radioactive gaseous process and effluent monitoring instrumentation channels shown in Table 3.5.5-2 shall be operable with their alarm/trip setpoints set to actuate before the limits of Specification 3.10.1 are exceeded.

b. If a radioactive gaseous process or effluent monitoring instrumentation channel alarm/trip setpoint is less conservative than required, declare the channel inoperable.

c. In the event that the number of radioactive gaseous process or effluent monitoring instrumentation channels falls below the limit given under Table 3.5.5-2, Column A, action shall be taken as shown in Column B.

3.5.5.3 Setpoints

The setpoints shall be determined in accordance with the methodology described in the ODCM and shall be recorded.

Bases

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases. The alarm/trip setpoints for these

instruments shall be calculated in accordance with NRC approved methods in the ODCM to assure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The operability and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63 and 64 of Appendix A to 10 CFR Part 50.

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases. The alarm/trip setpoints for these instruments shall be calculated in accordance with NRC approved methods in the ODCM to assure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. This instrumentation also includes provisions for monitoring (and controlling) the concentrations of potentially explosive gas mixtures in the waste gas holdup system. The operability and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

TABLE 3.5.5-1
LIQUID EFFLUENT MONITORING INSTRUMENTATION
OPERATING CONDITIONS

	INSTRUMENT	A MINIMUM OPERABLE CHANNELS	B OPERATOR ACTION IF MINIMUM NUMBER OF OPERABLE CHANNELS IS NOT MET
1.	Liquid Radwaste Effluent Line Monitor (RIA - 33)	1	(a)
2.	Turbine Building Sump (RIA -54)		
	Unit 1, 2	1	(b)
	Unit 3	1	(b)
3.	Liquid Radwaste Effluent Line Flow rate	1	(c)
4.	Waste Oil Collection Basin Composite Sampler and Sampler Flow Monitor	1	(d)

(a) Effluent releases may continue for up to 14 days, provided that prior to initiating a release:

1. Two independent samples are analyzed in accordance with Specification 3.9 and;

2. Two independent valve lineup verifications of the effluent pathway are conducted.

Otherwise, suspend release of radioactive effluents by this pathway.

(b) Effluent releases may continue for up to 14 days, provided that prior to batch release of the sump, grab samples are collected and analyzed for gross radioactivity at a lower limit of detection of at least 10^{-7} μCi/ml.

(c) Effluent releases may continue for up to 14 days provided flow rate is estimated at least once per four hours during actual releases.

(d) Effluent releases may continue provided that daily grab samples are collected and analyzed for gross radioactivity at a lower limit of detection of at least 10^{-7} μCi/ml.

TABLE 3.5.5-2
GASEOUS PROCESS AND EFFLUENT
MONITORING INSTRUMENTATION
OPERATING CONDITIONS

INSTRUMENT	A MINIMUM OPERABLE CHANNELS	B OPERATOR ACTION IF MINIMUM NUMBER OF OPERABLE CHANNELS IS NOT MET
1. Waste Gas Holdup Tanks (Unit 1, 2, system or Unit 3 system)		
a. Noble Gas Activity Monitor (RIA-37)	1	(a)
b. Effluent Flow Rate Monitor	1	(b)
c. Hydrogen Monitor	1	(c)
2. Containment Monitoring System		
a. Noble Gas Activity Monitor (RIA - 49)	1	(d)
b. Iodine Sampler	1	(e)
c. Particulate Sampler	1	(e)
d. Containment Purge Flow Rate Monitor	1	(b)
e. Sampler Flow Rate Monitor	1	NA
3. Unit Vent Monitoring System		
a. Noble Gas Activity Monitor (RIA - 45)	1	(d)
b. Iodine Sampler	1	(e)
c. Particulate Sampler	1	(e)
d. Effluent Flow Rate Monitor	1	(b)
e. Sampler Flow Rate Monitor	1	NA

INSTRUMENT	MINIMUM OPERABLE CHANNELS	OPERATOR ACTION IF MINIMUM NUMBER OF OPERABLE CHANNELS IS NOT MET
4. Condenser Air Ejector Monitoring Equipment		
a. Noble Gas Activity Monitor (RIA - 40)	1	(d)
b. Effluent Flow Rate Monitor	1	NA
5. Interim Radwaste Building Ventilation Monitoring System		
a. Noble Gas Activity Monitor (RIA - 53)	1	(d)

TABLE 3.5.5-2 NOTES

(a) Effluent releases may continue for up to 28 days provided that prior to initiating a release:

1. Two independent samples are analyzed and;

2. Two independent valve lineup verifications of the effluent pathway are conducted and;

3. The Unit Vent gas monitor is operable and the channel alarm setpoints are set to assure that the limits of Specification 3.10.1 are met.

Otherwise, suspend release of radioactive effluents via this pathway.

(b) Effluent releases may continue for up to 28 days provided the flow rate is estimated at least once per 4 hours.

(c) If the hydrogen monitoring instrumentation is in operable, it shall be returned to an operable status within 7 days. Otherwise, the waste gas tank on service shall be sampled every 3 days and all other waste gas tanks not in service shall be sampled every 7 days.

(d) Effluent releases may continue for up to 28 days provided grab samples are taken daily and these samples are analyzed for gross activity within 24 hours.

(e) Effluent releases may continue for up to 28 days, provided samples are continuously collected with auxiliary sampling equipment for periods of 7 days and analyzed within 48 hours of the end of sample collection.

3.9 RADIOACTIVE LIQUID EFFLUENTS

Applicability

Applies to the controlled release of all liquid waste discharged from the station which may contain radioactive materials.

Objective

To establish conditions for the controlled release of radioactive liquid effluents to assure that the dose or dose commitment to an individual from such releases during any calendar year shall not exceed 9 mrem to the total body or 30 mrem to any organ.

Specification

3.9.1 Concentration

a. The concentration of radioactive material released at anytime from the site to unrestricted areas (denoted in Figure 3.9-1) shall be limited to the concentration specified in 10 CFR Part 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 2×10^{-4} μCi/ml total activity.

b. If the concentration of radioactive material released from the site to unrestricted areas exceed the above limits, promptly restore concentration to within the above limits and notify the regional NRC Office of Inspection and Enforcement of the occurrence.

c. The concentration of radioactive material in liquid effluents released from the site shall be monitored in accordance with Table 4.1-4.

3.9.2 Liquid Effluent Monitors with Automatic Termination Capability

The liquid effluent monitors having provisions for automatic termination of liquid releases shall be used to limit the concentration of radioactive material released from the site to unrestricted areas to the values given in Specification 3.9.1.

3.9.3 Dose

a. The dose or dose commitment to an individual from radioactive materials in liquid effluents to unrestricted areas shall be limited during any calendar quarter to:

$\leq$ 4.5 mrem to the whole body
$\leq$ 15 mrem to any organ and;

b. If the calculated dose from the release of radioactive materials in liquid effluents exceeds any of the above limits, a report shall be submitted within 30 days to the regional NRC Office of Inspection and Enforcement which includes the following:

1. Cause(s) for exceeding the limit(s)

2. Corrective actions to be taken to reduce the releases of radioactive materials in liquid effluents during the remainder of the current calendar quarter and during the remaining quarters of the calendar year.

3. Results of radiological analyses of the drinking water source.

3.9.4 Liquid Waste Treatment

a. The appropriate subsystems of the liquid radwaste treatment system shall be used to reduce the radioactive materials in liquid waste prior to their discharge, if the projected dose due to liquid effluent releases to unrestricted areas, when averaged over 31 days would exceed 0.72 mrem to the total body or 2.4 mrem to any organ.

b. If radioactive liquid waste is discharged without treatment and in excess of the above limit, a report shall be submitted within 30 days to the regional NRC Office of Inspection and Enforcement which includes the following:

1. Cause of equipment or subsystem inoperability.

2. Corrective action to restore equipment and prevent recurrence.

3.9.5 Chemical Treatment Ponds

a. The quantity of radioactive material in the Chemical Treatment Ponds (CTP) shall be limited so that, for all radionuclides identifed, excluding noble gases, the sum of the ratios of activity (in curies) to the limits in 10CFR20, Appendix B, Table II, Column 2 shall not exceed 1.7×10^5.

$$\sum_j \frac{Aj}{Cj} < 1.7 \times 10^5$$

where Aj = pond inventory limit for single radionuclide 'j' (curies)

Cj = 10CFR20, Appendix B, Table II, Column 2, concentration for single radionuclide 'j' (curies)

b. After a primary to secondary leak is detected, the initial batch of used Powdex resin shall not be transferred to the CTP. No batch of used powdex resin shall be transferred to the CTP unless the sum of the ratios of the activity of the radionuclides identified in the preceeding batch from any powdex cell in the same unit is less than 0.1% of the limit identified in 3.9.6.a.

$$\sum_j \frac{Qj}{Aj} < 10^{-3}$$

where Qj = radionuclide activity in the batch

Aj = pond inventory limit for radionuclide 'j'

c. The radionuclide inventory per batch of used powdex resin transferred, averaged over the transfers of the previous 13 weeks, shall not exceed 0.01% of the pond radionuclide inventory limit. If this average exceeds 0.01% of the pond radionuclide inventory limit, then a report will be submitted within 30 days to the Regional NRC Office of Inspection and Enforcement describing the reason or reasons for exceeding the objective and plans for future operation. Decay of radionuclides may be taken into account in determining inventory levels.

$$\frac{Qj_1 + Qj_2 + \ldots Qj_{(n-1)} + Qjn}{n} \leq .01\% \times Aj$$

where Qj = activity of radionuclide 'j' in the batch

n = number of batches transferred to the chemical treatment ponds during the previous 13-week period.

Bases

The concentration specification is provided to ensure that the concentration of radioactive materials released in liquid waste effluents from the site to unrestricted areas will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II. The concentration limit for noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

The dose specification is provided to assure that the releases of radioactive material in liquid effluents will be kept "as low as is reasonably achievable". Also, for fresh water sites with drinking water supplies which can be potentially affected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40 CFR 141. The dose calculations in the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I is to be shown by calculational procedures based on models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated.

For units with shared radwaste treatment systems, the liquid effluents from the shared system are proportioned among the units sharing that system.

The requirements that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable". This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and design objective Section 11.D of Appendix A to 10 CFR Part 50.

The inventory limits of the chemical treatment ponds are based on limiting the consequences of an uncontrolled release of the pond inventory. The short term rate limit (2 mrem/hr) of 10CFR20.105 is applied to 10CFR20.106 in the following expression:

$$\frac{\frac{Aj}{1.3 \times 10^6 \text{ gal}} \times \frac{10^6 \ \mu Ci}{\text{curie}} \times \frac{\text{gal}}{3786 \text{ ml}}}{} \leq \frac{2 \text{ mrem/hr}}{500 \text{ mrem/yr}} \times \frac{8760 \text{ hr}}{\text{yr}}$$

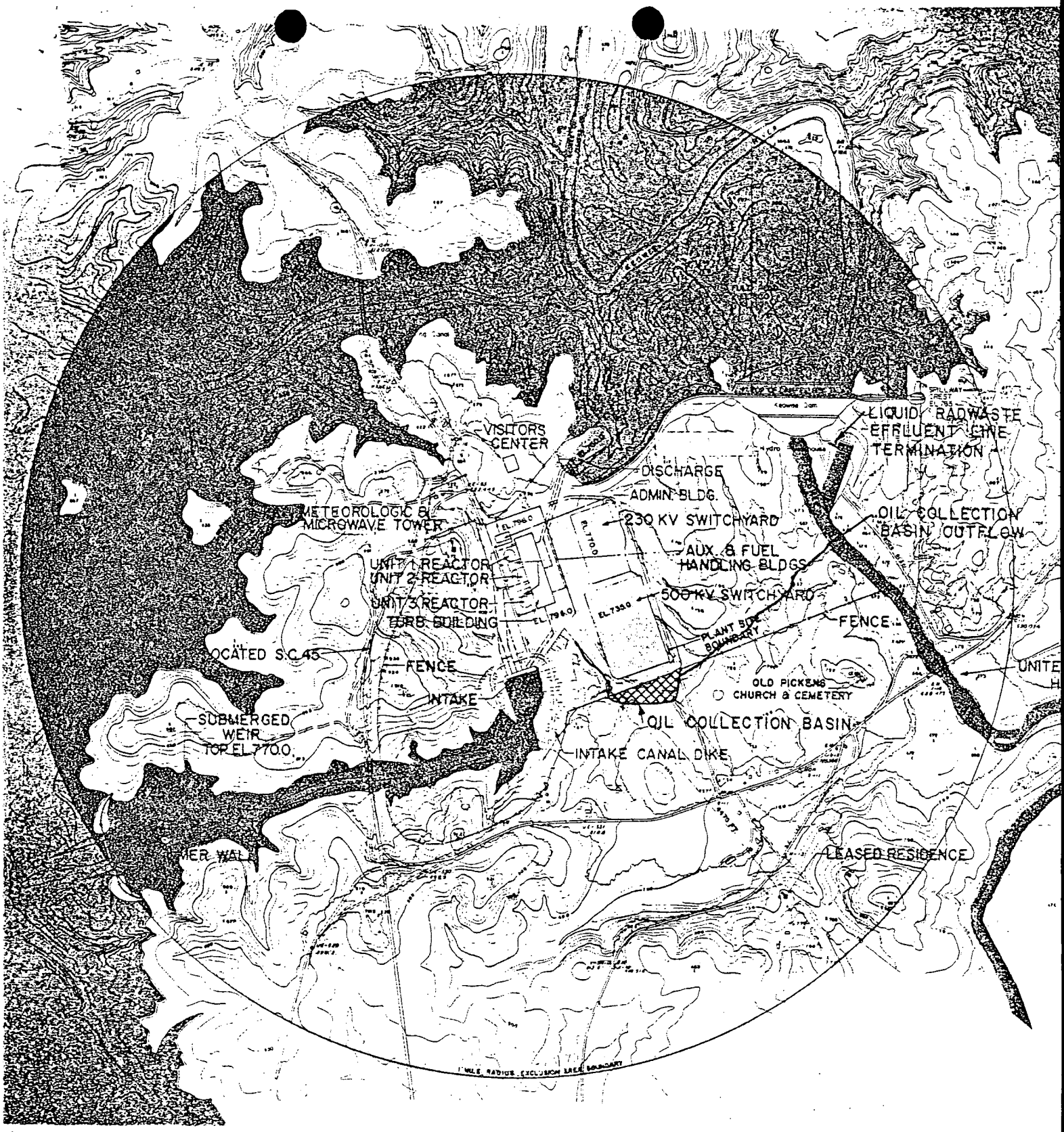
$$\sum_{Cj} \frac{Aj}{Cj} \leq 1.7 \times 10^5$$

where Aj = pond inventory limit for radionuclide 'j' (curies)

Cj = 10CFR20 Appendix B, Table II, Column 2-concentration for radionuclide 'j'

1.3×10^6 gal = estimated volume of smaller chemical treatment pond

The batch limits provide assurance that activity input to the CTP will be minimized.



EXCLUSION AREA

OCONEE NUCLEAR STATION

Figure 3.9-1

3.10 RADIOACTIVE GASEOUS EFFLUENTS

Applicability

Applies to the controlled release of all gaseous waste discharged from the station which may contain radioactive materials.

Objective

To establish conditions for the controlled release of radioactive gaseous effluents to assure that:

1) The air dose in unrestricted areas due to noble gases released in gaseous effluents during any calendar year shall not exceed 30 mrad for gamma radiation or 60 mrad for beta radiation.

2) The dose to an individual from radioiodines, radioactive materials in particulate form, and radionuclides other than noble gases with half-lives greater than 8 days in gaseous effluents released to unrestricted areas during any calendar quarter shall not exceed 45 mrem to any organ.

Specifications

3.10.1 Dose Rate

a. The instantaneous dose rate at the exclusion area boundary (Figure 3.9-1) due to radioactive materials released in gaseous effluents from the site shall be limited to the following values:

1. The dose rate limit for noble gases shall be

$\leq$ 500 mrem/yr to the total body

$\leq$ 3000 mrem/yr to the skin and;

2. The dose rate limit for all radioiodines and for all radioactive materials in particulate form and radionuclides other than noble gases with half-lives greater than 8 days shall be $\leq$ 1500 mrem/yr to any organ.

b. If the dose rate exceeds the above limits, promptly decrease the release rate to within the above limits and notify the regional NRC office of Inspection and Enforcement of the occurrence.

3.10.2 Release Rate

The release rate of noble gases in gaseous effluents shall be controlled by the offsite dose rate of Specification 3.10.1.

3.10.3 Noble Gas Effluent Monitors with Automatic Termination Capability

The noble gas effluent monitors having provisions for automatic termination of gaseous releases, shall be used to limit offsite doses to within the values established in Specification 3.10.1 when the monitor setpoint values are exceeded.

3.10.4 Determination of Dose Rate and Release Rate

The release rate of radioactive materials, other than noble gases, in gaseous effluents and the dose rate in unrestricted areas due to gaseous effluents, shall be determined in accordance with the sampling program of Specifications 4.1.

3.10.5 Dose

a. The air dose in unrestricted areas due to noble gases released in gaseous effluents shall be limited during any calendar quarter to:

$\leq$ 15 mrad for gamma radiation
$\leq$ 30 mrad for beta radiation

b. The dose to an individual from radioiodines, radioactive materials in particulate form, and radionuclides other than noble gases with half-lives greater than 8 days in gaseous effluents released to unrestricted areas, shall be limited during any calendar quarter to:

$\leq$ 22.5 mrem to any organ

c. If the calculated dose from these gaseous effluents exceeds any of above limits, a report shall be submitted within 30 days to the regional NRC Office of Inspection and Enforcement which includes the following:

1. Cause(s) for exceeding the limit(s)

2. Corrective action to be taken to reduce the releases of these radioactive materials in gaseous effluents during the remainder of the current calendar quarter and during the remaining quarters of the calendar year.

3.10.6 Gaseous Radwaste Treatment

a. The gaseous radwaste treatment system shall be used to reduce the noble gases in gaseous wastes prior to their discharge, if the projected gaseous effluent air doses due to gaseous effluent releases to unrestricted areas, when averaged over 31 days exceeds 2.4 mrad for gamma radiation and 4.8 mrad for beta radiation.

b. High efficiency particulate filters and charcoal filters where available shall be used to reduce radioactive materials other than noble gases in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases to unrestricted areas when averaged over 31 days would exceed 3.6 mrem to any organ.

c. If radioactive gaseous waste is discharged without treatment for more than 31 days and in excess of the above limits, a report shall be submitted within 30 days to the regional NRC Office of Inspection and Enforcement which includes the following:

1. Cause of equipment or subsystems inoperability

2. Corrective action to restore equipment and prevent recurrence

3.10.7 Explosive Gas Mixture

a. The concentration limit of hydrogen in the waste gas holdup tanks is 2% by volume.

b. If the concentration of hydrogen in the waste gas hold up tanks exceeds 2% by volume but is less than or equal to 4% by volume, then within 48 hours, reduce the concentration of hydrogen to within the limit.

c. If the concentration of hydrogen in the waste gas holdup tanks exceeds 4% by volume, then promptly suspend all additions of waste gases to the tank and, within 48 hours, reduce the concentration of hydrogen to within the limit.

3.10.8 Gas Storage Tanks

a. The quantity of radioactivity contained in each gas storage tank shall be limited to $\leq$ 3.8 E + 05 curies noble gases (considered as Xe-133).

b. Daily, when radioactive materials are being added to a gas storage tank, the quantity of radioactive material contained in the tank being filled shall be determined.

c. If the quantity of radioactive material in any gas storage tank exceeds the above limit, promptly suspend all additions of radioactive material to the tank and within 48 hours, reduce the tank contents to within the above limit.

Bases

Specification 3.10.1 is provided to assure that the dose rate at anytime at the exclusion area boundary from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20 for unrestricted areas. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of an individual in an unrestricted area, either within or outside the exclusion area boundary, to annual average concentrations exceeding the limits specified in Appendix B, Table 11 of 10 CFR Part 20 (10 CFR Part 20.106(b)). For individuals who may at times be within the exclusion area boundary, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the exclusion area boundary. The specified release rate limits restrict, at

all times, the corresponding gamma and beta dose rates above background to an individual at or beyond the exclusion area boundary to $\leq$ (500) mrem/year to the total body or to $\leq$ (3000) mrem/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to an infant via the cow-milk-infant pathway to $\leq$ 1500 mrem/year for the nearest cow to the plant.

For units which shared radwaste treatment systems, the gaseous effluents from the shared system are proportioned among the units sharing that system.

Specification 3.10.3 is provided to implement the requirements of Appendix I, 10 CFR Part 50. The specification provides the required operating flexibility and at the same time implement the guides set forth in Appendix I to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable". Surveillance requirements are implemented to meet the requirements of Appendix I. Calculational procedures based on models and data show that the actual exposure of an individual through the appropriate pathways is unlikely to be substantially underestimated.

The ODCM calculational methods for calculating the doses due to the actual release rates of the subject materials will be consistent with the methodology provided in Regulatory Guide 1.109, "Calculating of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision I, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors,"

Equations in the ODCM are provided for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for radioiodines, radioactive material in particulate form and radionuclides other than noble gases are dependent on the existing radionuclide pathways to man, in the unrestricted area. The pathways which are examined in the development of these calculations are: 1) individual inhalation of airborne radionuclides, 2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, 3) deposition onto grassy areas where milk animals and meat producing animals graze with consumption of the milk and meat by man, and 4) deposition on the ground with subsequent exposure of man.

The requirement that the appropriate portions of these systems be used when specified provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and design objective Section IID of Appendix I to 10 CFR Part 50.

Specification 3.10.7 is provided to assure that the concentration of potentially explosive gas mixtures contained in the waste gas treatment system is maintained below the flammability limits of hydrogen and oxygen. Maintaining the concentration of hydrogen below the flammability limit provides assurance that the releases of radioactive materials will be controlled in conformance with the requirements of General Design Criterion 60 of Appendix A to 10 CFR Part 50.

Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that in the event of an uncontrolled release of the tanks contents, the resulting total body exposure to an individual at the nearest exclusion area boundary will not exceed 0.5 rem.

4.1 OPERATIONAL SAFETY REVIEW

Applicability

Applies to items directly related to safety limits and limiting conditions for operation.

Objective

To specify the frequency and type of surveillance to be applied to unit equipment and conditions.

Specification

4.1.1 The frequency and type of surveillance required for Reactor Protective System and Engineered Safety Feature Protective System instrumentation shall be as stated in Table 4.1-1.

4.1.2 The frequency and type of surveillance required for selected equipment shall be as stated in Table 4.1-2.

4.1.3 Required sampling should be performed as detailed in Table 4.1-3.

4.1.4 The frequency and type of surveillance required for radioactive effluent monitoring instrumentation shall be as stated in Table 4.1-4.

4.1.5 Using the Incore Instrumentation System, a power map shall be made to verify expected power distribution at periodic intervals not to exceed ten effective full power days.

Bases

Failures such as blown instrument fuses, defective indicators, and faulted amplifiers which result in "upscale" or "downscale" indication can be easily recognized by simple observation of the functioning of an instrument or system. Furthermore, such failures are, in many cases, revealed by alarm or annunciator action. Comparison of output and/or state of independent channels measuring the same variable supplements this type of built-in surveillance. Based on experience in operation of both conventional and nuclear systems, when the unit is in operation, the minimum checking frequency stated is deemed adequate for reactor system instrumentation.

Calibration is performed to assure the presentation and acquisition of accurate information. The nuclear flux (power range) channels amplifiers are calibrated (during steady-state operating conditions) when core thermal power exceeds indicated neutron power by more than two percent. During non-steady-state operation, the nuclear flux channels amplifiers are calibrated daily to compensate for instrumentation drift and changing rod patterns and core physics parameters.

Channels subject only to "drift" errors induced within the instrumentation itself can tolerate longer intervals between calibrations. Process system instrumentation errors induced by drift can be expected to remain within acceptable tolerances if recalibration is performed at the intervals specified.

Substantial calibration shifts within a channel (essentially a channel failure) are revealed during routine checking and testing procedures. Thus, the minimum calibration frequencies set forth are considered acceptables.

Periodic use of the Incore Instrumentation System for power mapping is sufficient to assure that axial and radial power peaks and the peak locations are controlled in accordance with the provisions of the Technical Specifications.

REFERENCE

(1) FSAR, Section 7.1.2.3.4

TABLE 4.1-1 (Continued)

Channel Description	Check	Test	Calibrate	Remarks
20. Reactor Building Spray System Logic	NA	MO	NA	
21. Reactor Building Spray System Analog Channel - Reactor Building High Pressure	NA	MO	AN	
22. Pressurizer Temperature	ES	NA	AN	
23. Control Rod Absolute Position	ES(1)	NA	AN(2)	(1) Check with Relative Position Indicator. (2) Calibrate rod misalignment channel.
24. Control Rod Relative Position	ES(1)	NA	AN(2)	(1) Check with Absolute Position Indicator. (2) Calibrate rod misalignment channel.
25. Core Flood Tanks				
a. Pressure	ES	NA	AN	
b. Level	ES	NA	AN	
26. Pressurizer Level	ES	NA	AN	
27. Letdown Storage Tank	DA	NA	AN	
28. Delete				
29. High and Low Pressure Injection Systems Flow Channels	NA	NA	AN	

TABLE 4.1-3

Minimum Sampling Frequency

Item	Check	Frequency
1. Reactor Coolant	a. Gamma Isotopic Analysis	a. Monthly*
	b. Radiochemical Analysis for Sr 89, 90	b. Monthly*
	c. Tritium	c. Monthly*
	d. Gross Beta & Gamma Activity (1)	d. 5 times/week*
	e. Chemistry (Cl, F and 02)	e. 5 times/week*
	f. Boron Concentration	f. 2 times/week**
	g. Gross Alpha Activity	g. Monthly*
	h. E Determination (2)	h. Semi-annually
2. Borated Water Storage Tank Water Sample	Boron Concentration	Weekly* and after each makeup
3. Core Flooding Tank	Boron Concentration	Monthly* and after each makeup
4. Spent Fuel Pool Water Sample	Boron Concentration	Monthly*** and after each makeup
5. Secondary Coolant	a. Gross Beta & Gamma Activity	a. Weekly*
	b. Iodine Analysis (3)	
6. Concentrated Boric Acid Tank	Boron Concentration	Twice weekly*

*Not applicable if reactor is in a cold shutdown condition for a period exceeding the sampling frequency.
**Applicable only when fuel is in the reactor.
***Applicable only when fuel is in wet storage in the spent fuel pool.

TABLE 4.1-3 Continued

Minimum Sampling Frequency

	Item		Check		Frequency		Lower Limit of Dectection[5] of Lab Analysis for Waste
7.	Low Activity Waste Tank, Condensate Test Tank, Condensate Monitoring Tank, Laundry-Hot Shower Tank	a.	Principal Gamma Emitters[6] including Dissolved Noble Gases	a.	Prior to release of each batch	a.	Gamma Nuclides $<5\times10^{-7}$ µCi/ml Dissolved Gases $<10^{-5}$ µCi/ml
		b.	Radiochemical Analysis Sr 89, 90	b.	Monthly	b.	$<10^{-8}$ µCi/ml
		c.	Tritium	c.	Monthly	c.	$<10^{-5}$ µCi/ml
		d.	Gross Alpha Activity	d.	Monthly	d.	$<10^{-7}$ µCi/ml
8.	Waste Gas Decay Tank	a.	Principal Gamma Emitters[6]	a.	Prior to release of each batch	a.	$<10^{-4}$ µCi/cc (gases) $<10^{-10}$ µCi/cc (particulates and iodines)
		b.	Tritium	b.	Prior to release of each batch	b.	$<10^{-6}$ µCi/cc
9.	Unit Vent Sampling	a.	Iodine Spectrum [4]	a.	Weekly	a.	$<10^{-10}$ µCi/cc
		b.	Particulates[4]				
			1) Principal Gamma Emitters[6]		1) Weekly Composite		1) $<10^{-10}$ µCi/cc
			2) Gross Alpha Activity		2) Quarterly on a sample of one week duration		2) $<10^{-11}$ µCi/cc
			3) Radiochemical Analysis Sr 89,90		3) Quarterly Composite		3) $<10^{-11}$ µ Ci/cc
		c.	Gases by Principal Gamma Emitters(6)	c.	Weekly	c.	$<10^{-4}$ µCi/cc

TABLE 4.1-3 Continued

Minimum Sampling Frequency

	Item	Check	Frequency	Lower Limit of Dectection[5] of Lab Analysis for Waste
10.	Keowee Hydro Dam Dilution Flow	Measure Leakage Flow Rate	Annually	
11.	Condenser Air Ejector Partition Factor	Measure Iodine Partition Factor in Condenser	One time if and when primary to secondary leaks develop	
12.	Reactor Building	a. Principal Gamma Emitters[6]	a. Each Purge	a. $<10^{-4}$ µCi/cc (gases) $<10^{-10}$ µCi/cc (particulates and iodines)
		b. Tritium	b. Each Purge	b. $<10^{-6}$ µCi/cc

(1) When radioactivity level is greater than 10 percent of the limits of Specification 3.1.4, the sampling frequency shall be increased to a minimum of once each day.

(2) $\bar{E}$ determination will be started when gross beta-gamma activity analysis indicates greater than 10 µCi/ml and will be redetermined for each 10 µCi/ml increase in gross beta-gamma activity analysis thereafter. A radiochemical analysis for this purpose shall consist of a quantitative measurement of 95 percent of the radionuclides in the reactor coolant with half lives greater than 30 minutes. This is expected to consist of gamma isotopic analysis of the primary coolant, including dissolved gaseous activities, radiochemical analysis for Sr-89 and Sr-90, and tritium analysis.

TABLE 4.1-3 Continued

Minimum Sampling Frequency

(3) When gross activity increases by a factor of two above background, an iodine analysis will be made and performed thereafter when the gross beta-gamma activity increases by 10 percent.

(4) When the activity level exceeds 10 percent of the limits of Specification 3.9, the sampling frequency shall be increased to a minimum of once each day. This can be done by RIA-44 (Unit Vent Iodine Monitor). When the gross activity release rate exceeds one percent of the maximum release rate and the average gross activity release rate increased by 50 percent over the previous day, an analysis shall be performed for iodines and particulates. This can be done by RIA-44 (Unit Vent Iodine Monitor) and RIA-43 (Unit Vent Particulate Monitor).

(5) For certain radionuclides with low gamma yield or low energies, or for certain radionuclides mixtures, it may not be possible to measure radionuclides in concentrations near the lower limit of detection (LLD). Under these circumstances, the LLD may be increased inversely proportionally to the magnitude of the gamma yield (i.e., $5 \times 10^{-7}/I$, where I is the photon abundance expressed as a decimal fraction), but in no case shall the LLD, as calculated in this manner for a specific radionuclide, be greater than 10% of the MPC value specified in 10 CFR 20, Appendix B, Table II, Column 2.

(6) The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below the LLD for the analyses should not be reported as being present at the LLD level. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the semiannual Radioactive Effluent Release Report.

TABLE 4.1-4

RADIOACTIVE EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Liquid Radwaste Effluent Line	*	*	AN(3)	QU(1)
2. Turbine Building Sumps	DA*	MO	AN(3)	QU(2)
3. Waste Oil Collection Basin Out-Flow Sampler	DA	NA	NA	NA
4. Waste Gas Holdup Tanks				
a. Noble Gas Activity Monitor	PR*	PR	AN(3)	QU(1)
b. System Effluent Flow Rate Measuring Device	PR*	NA	AN	QU
c. Hydrogen Monitor	DA**	NA	QU(4)	NA
5. Containment Monitoring				
a. Noble Gas Activity Monitor	DA*	PR	AN(3)	QU(1)
b. Iodine Sampler	DA*	NA	NA	NA
c. Particulate Sampler	DA*	NA	NA	NA
d. Containment Purge Flow Rate Monitor	DA*	NA	AN	QU
e. Sampler Flow Rate Monitor	DA*	NA	AN	QU

TABLE 4.1-4

RADIOACTIVE EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
6. Unit Vent Monitoring				
a. Noble Gas Activity Monitor	DA*	MO	AN(3)	QU(2)
b. Iodine Sampler	DA*	NA	NA	NA
c. Particulate Sampler	DA*	NA	NA	NA
d. Effluent Flow Rate Monitor	DA*	NA	AN	QU
e. Sampler Flow Rate Sampler	DA*	NA	AN	QU
7. Condenser Air Ejector Monitoring				
a. Noble Gas Activity Monitor	DA*	MO	AN(3)	QU(2)
b. Effluent Flow Rate Monitor	DA*	NA	AN	QU
8. Interim Radwaste Building Ventilation Monitoring				
a. Noble Gas Activity Monitor	DA*	MO	AN(3)	QU(2)

*During releases via this pathway.
**During waste gas holdup system operation (treatment for primary system of gases)

Frequency Notation

DA - Daily
QU - Quarterly
MO - Monthly
AN - Annually
PR - Completed prior to each release
NA - Not Applicable

TABLE 4.1-4 (Continued)

TABLE NOTATION

(1) The channel functional test shall demonstrate automatic isolation of this pathway if the instrument indicates measured levels above the alarm/trip setpoint and;

(2) The channel functional test shall demonstrate that control room alarm annunciation occurs if the instrument indicates measured levels above the alarm/trip setpoint.

(3) The initial channel calibration for radioactivity measurement instrumentation shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) using standards that have been obtained from suppliers that participate in measurements assurance activities with NBS. These standards should permit calibrating the system over its intended range of energy and rate capabilities. For subsequent channel calibration, sources that have been related to the initial calibration should be used, at intervals of at least once per eighteen months. This can normally be accomplished during refueling outages.

(4) The channel calibration shall include the use of standard gas samples containing a nominal:

1. One volume percent hydrogen, balance nitrogen; and

2. Four volume percent hydrogen, balance nitrogen.

4.11 RADIOLOGICAL ENVIRONMENTAL MONITORING

Applicability

Applies to the surveillance of the station environ for radiation and radioactive materials attributable to station operation and effluent releases.

Specification

4.11.1 Radiological Environmental Monitoring Program

a. The radiological environmental monitoring samples shall be collected in accordance with Table 4.11-1 and shall be analyzed pursuant to the requirements of Tables 4.11-1, 4.11-2.

b. If the radiological environmental monitoring program is not conducted as required, a description of the reason for not conducting the program as required and plans to prevent a recurrence shall be included in the Annual Radiological Environmental Operating Report. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, or to malfunction of automatic sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period.

c. If milk samples become permanently unavailable from any of the required sample locations, a report shall be submitted within 30 days to the regional NRC Office of Inspection and Enforcement which identifies the cause of the unavailability of samples and identifies locations for obtaining replacement samples. The locations from which samples were unavailable may then be deleted from Table 4.11.1 provided the locations from which the replacement samples were obtained are added to the environmental monitoring program as replacement locations, if available.

d. Figure 4.11-1 shows the sample locations based on the initial census results. Actual locations may vary due to subsequent census results or other applicable conditions.

4.11.2 Land Use Census

a. A land use census shall be conducted and shall identify the location of the nearest milk animal and the nearest residence in each of the 16 meteorological sectors within a distance of five miles. Broad leaf vegetation sampling shall be performed at the site boundary in the direction sector with the highest D/Q in lieu of the garden census.

b. If a land use census identifies a location which yields a calculated dose or dose commitment greater than the values currently being calculated in Specification 4.21, then a report shall be submitted within 30 days to the regional NRC Office of Inspection and Enforcement identifying the new location.

c. If a land use census identifies a location which yields a calculated dose or dose commitment (via the same exposure pathway) greater than at a location from which samples are currently being obtained pursuant to Specification 4.11.1, then a report shall be submitted within 30 days to the NRC Office of Inspection and Enforcement identifying the new location. The new location shall be added to the radiological environmental monitoring program within 30 days. The sampling location having the lowest calculated dose or dose commitment (via the same exposure pathway) may be deleted from this monitoring program after October 31 of the year in which this land use census was conducted.

d. The land use census shall be conducted annually between the dates of June 1 and October 1, by door-to-door survey, aerial survey, or by consulting local authorities.

4.11.3 Interlaboratory Comparison Program

a. Analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program which has been approved by the NRC.

b. If these analyses are not performed as required, report corrective actions in the Annual Radiological Environmental Operating Report.

Bases

The environmental monitoring program required by this specification provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of individuals resulting from the station operation. This monitoring program thereby supplements the radiological effluent monitoring program by verifying 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 program will be effective for at least the first three years of commercial operation. Following this period, program changes may be initiated based on operational experience.

The detection capabilities required by Table 4.11-1 are state-of-the-art for routine environmental measurements in industrial laboratories. The specified lower limits of detection correspond to less than the 10CFR50, Appendix I, design objective dose-equivalent of 15 mrem/year for atmospheric releases to the most sensitive organ and individual.

The land use census specification is provided to assure that changes in the use of unrestricted areas are identified and that modifications to the monitoring program are made if required by the results of this census.

The requirement for participation in an Interlaboratory Comparison Program is provided to assure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of a quality assurance program for environmental monitoring in order to demonstrate that the results are reasonably valid.

TABLE 4.11-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
1. AIRBORNE			
a. Radioiodine and Particulates	Location 023 - Site Boundary: SSW Sector Location 021 - Site Boundary: ENE Sector Location 036 - Highway 130: S Sector (1.7 mi) Location 038 - Keowee Key Resort: NNW Sector (1.7 mi) Location 037 - Tamassee D.A.R. School: NW Sector (9 mi) Control.	Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days.	Radioiodine canister. Gamma isotopic analysis for I-131 or each sample. Particul[redacted] sampler. Gamma isotopic analysis on each sample.
2. DIRECTION RADIATION			
	Location 023 - Site Boundary: SSW Sector Location 021 - Site Boundary: ENE Sector Location 020 - Site Boundary: N Sector Location 022 - Site Boundary: SSE Sector Location 024 - Site Boundary: SW Sector Location 036 - Highway 130: S Sector (1.7 mi) Location 038 - Keowee Key Resort: NNW Sector (1.7 mi) Location 031 - High Falls County Park: W Sector (2 mi) Location 035 - Lake Hartwell Access: ESE Sector (2 mi) Location 037 - Tamassee D.A.R. School: NW Sector (9 mi) Control	Continuous integration with collection at least once per 92 days.	Gamma dose on each dosimeter.
3. WATERBORNE			
a. Surface	Location 025 - Keowee Hydro Intake Control Location 026 - Hwy 183 Bridge	Composite* sample collected over a period of $\leq$ 31 days.	Gamma isotopic analysis of each composite sample by location. Tritium analysis of composite sample at least once per 92 days.

TABLE 4.11-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Locations**	Sampling and Collection Frequency	Type and Frequency of Analysis
b. Drinking	Location 027 - Seneca (Control) (6.7 mi) SW Location 028 - Clemson: (8.1 mi) SSE Location 029 - Anderson: (19 mi) SSE	Composite* sample collected over a period of ≤ 31 days.	Gross beta and gamma isotopic analysis of each composite sample. Tritium analysis of composite sample at least once per 92 days.
c. Sediment from Shoreline	Location 030 - Hwy 27 Bridge (4.2 mi) SSE Location 031 - High Falls County Park (Control)	At least once per 184 days.	Gamma isotopic analysis of each sample.
4. INGESTION			
a. Milk	Samples from milking animals in 3 locations within 3 miles having the highest dose potential. (Locations 032, 033, 034) 1 sample from milking animals at a control location. (Location 029.)	At least once per 15 days when animals are on pasture; at least once per 31 days at other times.	Gamma isotopic and I-131 analysis of each sample.
b. Fish	Location 026 - Lake Hartwell: ESE Sector-near Hwy 183 Location 025 - Lake Keowee: ENE Sector (Control)	At least once per 184 days. One sample of each of the following species: 1. Bass 2. Catfish	Gamma isotopic analysis on edible portion.
c. Broad-Leaf Vegetation	Location 023 - Site Boundary: SSW Sector Location 037 - Tamasse D.A.R. School: NW Sector (9 mi) Control	At least once per 31 days.	Gamma isotopic analysis.

*Composite samples shall be collected by collecting an aliquot at intervals not exceeding 2 hours.
**Sample locations are shown on Figure 4.11-1

TABLE 4.11-2

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)[a]

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg,wet)	Milk (pCi/l)	Food Products (pCi/kg,wet)	Sediment (pCi/kg,dry)
gross beta	4[b]					
^{3}H	2000					
^{54}Mn	15		130			
^{59}Fe	30		260			
$^{58,60}Co$	15		130			
^{65}Zn	30		260			
^{95}Zr-Nb	15					
^{131}I	15[c]	7×10^{-2}		1	60	
$^{134,137}Cs$	15,18	$5,6 \times 10^{-2}$	130,150	15,18	80	150
^{140}Ba-La	15			15		

TABLE 4.11-2 (Continued)

TABLE NOTATION

a - The LLD is the smallest concentration of radioactive material in a sample with a 95% probability of detection and with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ s_b}{E \cdot V \cdot 2.22 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

where

LLD is the lower limit of detection as defined above (as pCi per unit mass or volume)

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute)

E is the counting efficiency (as counts per transformation)

V is the sample size (in units of mass or volume)

2.22 is the number of transformation per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

λ is the radioactive decay constant for the particular radionuclide

Δt is the elapsed time between sample collection (or end of the sample collection period) and time of counting

The value of s_b used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples). Typical values of E, V, Y, and Δt should be used in the calculation.

TABLE 4.11-2 (Continued)

TABLE NOTATION

The LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as a posteriori (after the fact) limit for a particular measurement*.

Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interferring nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors will be identified and described in the Annual Radiological Environmental Operating Report.

b - LLD for drinking water.

c - The calculated dose from I-131 in drinking water at all locations is less than 1 mrem per year. Therefore, low level analyses will not be routinely performed. Low level I-131 analyses will be performed if abnormal releases occur which could reasonably result in 1 pCi/liter of I-131 in drinking water.

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*For a more complete discussion of the LLD, and other detection limits, see the following:

(1) HASL Procedures Manual, HASL-300 (revised annually).
(2) Currie, L.A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry" Anal. Chem. 40, 586-93 (1968).
(3) Hartwell, J. K., "Detection Limits for Radioisotopic Counting Techniques," Atlantic Richfield Hanford Company Report (ARH-2537 (June 22, 1972).

4.21 DOSE CALCULATIONS

Applicability

Applies to the projected and cummulative dose contributions from all radioactive liquid and gaseous effluents.

Specification

4.21.1 Dose From All Sources

a. The dose or dose commitment to an individual from all uranium fuel cycle sources shall not exceed 25 mrem to the whole body or any organ (except the thyroid, which shall not exceed 75 mrem) over a period of 12 consecutive months and shall be calculated using the methodology contained in the Offsite Dose Calculation Manual.

b. If the calculated dose from the release of radioactive materials in liquid or gaseous effluents exceeds twice the limits of Specifications 3.9.3, 3.10.5.a, or 3.10.5.b, then limit subsequent releases such that Specification 3.10.5.d is met and within 30 days submit a report to the regional NRC Office of Inspection and Enforcement which includes an analysis which demonstrates that radiation exposure to the critical individual from all uranium fuel cycle sources are within 40 CFR Part 190 requirements.

4.21.2 Dose Due to Liquid Effluents

a. Monthly, cummulative dose contributions from liquid effluents shall be determined in accordance with the Offsite Dose Calculation Manual.

4.21.3 Dose Due to Gaseous Effluents

a. Monthly, cummulative dose contributions from gaseous effluents shall be determined in accordance with the Offsite Dose Calculation Manual.

g. Any other area of station operation considered appropriate by the NSRB or the Vice President, Steam Production.

h. The station fire protection program and implementing procedures at least once per 24 months.

i. The Offsite Dose Calculation Manual and implementing procedures at least once per 24 months.

6.1.3.5 Responsibilities and Authorities

a. The NSRB shall report to and advise the Vice President, Steam Production on those areas of responsibility specified in Specifications 6.1.3.3 and 6.1.3.4.

b. Minutes shall be prepared and forwarded to the Vice President, Steam Production, and to the Senior Vice President, Production and Transmission, within 14 days following each formal meeting of the NSRB.

c. Records of activities performed in accordance with Specifications 6.1.3.3 and 6.1.3.4 shall be maintained.

d. Audit reports encompassed by Section 6.1.3.4 shall be forwarded to the Vice President, Steam Production, and to the Senior Vice President, Production and Transmission and to the management positions responsible for the areas audited within 30 days of completion of each audit.

6.4 STATION OPERATING PROCEDURES

Specification

6.4.1

The station shall be operated and maintained in accordance with approved procedures. Written procedures with appropriate check-off lists and instructions shall be provided for the following conditions:

a. Normal startup, operation, and shutdown of the complete facility and of all systems and components involving nuclear safety of the facility.

b. Refueling operations.

c. Actions taken to correct specific and foreseen potential malfunctions of systems or components involving nuclear safety and radiation levels, including responses to alarms, suspected primary system leaks and abnormal reactivity changes.

d. Emergency procedures involving potential or actual release of radioactivity.

e. Preventive or corrective maintenance which could affect nuclear safety or radiation exposure to personnel.

f. Station survey following an earthquake.

g. Personnel radiation protection procedures.

h. Operation of radioactive waste management systems.

i. Control of pH in recirculated coolant after loss-of-coolant accident. Procedure shall state that pH will be measured and the addition of appropriate caustic to coolant will commence within 30 minutes after switchover to recirculation mode of core cooling to adjust the pH to a range of 7.0 to 8.0 within 24 hours.

j. Nuclear safety-related periodic test procedures.

k. Long-term emergency core cooling systems. Procedures shall include provision for remote or local operation of system components necessary to establish high and low pressure injection within 15 minutes after a line break.

l. Fire Protection Program implementation.

m. Offsite Dose Calculation Manual

6.4.2

Quarterly selected drills shall be conducted on site emergency procedures including assembly preparatory to evacuation off site and a check of the adequacy of communications with off-site support groups.

6.4.3

A respiratory protective program approved by the Commission shall be in force.

h. By-product material inventory records.

i. Minutes of Nuclear Safety Review Board meetings.

j. Training records.

k. Test results, in units of microcuries, for leak tests performed pursuant to Specification 4.16.

l. Radioactive liquid effluent, gaseous effluent, and gaseous process monitoring instrumentation alarm/trip setpoints.

6.6 STATION REPORTING REQUIREMENTS

6.6.1 Routine Reports

In addition to the applicable reporting requirements of Title 10, Code of Federal Regulations, the following reports shall be submitted to the Director of the Office of Inspection and Enforcement, Region II unless otherwise noted.

6.6.1.1 Startup Report

A summary report of unit startup and power escalation testing shall be submitted following (1) receipt of an operating license, (2) amendment to the facility license involving a planned increase in power level, (3) installation of fuel that has a different design or has been manufactured by a different fuel supplier, and (4) modifications that may have significantly altered the nuclear, thermal, or hydraulic performance of the unit. Startup reports shall be submitted (1) within 90 days following completion of the startup test program, (2) 90 days following resumption or commencement of commercial power operation, or (3) nine months following initial criticality, whichever occurs first. If a startup report does not cover all three events, i.e., initial criticality, completion of the startup test program and resumption or commencement of commercial power operation supplementary reports shall be submitted at least every three months until all three events are completed.

6.6.1.2 Monthly Operating Report

Routine reports of operating statistics and shutdown experience shall be submitted on a monthly basis to the Director, Office of Management Information and Program Control, U.S. Nuclear Regulatory Commission, Washington, D.C., 20555, with a copy to the appropriate Regional Office, to be submitted by the fifteenth of each month following the calendar month covered by the report.

6.6.1.3 Personnel Exposure and Monitoring Report

Prior to March 1 of each year, a tabluation shall be submitted to the NRC of the number of station, utility and other personnel (including contractors) receiving exposures greater than 100 mrem/yr and their associated man-rem exposure according to work and job functions, e.g., reactor operations and surveillance, inservice inspection, routine maintenance, special maintenance (describe maintenance), waste processing, and refueling. The dose assignment to various duty functions may be estimates based on pocket dosimeter, TLD, or film badge measurements. Small exposures totalling less than 20% of the individual total dose need not be accounted for. In the aggregate, at least 80% of the total whole body dose received from external sources shall be assigned to specific major work functions.

6.6.1.4 Radioactive Effluent Release Report

Routine radioactive effluent release reports covering the operating of the unit during the previous 6 months of operation shall be submitted within 60 days after January 1 and July 1 of each year.

The radioactive effluent release reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the station.

The radioactive effluent release reports shall include a summary of the meteorological conditions concurrent with the release of gaseous effluents during each quarter.

The radioactive effluent release reports shall include an assessment of the radiation doses from radioactive effluents to individuals due to their activities inside the unrestricted area boundary during the report period. All assumptions used in making these assessments (e.g., specific activity, exposure time and location) shall be included in these reports.

The radioactive effluent release reports shall include the following information for all unplanned releases to unrestricted areas of radioactive materials in gaseous and liquid effluents:

a. A description of the event and equipment involved.

b. Cause(s) for the unplanned release.

c. Actions taken to prevent recurrence.

d. Consequences of the unplanned release.

The radioactive effluent release reports shall include an assessment of radiation doses from the radioactive liquid and gaseous effluents released from the station during each calendar quarter. In addition, the unrestricted area boundary maximum noble gas gamma air and beta air doses shall be evaluated. The meteorological conditions concurrent with the releases of effluents shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the Offsite Dose Calculation Manual.

The radioactive effluent release reports shall include the following information for each type of solid waste shipped offsite during the report period:

a. container volume,

b. total curie quantity (determined by measurement or estimate),

c. principal radionuclides (determined by measurement or estimate),

d. Type of waste (e.g., spent resin, compacted dry waste evaporator bottoms),

e. type of container (e.g., LSA, Type A, Type B, Large Quantity), and

f. Solidification agent (e.g., cement, urea formaldehyde).

The radioactive effluent release reports shall include any changes to the Offsite Dose Calculation Manual during the reporting period.

6.6.1.5 Radiological Environmental Monitoring

Routine radiological environmental operating reports covering the operation of the unit during the previous calendar year shall be submitted prior to May 1 of each year.

The annual radiological environmental operating reports shall include summaries, interpretations, and statistical evaluation of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of the land use censuses required by Specification 4.11. If harmful effects are detected by the monitoring, the report shall provide an analysis of the problem and a planned course of action to alleviate the problem.

The annual radiological environmental operating reports shall include summarized and tabluated results of the radiological environmental samples required by Specification 4.11 taken during the report period. In the event that some results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The initial report shall also include the following: a summary description of the radiological environmental monitoring program including sampling methods for each sample type, size and physical characteristics of each sample type, sample preparation methods, analytical methods, and measuring equipment used; a map of all sampling locations keyed to a table giving distances and directions from one reactor; and the result of land use censuses required by Specification 4.11. Subsequent reports shall describe all substantial changes in these aspects.

b. Thirty-Day Written Reports

The types of events listed below shall be the subject of written reports to the Director, Office of Inspection and Enforcement, Region II, within 30 days of discovery of the event. (Copy to the Director, Office of Management Information and Program Control.)

(1) Reactor protection system or engineered safety feature instrument settings which are found to be less conservative than those established by the technical specifications but which do not prevent the fulfillment of the functional requirements of affected systems.

(2) Conditions leading to operation in a degraded mode permitted by a limiting condition for operation or shutdown required by a limiting condition for operation.

(3) Observed inadequacies in the implementation of administrative or procedural controls during operation of a unit which could cause reduction of degree of redundancy provided in the Reactor Protective System or Engineered Safety Feature Systems.

(4) Occurrence of radioactive material contained in liquid or gaseous holdup tanks in excess of that permitted by the limiting condition for operation established in the technical specifications.

(5) An unplanned offsite release of 1) more than 1 curie of radioactive material in liquid effluents, 2) more than 150 curies of noble gas in gaseous effluents, or 3) more than 0.05 curies of radioiodine in gaseous effluents. The report of an unplanned offsite release of radioactive material shall include the following information:

1. A description of the event and equipment involved.

2. Cause(s) for the unplanned release.

3. Actions taken to prevent recurrence.

4. Consequences of the unplanned release.

(6) Measured levels of radioactivity in an environmental sampling medium determined to exceed the reporting level values of Table 6.6-1 when averaged over any calendar quarter sampling period. When more than one of the radionuclides in Table 6.6-1 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{concentration (1)}}{\text{limit level (1)}} + \frac{\text{concentration (2)}}{\text{limit level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those in Table 6.6-1 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose to an individual is equal to or greater than the calendar year objectives of Specifications 3.9 and 3.10. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

TABLE 6.6-1

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Reporting Levels				
	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/Kg, wet)	Milk (pCi/l)	Vegetables (pCi/Kg, wet)
H-3	3×10^4				
Mn-54	1×10^3		3×10^4		
Fe-59	4×10^2		1×10^4		
Co-58	1×10^3		3×10^4		
Co-60	3×10^2		1×10^4		
Zn-65	3×10^2		2×10^4		
Zr-Nb-95	4×10^2				
I-131	2*	0.9		3	1×10^2
Cs-134	30	10	1×10^3	60	1×10^3
Cs-137	50	20	2×10^3	70	2×10^3
Ba-La-140	2×10^2			3×10^2	

*If low level I-131 analyses are performed.

6.6.3 Special Reports

Special reports shall be submitted to the Director, Office of Inspection and Enforcement, Region II, within the time period specified for each report. These reports shall be submitted covering the activities identified below pursuant to the requirements of the applicable reference specification:

a. Single Loop Operation Specification 3.1.8

b. Auxiliary Electrical Systems 3.7

c. Radioactive Liquid Effluents,
   Concentration, Specification 3.9.1
   Dose, Specification 3.9.3
   Liquid Waste Treatment, Specification 3.9.4
   Chemical Treatment Ponds, Specification 3.9.5

d. Radioactive Gaseous Effluents,
   Dose Rate, Specification 3.10.1
   Dose, Specification 3.10.5
   Gaseous Radwaste Treatment, Specification 3.10.6

e. Fire Protection and Detection Systems, Specification 3.17

f. Reactor Coolant System Surveillance,
   Inservice Inspection, Specification 4.2.4
   Reactor Vessel Speciman, Specification 4.2.8

g. Reactor Building Surveillance,
   Containment Integrated Leak Rate, Specification 4.4.1.1.7
   Annual Inspection Specification 4.4.1.4

h. Structural Integrity Surveillance,
   Tendon Stress, Specification 4.4.2.2
   End Anchorage Concrete, Specification 4.4.2.3
   Liner Plate, Specification 4.4.2.4

i. Radiological Effluent and Environmental Monitoring
   Program, Specification 4.11.1
   Land Use Census, Specification 4.11.2

j. Fuel Surveillance Program, Specification 4.13

6.7 OFFSITE DOSE CALCULATION MANUAL (ODCM)

6.7.1

The ODCM shall describe the methodology and parameters to be used in the calculation of offsite doses due to radioactive gaseous and liquid instrumentation alarm/trip setpoints consistent with the applicable LCO's contained in these Technical Specifications. Methodologies and calculational procedures acceptable to the Commission are contained in NUREG-0133.

The ODCM shall be submitted to the Commission at the time of proposed Radiological Effluent Technical Specifications and shall be subject to review and approval by the Commission prior to implementation.

6.7.2

Any changes to the ODCM shall be made by either of the following methods:

A. Licensee initiated changes:

1. Shall be submitted to the Commission by inclusion in the semi-annual Effluent Release Report for the period in which the change(s) was made and shall contain:

   a. sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information. Information submitted should consist of a package of those pages of the ODCM to be changed with each page numbered and provided with an approval and date box, together with appropriate analyses or evaluations justifying the change(s);

   b. a determination that the change will not reduce the accuracy or reliability of dose calculations or setpoint determinations; and

   c. documentation of the fact that the change has been reviewed and found acceptable by the station manager and the NSRB.

2. Shall become effective upon review and acceptance by both the station manager and the NSRB after confirmation of receipt unless otherwise acted upon by the Commission through written notification to the licensee.

B. Commission initiated changes:

1. Shall be determined by the station manager to be applicable to the facility after consideration of facility design.

2. The licensee shall provide the Commission with written notification of their determination of applicability including any necessary revisions to reflect facility design.

3. Shall be reviewed by the NSRB at its next regularly scheduled meeting.

ATTACHMENT 2

OCONEE NUCLEAR STATION
OFFSITE DOSE CALCULATION MANUAL

See Rpts