PROPOSED TECHNICAL SPECIFICATION CHANGES

ANO-1

TABLE OF CONTENTS

SECTION	TITLE	PAGE
3.14	HYDROGEN RECOMBINERS	66e
3.15	FUEL HANDLING AREA VENTILATION SYSTEM	66g
3.16	SHOCK SUPPRESSORS (SNUBBERS)	66i
3.17	FIRE SUPPRESSION WATER SYSTEM	66m
3.18	FIRE SUPPRESSION SPRINKLER SYSTEMS	66n
3.19	CONTROL ROOM AND AUXILIARY CONTROL ROOM HALON SYSTEMS	66o
3.20	FIRE HOSE STATIONS	66p
3.21	FIRE BARRIERS	66q
3.22	REACTOR BUILDING PURGE FILTRATION SYSTEM	66r
3.23	REACTOR BUILDING PURGE VALVES	66t
3.24	EXPLOSIVE GAS MIXTURE	66u
3.25	RADIOACTIVE EFFLUENTS	66v
3.25.1	Radioactive Liquid Holdup Tanks	66v
3.25.2	Radioactive Gas Storage Tanks	66w
4.	SURVEILLANCE REQUIREMENTS	67
4.1	OPERATIONAL SAFETY ITEMS	67
4.2	REACTOR COOLANT SYSTEM SURVEILLANCE	76
4.3	TESTING FOLLOWING OPENING OF SYSTEM	78
4.4	REACTOR BUILDING	79
4.4.1	Reactor Building Leakage Tests	79
4.4.2	Structural Integrity	85
4.5	EMERGENCY CORE COOLING SYSTEM AND REACTOR BUILDING COOLING SYSTEM PERIODIC TESTING	92
4.5.1	Emergency Core Cooling Systems	92
4.5.2	Reactor Building Cooling Systems	95
4.6	AUXILIARY ELECTRICAL SYSTEM TESTS	100
4.7	REACTOR CONTROL ROD SYSTEM TESTS	102
4.7.1	Control Rod Drive System Functional Tests	102
4.7.2	Control Rod Program Verification	104
4.8	EMERGENCY FEEDWATER PUMP TESTING	105
4.9	REACTIVITY ANOMALIES	106
4.10	CONTROL ROOM EMERGENCY AIR CONDITIONING AND ISOLATION SYSTEM SURVEILLANCE	107
4.11	PENETRATION ROOM VENTILATION SYSTEM SURVEILLANCE	109
4.12	HYDROGEN RECOMBINERS SURVEILLANCE	109b
4.13	EMERGENCY COOLING POND	110a
4.14	RADIOACTIVE MATERIALS SOURCES SURVEILLANCE	110b
4.15	AUGMENTED INSERVICE INSPECTION PROGRAM FOR HIGH ENERGY LINES OUTSIDE OF CONTAINMENT	110c

LIST OF FIGURES

1.10 Dose Equivalent I-131

The Dose Equivalent I-131 shall be the concentration of I-131 (microcurie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites."

1.11 Liquid Radwaste Treatment System

A Liquid Radwaste Treatment System is a system designed and used for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the evironment.

1.12 Purge - Purging

Purge or Purging is the controlled process of discharging air or gas from a confinement to reduce the airborne radioactivity concentration in such a manner that replacement air or gas is required to purify the confinement.

1.13 Member(s) of the Public

Member(s) of the Public shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

1.14 Exclusion Area

The exclusion area is that area surrounding ANO within a minimum radius of .65 miles of the reactor buildings and controlled to the extent necessary by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

1.15 Unrestricted Area

An unrestricted area shall be any area beyond the exclusion area boundary.

1.16 Core Operating Limits Report

The CORE OPERATING LIMITS REPORT is the ANO-1 specific document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Technical Specification 6.12.3. Plant operation within these operating limits is addressed in individual specifications.

3.25 RADIOACTIVE EFFLUENTS

3.25.1 Radioactive Liquid Holdup Tanks

Applicability: At all times.

Objective: To ensure that the limits of 10 CFR 20 are not exceeded.

Specifications:

3.25.1 A. The quantity of radioactive material contained in each unprotected* outside temporary radioactive liquid storage tank shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.

B. With the quantity of radioactive material exceeding the above limit, immediately suspend all additions of radioactive material to the affected tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluent Release Report pursuant to Specification 6.12.2.6.

C. The provisions of Specification 3.0.3 are not applicable.

Bases:

This specification is provided to ensure that in the event of an uncontrolled release of the contents of the tank* the resulting concentrations would be less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in the unrestricted area.

*Tanks included in this specification are those outdoor temporary tanks that 1) are not surrounded by liners, dikes, or walls capable of holding the tank contents, and 2) do not have overflows and surrounding area drains connected to the liquid radwaste treatment system.

3.25.2 Radioactive Gas Storage Tanks

Applicability: At all times

Objective: To restrict the amount of activity in a radioactive gas holdup tank.

Specifications:

3.25.2 A. The quantity of radioactivity contained in each gas storage tank shall be limited to 300,000 curies noble gases (Xe-133 equivalent).

B. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluent Release Report pursuant to Specification 6.12.2.6.

C. The provisions of Specification 3.0.3 are not applicable.

Bases:

The value of 300,000 curies is a suitable fraction of the quantity of radioactive material which if released over a 2-hour period, would result in a total body exposure to a member of the public at the exclusion area boundary of 500 mrem. This is consistent with Branch Technical Position ETSB 11-5 in NUREG-0800, July 1981.

4.29 RADIOACTIVE EFFLUENTS

4.29.1 Radioactive Liquid Holdup Tanks

Applicability: At all times

Objective: To ensure that the limits of 10 CFR 20 are not exceeded.

Specification:

4.29.1 The quantity of radioactive material contained in an outside temporary radioactive liquid storage tank shall be determined to be within the limit of Specification 3.25.1 by analyzing a representative sample of the contents of the tank at least once per 7 days when radioactive materials are being added to the tank.

Bases:

This specification is provided to ensure that in the event of an uncontrolled release of the contents of the tank the resulting concentrations would be less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in the unrestricted area.

4.29.2 Radioactive Gas Storage Tanks

Applicability: At all times

Objective: To ensure meeting the requirements of Specification 3.25.2.

Specification:

4.29.2 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the limits of Specification 3.25.2 at least once per 24 hours when radioactive materials are being added to the tank and the reactor coolant activity exceeds the limits of Specification 3.1.4.1.b.

Bases:

This specification is provided so that the requirements of Specification 3.25.2 are met.

6.6 REPORTABLE EVENT ACTION

6.6.1 A REPORTABLE EVENT shall be any of those conditions specified in Section 50.73 to 10 CFR Part 50.

6.6.2 The following actions shall be taken for REPORTABLE EVENTS:

a. A report shall be submitted to the Commission pursuant to the requirements of Section 50.73 to 10 CFR Part 50, and

b. Each REPORTABLE EVENT shall be reviewed by the PSC, and the results of this review shall be submitted to the SRC and the Vice President, Operations ANO.

6.7 SAFETY LIMIT VIOLATION

6.7.1 The following actions shall be taken in the event a Safety Limit is violated:

a. The facility shall be placed in at least hot shutdown within one hour.

b. The Nuclear Regulatory Commission shall be notified pursuant to 10 CFR 50.72 and a report submitted pursuant to the requirements of 10 CFR 50.36 and Specification 6.6.

6.8 PROCEDURES AND PROGRAMS

6.8.1 Written procedures shall be established, implemented and maintained covering the activities referenced below:

a. The applicable procedures recommended in Appendix "A" of Regulatory Guide 1.33, November, 1972.

b. Refueling operations.

c. Surveillance and test activities of safety related equipment.

d. (Deleted)

e. (Deleted)

f. Fire Protection Program Implementation.

g. New and spent fuel storage.

h. Offsite Dose Calculation Manual and Process Control Program implementation at the site.

i. Post accident sampling (includes sampling of reactor coolant, radioactive iodines and particulates in plant gaseous effluents, and the containment atmosphere).

6.8.2 Each procedure of 6.8.1 above, and changes in intent thereto, shall be reviewed and approved as required by the QAMO prior to implementation and reviewed periodically as set forth in administrative procedures.

6.8.3 Changes to procedures of 6.8.1 above may be made and implemented prior to obtaining the review and approval required in 6.8.2 above provided:

a. The intent of the original procedure is not altered.

b. The change is approved by two members of the plant management staff, at least one of whom holds a Senior Reactor Operator's license on Unit 1.

c. The change is documented, reviewed and approved as required by the QAMO, within 14 days of implementation.

6.8.4 The following program shall be established, implemented, and maintained:

a. Radioactive Effluent Controls Program

This program conforms with 10 CFR 50.36a for the control of radioactive effluents and for maintaining the doses to MEMBERS OF THE PUBLIC from radioactive effluents as low as reasonably achievable. The program shall be contained in the ODCM, shall be implemented by procedures, and shall include remedial actions to be taken whenever the program limits are exceeded. The program shall include the following elements:

1) Limitations on the functional capability of radioactive liquid and gaseous monitoring instrumentation including surveillance tests and setpoint determination in accordance with the methodology in the ODCM;

2) Limitations on the concentrations of radioactive material released in liquid effluents to UNRESTRICTED AREAS conforming to 10 CFR Part 20, Appendix B, Table 2, Column 2;

3) Monitoring, sampling, and analysis of radioactive liquid and gaseous effluents in accordance with 10 CFR 20.1302 and with the methodology and parameters in the ODCM;

4) Limitations on the annual and quarterly doses or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released from each unit to UNRESTRICTED AREAS, conforming to 10 CFR 50, Appendix I;

5) Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM at least every 31 days;

6) Limitations on the functional capability and use of the liquid and gaseous effluent treatment systems to ensure that appropriate portions of these systems are used to reduce releases of radioactivity when the projected doses in a period of 31 days would exceed 2% of the guidelines for the annual dose or dose commitment, conforming to 10 CFR 50, Appendix I;

7) Limitations on the dose rate resulting from radioactive material released in gaseous effluents to areas beyond the site boundary conforming to the dose associated with 10 CFR 20, Appendix B, Table 2, Column 1;

8) Limitations on the annual and quarterly air doses resulting from noble gases released in gaseous effluents from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I;

9) Limitations on the annual and quarterly doses to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives > 8 days in gaseous effluents released from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I; and

10) Limitations on the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources, conforming to 40 CFR 190.

h. Records of in-service inspections performed pursuant to these Technical Specifications.

i. Records of Quality Assurance activities required by Section 17 of the Quality Assurance Manual for Operations.

j. Records of reviews performed for changes made to procedures or equipment or reviews of tests and experiments pursuant to 10CFR50.59.

k. Records of meetings of the PSC and the SRC.

l. Records of reviews performed for changes made to the Offsite Dose Calculation Manual and Process Control Program.

m. Records of the service lives of the seals of all hydraulic snubbers applicable to Specification 3.16 including the date at which the service life commences and associated installation and maintenance records.

n. Records of analyses required by the Radiological Environmental Monitoring Program.

6.10 RADIATION PROTECTION PROGRAM

Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure.

6.11 HIGH RADIATION AREA

6.11.1 In lieu of the "control device" or "alarm signal" required by paragraph 20.203(c)(2) of 10CFR20, each high radiation area (as defined in 20.202(b)(3) of 10CFR20) in which the intensity of radiation is 1000 mrem/hr or less shall be barricaded and conspicuously posted as a high radiation area and shall be controlled by requiring the issuance of a radiation work permit. Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following:

a. A radiation monitoring device which continuously indicates the radiation dose rate in the area.

b. A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a pre-set integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate level in the area has been established and personnel have been made knowledgeable of them.

c. An individual qualified in radiation protection procedures who is equipped with a radiation dose rate monitoring device. This individual shall be responsible for providing positive control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified in the radiation work permit.

The dose assignments to various duty functions may be estimates based on pocket dosimeter, TLD, or film badge measurements. Small exposures totaling 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.

6.12.2.3 Monthly Operating Report

Routine reports of operating statistics which include:

(1) Average Daily Unit Power Level
(2) Operating Data Report
(3) Unit Shutdowns and Power Reductions
(4) Narrative Summary of Operating Experience

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

6.12.2.4 Annual Report

All challenges to the pressurizer electromatic relief valve (ERV) and pressurizer safety valves shall be reported annually.

6.12.2.5 Annual Radiological Environmental Operating Report *

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual 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 in a supplementary report as soon as possible.

6.12.2.6 Radioactive Effluent Release Report **

The Radioactive Effluent Release Report covering the operation of the unit shall be submitted in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

* A single submittal may be made for ANO. The submittal should combine those sections that are common to both units.

** A single submittal may be made for ANO. The submittal should combine those sections that are common to both units. The submittal shall specify the releases of radioactive material from each unit.

6.12.5 Special Reports

Special reports shall be submitted to the Administrator of the appropriate Regional Office 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. Tendon Surveillance, Specification 4.4.2.2

b. Inoperable Containment Radiation Monitors, Specification 3.5.1, Table 3.5.1-1.

c. Deleted

d. Steam Generator Tubing Surveillance - Category C-3 Results, Specification 4.18.

e. Miscellaneous Radioactive Materials Source Leakage Tests, Specification 3.12.2.

f. Deleted

g. Deleted

h. Inoperable Fire Detection Instrumentation

i. Inoperable Fire Suppression Systems

j. Degraded Auxiliary Electrical Systems, Specification 3.7.2.H.

k. Inoperable Reactor Vessel Level Monitoring Systems, Table 3.5.1-1

l. Inoperable Hot Leg Level Measurement Systems, Table 3.5.1-1

m. Inoperable Main Steam Line Radiation Monitors, Specification 3.5.1, Table 3.5.1-1.

6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the radiological environmental monitoring program.

The ODCM shall also contain the radioactive effluent controls and radiological environmental monitoring activities and descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Specifications 6.12.2.5 and 6.12.2.6.

Licensee initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

    1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s), and

    2. A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations;

b. Shall become effective after approval of the General Manager, Plant Operations; and

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed and shall also indicate the date (i.e., month and year) the change was implemented.

ANO-2

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES

ADMINISTRATIVE CONTROLS

AXIAL SHAPE INDEX

1.22 The AXIAL SHAPE INDEX shall be the power generated in the lower half of the core less the power generated in the upper half of the core divided by the sum of these powers.

REACTOR TRIP SYSTEM RESPONSE TIME

1.23 The REACTOR TRIP SYSTEM RESPONSE TIME shall be the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until electrical power is interrupted to the CEA drive mechanism.

ENGINEERED SAFETY FEATURE RESPONSE TIME

1.24 The ENGINEERED SAFETY FEATURE RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays where applicable.

PHYSICS TESTS

1.25 PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation and 1) described in Chapter 14.0 of the FSAR, 2) authorized under the provisions of 10 CFR 50.59, or 3) otherwise approved by the Commission.

SOFTWARE

1.26 The digital computer SOFTWARE for the reactor protection system shall be the program codes including their associated data, documentation and procedures.

PLANAR RADIAL PEAKING FACTOR F_{xy}

1.27 The PLANAR RADIAL PEAKING FACTOR is the ratio of the peak to plane average power density of the individual fuel rods in a given horizontal plane, excluding the effects of azimuthal tilt.

LIQUID RADWASTE TREATMENT SYSTEM

1.28 A LIQUID RADWASTE TREATMENT SYSTEM is a system designed and installed to reduce radioactive liquid effluents from the unit. This is accomplished by providing for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the environment.

MEMBER(S) OF THE PUBLIC

1.29 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

PURGE-PURGING

1.30 PURGE or PURGING is the controlled process of discharging air or gas from a confinement to reduce airborne radioactive concentrations in such a manner that replacement air or gas is required to purify the confinement.

EXCLUSION AREA

1.31 The EXCLUSION AREA is that area surrounding ANO within a minimum radius of .65 miles of the reactor buildings and controlled to the extent necessary by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

UNRESTRICTED AREA

1.32 An UNRESTRICTED AREA shall be any area at or beyond the exclusion area boundary.

CORE OPERATING LIMITS REPORT

1.33 The CORE OPERATING LIMITS REPORT is the ANO-2 specific document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Technical Specification 6.9.5 Plant operation within these operating limits is addressed in individual specifications.

THIS PAGE INTENTIONALLY LEFT BLANK

3/4.3.4 TURBINE OVERSPEED PROTECTION

LIMITING CONDITION FOR OPERATION

3.3.4.1 At least one turbine overspeed protection system shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a. With one stop valve and/or one control valve inoperable, within 4 hours either restore the inoperable valve(s) to OPERABLE status or close the inoperable valve(s); otherwise, isolate the turbine from the steam supply within the next 6 hours.

b. With one combined stop and intercept valve inoperable, within 4 hours either restore the inoperable valve to OPERABLE status or close the inoperable valve; otherwise, isolate the turbine from the steam supply within the next 6 hours.

c. With the above required turbine overspeed protection system otherwise inoperable, within 6 hours either restore the system to OPERABLE status or isolate the turbine from the steam supply.

SURVEILLANCE REQUIREMENTS

4.3.4.1.1 The provisions of Specification 4.0.4 are not applicable.

4.3.4.1.2 The above required turbine overspeed protection system shall be demonstrated OPERABLE:

a. At least once per 92 days by direct observation of the movement of each of the following valves through at least one complete cycle from the running position:

   1. Four high pressure turbine stop valves.

   2. Four high pressure turbine control valves.

   3. Four low pressure turbine combined stop and intercept valves.

b. At least once per 18 months by performance of a CHANNEL CALIBRATION on the turbine overspeed protection systems.

c. At least once per 40 months by disassembling at least one of each of the above valves and performing a visual and surface inspection of valve seats, disks and stems and verifying no unacceptable flaws or corrosion.

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1 LIQUID HOLDUP TANKS*

LIMITING CONDITION FOR OPERATION

3.11.1 The quantity of radioactive material contained in each unprotected outside temporary radioactive liquid storage tank shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material exceeding the above limit, immediately suspend all additions of radioactive material to the affected tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluents Release Report pursuant to Specification 6.9.3.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1 The quantity of radioactive material contained in each unprotected outside temporary radioactive liquid storage tank shall be determined to be within the above limit by analyzing a representative sample of the contents of the tank at least once per 7 days when radioactive materials are being added to the tank.

---

*Tanks included in this specification are those outdoor temporary tanks that 1) are not surrounded by liners, dikes, or walls capable of holding the tank contents, and 2) do not have overflows and surrounding area drains connected to the liquid radwaste treatment system.

3/4.11.2 GAS STORAGE TANKS

LIMITING CONDITION FOR OPERATION

3.11.2 The quantity of radioactivity contained in each gas storage tank shall be limited to less than or equal to 300,000 curies noble gases (considered as Xe-133).

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluent Release Report pursuant to Specification 6.9.3.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank and the reactor coolant activity exceeds the limits of Specification 3.4.8.

3/4.11.3 EXPLOSIVE GAS MIXTURE

LIMITING CONDITION FOR OPERATION

3.11.3 The concentration of the hydrogen/oxygen shall be limited in the waste gas storage tanks to Region "A" of Figure 3.11-1.

APPLICABILITY: At all times.

ACTION:

a. When the concentration of hydrogen/oxygen in the waste gas storage tanks enters Region "B" of Figure 3.11-1, corrective action shall be taken to return the concentration values to Region "A" within 24 hours.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.3 The concentration of hydrogen/oxygen in the waste gas holdup system shall be determined to be within the above limits, with the waste gas system in operation, by continuously monitoring with the hydrogen/oxygen monitors required OPERABLE by Table 3.11-3.

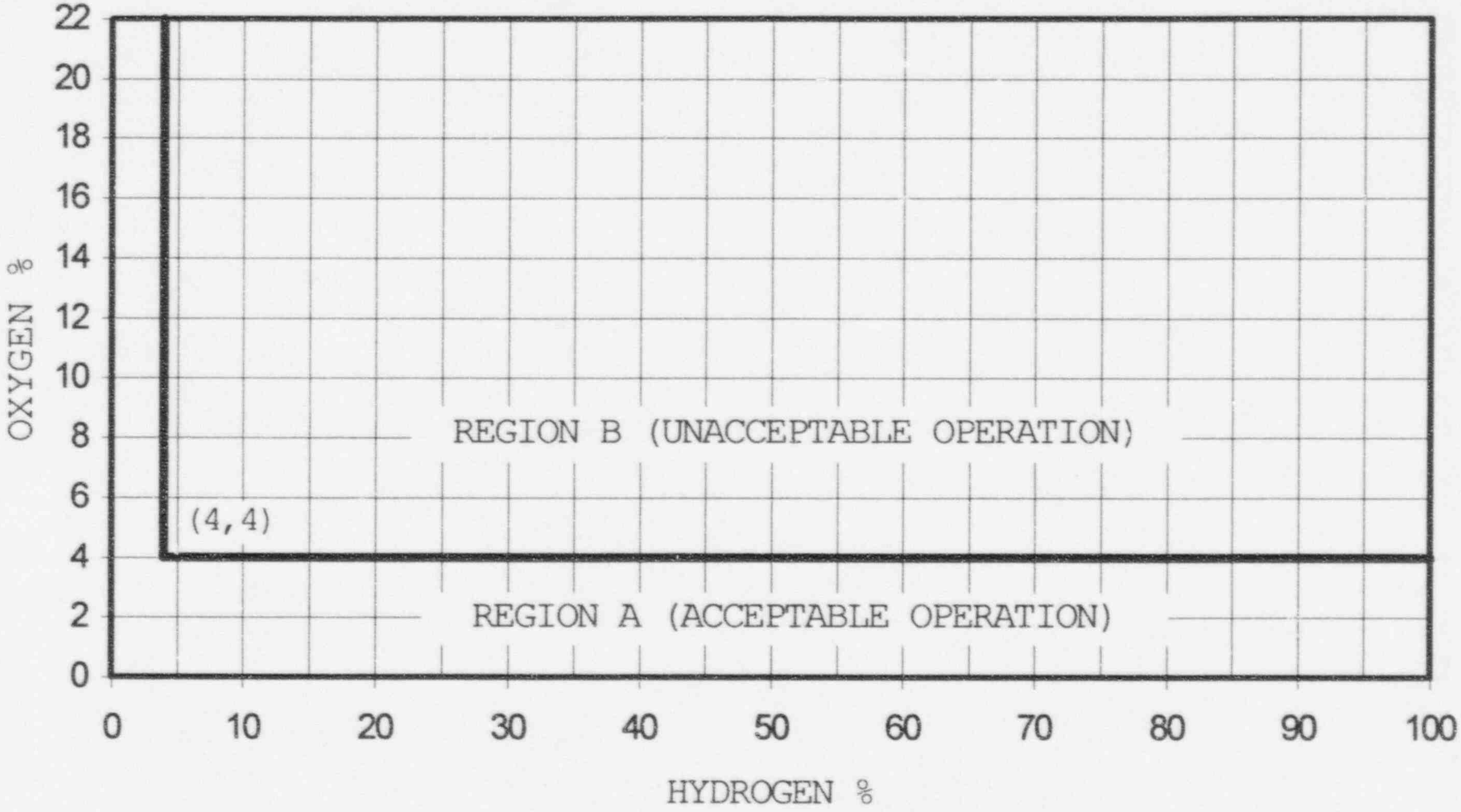
TABLE 3.11-3

EXPLOSIVE GAS MONITORING INSTRUMENTATION

Instrument	Minimum Channels Operable	Applicability	Action
1. Waste Gas Holdup System Explosive Gas Monitoring System			
a. Hydrogen monitor	1	*	1
b. Oxygen monitor	1	*	1

*During waste gas compressing operation (trea*ment for primary system off gases.)

ACTION 1 - With both channels inoperable, operation may continue provided grab samples are taken 1) every 4 hours during degassing operations, and 2) daily during other operations. The analysis of these samples shall be completed within 8 hours of taking the sample.



<u>HYDROGEN - OXYGEN LIMITS FOR ANO-2 WASTE GAS SYSTEM</u>

<u>Figure 3.11-1</u>

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION

The OPERABILITY of the post-accident instrumentation ensures that sufficient information is available on selected plant parameters to monitor and assess these variables following an accident. This capability is consistent with the recommendations of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Plants to Assess Plant Conditions During and Following an Accident," December 1975 and NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations."

The Reactor Vessel Level Monitor is provided as a means of indicating level in the reactor vessel during accident conditions. A minimum of two operable level sensors in the upper plenum region and one operable level sensor in the dome region are required for RVLMS channel operability. When Reactor Coolant Pumps are running, all except the dome sensors are interlocked to read "invalid" due to flow induced variables that may offset the sensor outputs. If the equipment is inaccessible due to health and industrial safety concerns (for example, high radiation area, low oxygen content of the containment atmosphere) or due to physical location of the fault (for example, probe failure in the reactor vessel), then operation may continue until the next scheduled refueling outage and a report filed.

3/4.3.3.7 CHLORINE DETECTION SYSTEMS

The OPERABILITY of the chlorine detection system ensures that sufficient capability is available to promptly detect and initiate protective action in the event of an accidental chlorine release. This capability is required to protect control room personnel and is consistent with the recommendations of Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release," February 1975.

3/4.3.4 TURBINE OVERSPEED PROTECTION

This specification is provided to ensure that the turbine overspeed protection instrumentation and the turbine speed control valves are OPERABLE and will protect the turbine from excessive overspeed. Protection from turbine excessive overspeed is required since excessive overspeed of the turbine could generate potentially damaging missiles which could impact and damage safety related components, equipment or structures.

3/4.11.1 LIQUID HOLDUP TANKS

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that, in the event of an uncontrolled release of the contents of the tanks, the resulting concentrations would be less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an UNRESTRICTED AREA.

3/4.11.2 GAS STORAGE TANKS

Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that, in the event of an uncontrolled release of the tank's contents, the resulting total body exposure to a MEMBER OF THE PUBLIC at the nearest EXCLUSION AREA boundary will not exceed 0.5 rem. This is consistent with Branch Technical Position ETSB 11-5 in NUREG-0800, July 1981.

3/4.11.3 EXPLOSIVE GAS MIXTURE

It is expected that the hydrogen/oxygen concentration will be kept within the limits and therefore not enter the flammable or detonable region concentrations within the waste gas storage tanks.

These levels provide reasonable assurance that no hydrogen/oxygen explosion could occur to allow rupture of the waste gas storage tanks. The hydrogen and oxygen limits are based on information in NUREG/CR-2726, "Light Water Reactor Hydrogen Manual."

Grab samples are to be taken every 4 hours during degassing operations when both hydrogen/oxygen analyzers are out of service. These samples are to be analyzed within 8 hours to assure that the hydrogen/oxygen concentration is within the limits in Figure 3.11-1. During other Waste Gas Compressor operations, the hydrogen/oxygen concentration is not as subject to change, therefore grab samples are to be taken every 24 hours.

6.7 SAFETY LIMIT VIOLATION

6.7.1 The following actions shall be taken in the event a Safety Limit is violated:

a. The unit shall be placed in at least HOT STANDBY within one hour.
b. The Vice President, Operations ANO and the SRC shall be notified within 24 hours.
c. The Nuclear Regulatory Commission shall be notified pursuant to 10CFR50.72 and a report submitted pursuant to the requirements of 10CFR50.36 and Specification 6.6.

6.8 PROCEDURES AND PROGRAMS

6.8.1 Written procedures shall be established, implemented and maintained covering the activities referenced below:

a. The applicable procedures recommended in Appendix "A" of Regulatory Guide 1.33, Revision 2, February 1978.
b. Refueling operations.
c. Surveillance and test activities of safety related equipment.
d. (Deleted)
e. (Deleted)
f. Fire Protection Program implementation.
g. Modification of Core Protection Calculator (CPC) Addressable Constants. These procedures should include provisions to assure that sufficient margin is maintained in CPC Type I addressable constants to avoid excessive operator interaction with the CPCs during reactor operation.

NOTE: Modifications to the CPC software (including changes of algorithms and fuel cycle specific data) shall be performed in accordance with the most recent version of "CPC Protection Algorithm Software Change Procedure," CEN-39(A)-P that has been determined to be applicable to the facility. Additions or deletions to CPC addressable constants or changes to addressable constant software limit values shall not be implemented without prior NRC approval.

h. New and spent fuel storage.
i. ODCM and PCP implementation.
j. Post accident sampling (includes sampling of reactor coolant, radioactive iodines and particulates in plant gaseous effluent, and the containment atmosphere).

6.8.2 Each procedure of 6.8.1 above, and changes in intent thereto, shall be reviewed and approved as required by the QAMO prior to implementation and reviewed periodically as set forth in administrative procedures.

6.8.3 Changes to procedures of 6.8.1 above may be made and implemented prior to obtaining the review and approval required in 6.8.2 above provided:

a. The intent of the original procedure is not altered.

b. The change is approved by two members of the plant management staff, at least one of whom holds a Senior Reactor Operator's License on Unit 2.

c. The change is documented, reviewed and approved as required by the QAMO, within 14 days of implementation.

6.8.4 The following program shall be established, implemented, and maintained:

a. <u>Radioactive Effluent Controls Program</u>

This program conforms with 10 CFR 50.36a for the control of radioactive effluents and for maintaining the doses to MEMBERS OF THE PUBLIC from radioactive effluents as low as reasonably achievable. The program shall be contained in the ODCM, shall be implemented by procedures, and shall include remedial actions to be taken whenever the program limits are exceeded. The program shall include the following elements:

1) Limitations on the functional capability of radioactive liquid and gaseous monitoring instrumentation including surveillance tests and setpoint determination in accordance with the methodology in the ODCM;

2) Limitations on the concentrations of radioactive material released in liquid effluents to UNRESTRICTED AREAS conforming to 10 CFR Part 20, Appendix B, Table 2, Column 2;

3) Monitoring, sampling, and analysis of radioactive liquid and gaseous effluents in accordance with 10 CFR 20.1302 and with the methodology and parameters in the ODCM;

4) Limitations on the annual and quarterly doses or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released from each unit to UNRESTRICTED AREAS, conforming to 10 CFR 50, Appendix I;

5) Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM at least every 31 days;

6) Limitations on the functional capability and use of the liquid and gaseous effluent treatment systems to ensure that appropriate portions of these systems are used to reduce releases of radioactivity when the projected doses in a period of 31 days would exceed 2% of the guidelines for the annual dose or dose commitment, conforming to 10 CFR 50, Appendix I;

7) Limitations on the dose rate resulting from radioactive material released in gaseous effluents to areas beyond the site boundary conforming to the dose associated with 10 CFR 20, Appendix B, Table 2, Column 1;

8) Limitations on the annual and quarterly air doses resulting from noble gases released in gaseous effluents from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I;

9) Limitations on the annual and quarterly doses to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives > 8 days in gaseous effluents released from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I; and

10) Limitations on the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources, conforming to 40 CFR 190.

6.9 REPORTING REQUIREMENTS

ROUTINE REPORTS

6.9.1 In addition to the applicable reporting requirements of Title 10, Code of Federal Regulations, the following reports shall be submitted to the Administrator of the Regional Office unless otherwise noted.

STARTUP REPORT

6.9.1.1 A summary report of plant startup and power escalation testing shall be submitted following (1) receipt of an operating license, (2) amendment to the 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 plant.

6.9.1.2 The startup report shall address each of the tests identified in the FSAR and shall include a description of the measured values of the operating conditions or characteristics obtained during the test program and a comparison of these values with design predictions and specifications. Any corrective actions that were required to obtain satisfactory operation shall also be described. Any additional specific details required in license conditions based on other commitments shall be included in this report.

6.9.1.3 Startup reports shall be submitted within (1) 90 days following completion of the startup test program, (2) 90 days following resumption or commencement of commercial power operation, or (3) 9 months following initial criticality, whichever is earliest. If the Startup Report does not cover all three events (i.e., initial criticality, completion of 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 have been completed.

h. Deleted

i. Inoperable Containment Radiation Monitors, Specification 3.3.3.1.

j. Steam Generator Tubing Surveillance -- Category C-3 Results, Specification 4.4.5.5.

k. Maintenance of Spent Fuel Pool Structural Integrity, Specification 3.7.12.

l. Deleted

m. Deleted

n. Inoperable Reactor Vessel Level Monitoring System (RVLMS), Specification 3.3.3.6, Table 3.3-10 Item 14.

o. Inoperable Main Steam Line Radiation Monitors, Specification 3.3.3.1, Table 3.3-6.

RADIOACTIVE EFFLUENT RELEASE REPORT *

6.9.3 The Radioactive Effluent Release Report covering the operation of the unit shall be submitted in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

* A single submittal may be made for ANO. The submittal should combine those sections that are common to both units. The submittal shall specify the releases of radioactive material from each unit.

THIS PAGE INTENTIONALLY LEFT BLANK

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT *

6.9.4 The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual 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 in a supplementary report as soon as possible.

* A single submittal may be made for ANO. The submittal should combine those sections that are common to both units.

f. Records of reactor tests and experiments.

g. Records of training and qualification for current members of the unit staff.

h. Records of in-service inspections performed pursuant to these Technical Specifications.

i. Records of Quality Assurance activities required by the QA Manual.

j. Records of reviews performed for changes made to procedures or equipment or reviews of tests and experiments pursuant to 10CFR50.59.

k. Records of meetings of the PSC and the SRC.

l. Records of changes to the Core Protection Calculator System (CPCS) SOFTWARE. Changes to the CPCS SOFTWARE shall be made in accordance with methods approved by the NRC. These records shall include the following:

1. Purpose of change.

2. Detailed description of changes including algorithms, changes to the assembly listings, checksums and disk identification numbers.

3. Summary of validation test results.

m. Records of reviews performed for changes made to the Offsite Dose Calculation Manual and Process Control Program.

n. Records of the service lives of the seals of all hydraulic snubbers required by Specification 3.7.8, including the date at which the service life commences and associated installation and maintenance records.

6.11 RADIATION PROTECTION PROGRAM

Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure.

6.12 (DELETED)

6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the radiological environmental monitoring program.

The ODCM shall also contain the radioactive effluent controls and radiological environmental monitoring activities and descriptions of the information that should be included in the Radioactive Effluent Release and Annual Radiological Environmental Operating Reports required by Specifications 6.9.3 and 6.9.4.

Licensee initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

    1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s),

    2. A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations;

b. Shall become effective after approval of the General Manager, Plant Operations; and

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed and shall also indicate the date (i.e., month and year) the change was implemented.

MARKUP OF CURRENT ANO-1 TECHNICAL SPECIFICATIONS

(FOR INFO ONLY)

TABLE OF CONTENTS

LIST OF FIGURES

~~1.10 RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS (RETS) DEFINITIONS~~

~~1.10.1 Dose Equivalent I-131~~ **(Moved to page 6 as specification 1.10)**

~~The Dose Equivalent I-131 shall be the concentration of I-131 (microcurie/gram) which alone would produce the same thyroid doseas the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites."~~

~~1.10.2 Source Check~~

~~A Source Check shall be the qualitative assessment of channel response when the channel sensor is exposed to a radioactive source.~~

~~1.10.3 Offsite Dose Calculation Manual (ODCM)~~ **(Moved to Specification 6.14)**

~~The Offsite Dose Calculation Manual shall contain the methodology and parameters used in the calculation of offsite doses due to radioactive gaseous and liquid effluents, and in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints, and in the conduct of the Environmental Radiological Monitoring Program.~~

~~1.10.4 Liquid Radwaste Treatment System~~ **(Moved to Page 6 as 1.11)**

~~A Liquid Radwaste Treatment System is a system designed and used for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the evironment.~~

~~1.10.5 Gaseous Radwaste Treatment System~~

~~A Gaseous Radwaste Treatment System is any system designed and installed to reduce radioactive gaseous effluents by collecting gases from radioactive systems and providing for decay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.~~

~~1.10.6 Ventilation Exhaust Treatment System~~

~~A Ventilation Exhaust Treatment System is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal absorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to release to the environment (such a system is not considered to have any effect on noble gas effluents). Engineered Safety Feature (ESF) atomspheric cleanup systems are not considered to be Ventilation Exhaust Treatment Systems.~~

~~1.10.7 Purge - Purging~~ **(Moved to Page 6 as specification 1.12)**

~~Purge or Purging is the controlled process of discharging air or gas from a confinement to reduce the airborne radioactivity concentration in such a manner that replacement air or gas is required to purify the confinement.~~

(This page will be deleted)

1.10 Dose Equivalent I-131

The Dose Equivalent I-131 shall be the concentration of I-131 (microcurie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites."

1.11 Liquid Radwaste Treatment System

A Liquid Radwaste Treatment System is a system designed and used for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the evironment.

1.12 Purge - Purging

Purge or Purging is the controlled process of discharging air or gas from a confinement to reduce the airborne radioactivity concentration in such a manner that replacement air or gas is required to purify the confinement.

1.13~~0.8~~ Member(s) of the Public

Member(s) of the Public shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

1.14~~0.9~~ Exclusion Area

The exclusion area is that area surrounding ANO within a minimum radius of .65 miles of the reactor buildings and controlled to the extent necessary by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

1.15~~0.10~~ Unrestricted Area

An unrestricted area shall be any area beyond the exclusion area boundary.

1.16~~1~~ CORE OPERATING LIMITS REPORT

The CORE OPERATING LIMITS REPORT is the ANO-1 specific document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Technical Specification 6.12.3. Plant operation within these operating limits is addressed in individual specifications.

~~3.5.5 Fire Detection Instrumentation~~

~~DELETED~~

(This page will be deleted)

~~Table 3.5-5~~

~~SAFETY-RELATED AREAS PROTECTED BY HEAT/SMOKE DETECTORS~~

~~DELETED~~

<u>(This page will be deleted)</u>

~~3.5.6 Radioactive Liquid Effluent Instrumentation~~

~~Applicability: During releases via this pathway.~~

~~Objective: To provide instrumentation for radioactive liquid releases.~~

~~Specification:~~

~~3.5.6.1 The radioactive liquid effluent monitoring instrumentation shown in Table 3.5.6-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of specification 3.25.1.1 are not exceeded.~~

~~3.5.6.2 With alarm/trip setpoints less conservative than required by the above specification, immediately suspend the release of radioactive liquid effluents monitored by the affected channel, until the setpoint is changed to an acceptably conservative value.~~

~~3.5.6.3 With less than the minimum number of channels operable, take the action shown in Table 3.5.6-1. Return the instruments to operable status within 30 days or, in lieu of any other report, explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected.~~

~~3.5.6.4 The provisions of Specification 3.0.3 are not applicable.~~

~~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 the methods in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.~~

(This page will be deleted)

~~Table 3.5.6-1~~

~~Radioactive Liquid Monitoring Instrumentation~~

~~Instrument~~	~~Minimum Operable Channels~~	~~Applicability~~	~~Action~~
~~1. Liquid radwaste effluent monitor (automatic termination)~~	~~1~~	~~During releases via this pathway~~	~~A~~
~~2. Liquid radwaste effluent flow monitor~~	~~1~~	~~During releases via this pathway~~	~~B~~

(This page will be deleted)

~~Table 3.5.6-1 (Continued)~~

~~Table Notation~~

~~Action~~	~~Description~~	
~~A.~~	~~With the number of channels operable less than required, effluent releases may be resumed provided that prior to initiating a release :~~	
	~~1.~~	~~At least two independent samples of the tank's contents are analyzed in accordance with Specification 4.29.1.1,~~
	~~2.~~	~~At least two technically qualified members of the facility staff independently verify that the computer input data is correct and,~~
	~~3.~~	~~At least 2 members of the facility staff independently verify the discharge valve lineup.~~
	~~Otherwise, suspend release of radioactive effluents via this pathway.~~	
~~B.~~	~~With the number of channels operable less than required, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump curves may be used to estimate flow.~~	

(This page will be deleted)

~~3.5.7 Radioactive Gaseous Effluent Instrumentation~~

~~Applicability: As shown in Table 3.5.7-1.~~

~~Objective: To provide instrumentation for radioactive gaseous releases.~~

~~Specification:~~

~~3.5.7.1 The radioactive gaseous effluent monitoring instrumentation shown in Table 3.5.7-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of Specification 3.25.2.1 are not exceeded.~~

~~3.5.7.2 With a channel alarm/trip setpoint less conservative than required, declare the channel inoperable.~~

~~3.5.7.3 With less than the minimum number of channels operable, take the action shown in Table 3.5.7-1. Return the instruments to operable status within 30 days or, in lieu of any other report, explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected.~~

~~3.5.7.4 The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~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 methods in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.105.~~

(This page will be deleted)

~~Table 3.5.7-1~~

~~Radioactive Gas Effluent Monitoring Instrumentation~~

~~Instrument~~	~~Operable~~	~~Applicability~~	~~Parameter~~	~~Action~~
~~1. Waste Gas Holdup System~~				
~~Noble gas activity monitor (provides alarm and automatic termination of release)~~	~~1~~	~~During releases via this pathway (DRVTP)~~	~~Radioactivity~~	~~A~~
~~Effluent flow monitor~~	~~1~~	~~DRVTP~~	~~System flow~~	~~B~~
~~2. Auxiliary Building Ventilation System~~				
~~a) Noble gas activity monitor~~	~~1~~	~~DRVTP~~	~~Radioactivity~~	~~C~~
~~b) Iodine sampler~~	~~1~~	~~DRVTP~~		~~D~~
~~c) Particulate sampler~~	~~1~~	~~DRVTP~~		~~D~~
~~d) Effluent flow monitor~~	~~1~~	~~DRVTP~~	~~System flow~~	~~B~~
~~e) Sampler flow monitor~~	~~1~~	~~DRVTP~~	~~Sample flow~~	~~B~~
~~3. Spent Fuel Pool Area Ventilation System~~		~~When the system is in operation~~		
~~a) Noble gas activity monitor~~	~~1~~		~~Radioactivity~~	~~C~~
~~b) Iodine sampler~~	~~1~~			~~D~~

(This page will be deleted)

~~Table 3.5.7-1 (Continued)~~

~~Radioactive Gaseous Effluent Monitoring Instrumentation~~

~~Instrument~~	~~Operable~~	~~Applicability~~	~~Parameter~~	~~Action~~
~~c) Particulate sampler~~	~~1~~			~~D~~
~~d) Effluent flow monitor~~	~~1~~		~~System flow~~	~~B~~
~~e) Sampler flow monitor~~	~~1~~		~~Sample flow~~	~~B~~
~~4. Reactor Building Purge and Ventilation System~~		~~When the system is in the operation~~		
~~a) Noble gas activity monitor~~	~~1~~		~~Radioactivity~~	~~C, E~~
~~b) Iodine sampler~~	~~1~~			~~D~~
~~c) Particulate sampler~~	~~1~~			~~D~~
~~d) Effluent flow monitor~~	~~1~~		~~System flow~~	~~B~~
~~e) Sampler flow monitor~~	~~1~~		~~Sample flow~~	~~B~~

(This page will be deleted)

~~Table 3.5.7-1 (Continued)~~

~~Table Notation~~

~~Action~~ ~~Description~~

~~A. With the number of channels operable less than required, the contents of the tank may be released to the environment provided that prior to initiating the release:~~

~~1. At least two independent samples of the tank's contents are analyzed, and~~

~~2. At least two technically qualified members of the facility staff independently verify the computer input data, and~~

~~3. At least 2 members of the facility staff independently verify the correct discharge valve lineup.~~

~~Otherwise, suspend release of radioactive effluents via this pathway.~~

~~B. With the number of channels operable less than required, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours.~~

~~C. With the number of channels operable less than required, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours.~~

~~D. With the number of channels operable less than required, effluent releases via the affected pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in Table 4.29-3.~~

~~E. When purging the reactor building, immediately suspend purging if less than the required number of monitoring channels are operable. Purging may be resumed provided that prior to initiating the purge:~~

~~1. At least two independent samples of the reactor building atmosphere are analyzed, and~~

~~2. At least two technically qualified members of the facility staff independently verify the computer input data.~~

(This page will be deleted)

3.25 RADIOACTIVE EFFLUENTS

3.25.1 Radioactive Liquid Holdup Tanks

Applicability: At all times.

Objective: To ensure that the limits of 10 CFR 20 are not exceeded.

Specifications:

3.25.1 A. The quantity of radioactive material contained in each unprotected* outside temporary radioactive liquid storage tank shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.

B. With the quantity of radioactive material exceeding the above limit, immediately suspend all additions of radioactive material to the affected tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluent Release Report pursuant to Specification 6.12.2.6.

C. The provisions of Specification 3.0.3 are not applicable.

Bases:

This specification is provided to ensure that in the event of an uncontrolled release of the contents of the tank* the resulting concentrations would be less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in the unrestricted area.

*Tanks included in this specification are those outdoor temporary tanks that 1) are not surrounded by liners, dikes, or walls capable of holding the tank contents, and 2) do not have overflows and surrounding area drains connected to the liquid radwaste treatment system.

~~Effluents~~

~~3.25.1.1 Concentration~~

~~Applicability: At all times~~

~~Objective: To ensure that the limits of 10 CFR 20 are met.~~

~~Specifications:~~

~~3.25.1.1 A. The concentration of radioactive material released to the discharge canal 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 total concentration released shall be limited to 2 x 10^-4 μCi/ml.~~

~~B. With the concentration of radioactive material released exceeding the above limits, immediately initiate action to restore concentration to within limits and provide notification to the Commission within 24 hours. In lieu of any other report, prepare and submit a Special Report within 30 days pursuant to Specification 6.12.5~~

~~C. The provision of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~This 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. This limitation provides additional assurance that the levels of radioactive materials in bodies of water outside the site will not result in exposures greater than the Section II A design objectives of Appendix I, 10 CFR Part 50, to a member of the public. The concentration limit for noble gases is based upon the assumption that Xe-133 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.~~

3.25.2 Radioactive Gas Storage Tanks

Applicability: At all times

Objective: To restrict the amount of activity in a radioactive gas holdup tank.

Specifications:

3.25.2 A. The quantity of radioactivity contained in each gas storage tank shall be limited to 300,000 curies noble gases (Xe-133 equivalent).

B. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluent Release Report pursuant to Specification 6.12.2.6.

C. The provisions of Specification 3.0.3 are not applicable.

Bases:

The value of 300,000 curies is a suitable fraction of the quantity of radioactive material which if released over a 2-hour period, would result in a total body exposure to a member of the public at the exclusion area boundary of 500 mrem. This is consistent with Branch Technical Position ETSB 11-5 in NUREG-0800, July 1981.

~~Radioactive Liquid Effluents~~

~~3.25.1.2 Dose~~

~~Applicability: At all times~~

~~Objective: To ensure that the dose limits of 10 CFR 50, Appendix I, Section IV A, are met.~~

~~Specifications:~~

~~3.25.1.2 A The dose commitment to a member of the public from radio-active material in liquid effluents released from ANO-1 to the discharge canal shall be:~~

~~1) During any calendar quarter less than or equal to 1.5 mrem to the total body and less than or equal to 5 mrem to any organ, and~~

~~2) During any calendar year less than or equal to 3 mrem to the total body and less than or equal to 10 mrem to any organ.~~

~~B. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days, pursuant to Specification 6.12.5.~~

~~C. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~Specification 3.25.1.2 provides assurance that releases of liquid effluents will result in concentrations far below the limits of 10CFR20. The specification provides the required operating flexibility and at the same time assures that the release of radioactive material in liquid effluents will be kept "as low as reasonably achievable".~~

~~Radioactive Liquid Effluents~~

~~3.25.1.3 Waste Treatment~~

~~Applicability: At all times~~

~~Objective: To assure that the amount of radioactive material in liquid effluents will be "as low as reasonably achievable."~~

~~Specifications.~~

~~3.25.1.3 A. The appropriate parts of the liquid radwaste treatment system shall be used to reduce the radioactive materials in liquid waste prior to their discharge when it is projected that the cumulative dose during a calendar quarter due to liquid effluent releases would exceed 0.18 mrem to the total body or 0.625 mrem to any organ.~~

~~B. The provisions of this specification do not apply to the laundry tanks due to their incompatibility with the radwaste system.~~

~~C. With radioactive liquid waste being discharged without treatment and in excess of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days per Specification 6.12.5.~~

~~D. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~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." The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the guide set forth in Section II A of Appendix I, 10 CFR Part 50, for liquid effluents. The values of 0.18 mrem and 0.625 mrem are approximately 25% of the yearly design objectives on a quarterly basis. The yearly design objectives are given in 10 CFR 50, Appendix I, Section II.~~

(This page will be deleted)

~~Radioactive Liquid Effluents~~

~~3.25.1.4 Liquid Holdup Tanks~~ (Moved to page 66v as 3.25.1)

~~Applicability: At all times.~~

~~Objective: To ensure that the limits of 10 CFR 20 are not exceeded.~~

~~Sepcifications:~~

~~3.25.1.4 A. The quantity of radioactive material contained in each unprotected* outside temporary radioactive liquid storage tank shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.~~

~~B. With the quantity of radioactive material exceeding the above limit, immediately suspend all additions of radioactive material to the affected tank and within 48 hours reduce the tank contents to within the limit.~~

~~C. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~This specification is provided to ensure that in the event of an uncontrolled release of the contents of the tank* the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in the unrestricted area.~~

~~*Tanks included in this specification are those outdoor temporary tanks that 1) are not surrounded by liners, dikes, or walls capable of holding the tank contents, and 2) do not have overflows and surrounding area drains connected to the liquid radwaste treatment system.~~

(This page will be deleted)

~~3.25.2 Radioactive Gaseous Effluents~~

~~3.25.2.1 Dose Rate~~

~~Applicability: At all times~~

~~Objective: To ensure that the dose rate in unrestricted areas from gaseous effluents will be within the limits of 10 CFR 20.~~

~~Specifications:~~

~~3.25.2.1 A. The dose rate in unrestricted areas (see Figure 5.1-1) due to radioactive materials released in gaseous effluents from the site shall be:~~

~~1) For noble gases: Less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin.~~

~~2) For iodine-131, for tritium and for all radionuclides in particulate form with half lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.~~

~~During periods of reactor building purging the dose rate may be averaged over a one hour interval.~~

~~B. With the dose rate(s) exceeding the above limits, without delay restore the release rate to within the above limit(s)~~

~~C. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~This specification is provided to ensure that, at any time, the dose rate due to gaseous effluents from all units on the site will be within the limits of 10 CFR 20 for unrestricted areas.~~

~~This specification applies to the release of gaseous effluents from all reactors at the site.~~

(This page will be deleted)

~~Radioactive Gaseous Effluents~~

~~3.25.2.2 Dose - Noble Gases~~

~~Applicability: At all times~~

~~Objective: To ensure that the design objective doses of 10 CFR 50, Appendix I, Section IV A, are not exceeded.~~

~~Specifications:~~

~~3.25.2.2. A. The dose due to noble gases released in gaseous effluents from ANO-1 to unrestricted areas (see Figure 5.1-1) shall be:~~

~~1) During any calendar quarter, less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation, and~~

~~2) During any calendar year, less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.~~

~~B. With the calculated dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days, pursuant to Specification 6.12.5.~~

~~C. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~Specification 3.25.2.2 implements the design guides specified in 10 CFR 50, Appendix I, Section II, and the limiting condition for operation as set forth in Section IV A of Appendix I.~~

~~The specifications provide the required operating flexibility and at the same time implement the guides set forth in Section IV A, Appendix I, to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable."~~

~~These limits provide reasonable assurance that radioactive material dis-charged in gaseous effluents will not result in the exposure of an indi-vidual in an unrestricted area, to annual average concentrations exceeding the limits specified in Appendix B, Table II 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.~~

(This page will be deleted)

~~Radioactive Gaseous Effluents~~

~~3.25.2.3 Dose - Iodine-131, Tritium, and Radionuclides in Particulate Form~~

~~Applicability: At all times~~

~~Objective: To ensure that the dose limits of 10 CFR 50, Appendix I, Section IV A, are met.~~

~~Specifications:~~

~~3.25.2.3 A. The dose to a member of the public from iodine-131, from tritium, and from all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released from ANO-1 to unrestricted areas (see Figure 5.1-1) shall be:~~

~~1) During any calendar quarter, less than or equal to 7.5 mrems to any organ, and~~

~~2) During any calendar year, less than or equal to 15 mrems to any organ.~~

~~B. With the calculated dose from the release of iodine-131, tritium and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days, pursuant to Specification 6.12.5.~~

~~C. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~Specification 3.25.2.3 implements the design guides set forth in 10 CFR 50, Appendix I, Section II C, and the limiting conditions for operation as set forth in Appendix I, Section IV A.~~

~~The specifications provide the required operating flexibility and at the same time implement the guides set forth in Section IV A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as reasonably achievable".~~

(This page will be deleted)

~~Radioactive Gaseous Effluents~~

~~3.25.2.4 Gaseous Radwaste Treatment~~

~~Applicability: At all times~~

~~Objective: To assure that the amount of radioactive material in gaseous effluents is "as low as reasonably achievable."~~

~~Specifications:~~

~~3.25.2.4 A. Ventilation exhaust treatment systems shall be used to reduce radioactive materials in gaseous waste prior to discharge when the projected doses due to gaseous effluent releases from ANO-1 to unrestricted areas (see Figure 5.1-1) would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation over a calendar quarter; or when the projected doses due to iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days would exceed 1.0 mrem to any organ over a calendar quarter.~~

~~B. When degasifying the reactor coolant system, the gaseous radwaste treatment system shall be utilized to process the degassing effluent to reduce the concentration of radioactive materials prior to discharge when the projected doses due to gaseous effluent releases from ANO-1 to unrestricted areas (see Figure 5.1-1) would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation over a calendar quarter.~~

~~C. With gaseous waste being discharged without treatment and in excess of the above limits, in lieu of any other report, prepare and submit to the Commission within 30 days a Special Report, per Specification 6.12.5.~~

~~D. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~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 reasonably achievable." The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the guide set forth in Sections II B and II C of Appendix I, 10 CFR Part 50, for gaseous effluents. The values 0.625 mrad, 1.25 mrad, and 1.0 mrem are approximately 25% of the yearly design objectives on a quarterly basis. The yearly design objectives are given in Specifications 3.25.2.2 and 3.25.2.3.~~

(This page will be deleted)

~~Radioactive Gaseous Effluents~~

~~3.25.2.5 Gas Storage Tanks~~ **(Moved to page 66w as Specification 3.25.2)**

~~Applicability: At all times~~

~~Objective: To restrict the amount of activity in a radioactive gas holdup tank.~~

~~Specifications:~~

~~3.25.2.5 A. The quantity of radioactivity contained in each gas storage tank shall be limited to 300,000 curies noble gases (Xe-133 equivalent).~~

~~B. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limit.~~

~~C. The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~The value of 300,000 curies is a suitable fraction of the quantity of radioactive material which if released over a 2-hour period, would result in a total body exposure to a member of the public at the exclusion area boundary of 500 mrem. This is consistent with Branch Technical Position ETSB 11-5 in NUREG-0800, July 1981.~~

(This page will be deleted)

~~3.25.3 Total Dose~~

~~Applicability: At all times~~

~~Objective: To ensure that the limits of 40 CFR 190 are not exceeded.~~

~~Specifications:~~

~~3.25.3.1 The calculated doses from the releas of radioactive materials in liquid or gaseous effluents shall not exceed twice the limits of Specification 3.25.1.2, 3.25.2.2, or 3.25.2.3.~~

~~3.25.3.2 With the calculated doses exceeding the above limits, prepare and submit a Special Report pursuant to 10CFR Part 20.405C.~~

~~3.25.3.3 If the limits of 40CFR190 have been exceeded, obtain a variance from the Commission to permit further releases in excess of 40CFR190 limits. A variance is granted until staff action on the request is completed.~~

~~3.25.3.4 The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~This specification is provided to meet the dose limitations of 40 CFR 190 that have now been incorporated into 10 CFR Part 20. The specification requires the preparation and submittal of a Special Report whenever the calculated doses from plant radioactive effluents exceed twice the design objective doses of Appendix I. For sites containing up to 4 reactors, it is highly unlikely that the resultant dose to a member of the public will exceed the dose limits of 40 CFR 190 if the individual reactors remain within tre reporting requirement level. The Special Report will describe a course of action that should result in the limitation of the annual dose to a member of the public to within the 40 CFR 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the member of the public from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclea fuel cycle facilities within a radius of 8 km must be considered. If dose to any member of the public is estimated to exceed the require of 40 CFR 190, the Special Report with a request for a variance (d the release conditions resulting in violation of 40 CFR 190 have already been corrected), in accordance with the provisions of 40 R 190.11 and 10 CFR 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR 20, as addressed in Specifications 3.25.1 and 3.25.2. An individual is not considered to be a member of the public during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.~~

(This page will be deleted)

~~3.25.4~~ ~~Solid Radioactive Waste~~

~~Applicability: At all times~~

~~Objective: To ensure solid radwaste is processed in accordance with the Process Control Program to meet shipping and burial ground requirements.~~

~~Specifications:~~

~~3.25.4.1 With the provisions of the Process Control Program not satisfied, suspend shipments of defectively processed or defectively packaged solid radioactive waste from the site.~~

~~3.25.4.2 The provisions of Specification 3.0.3 are not applicable.~~

~~Bases: This specification implements the requirements of 10CFR50.36a and General Design Criterion 60 of Appendix A to 10CFR50.~~

(This page will be deleted)

4.29 RADIOACTIVE EFFLUENTS

4.29.1 Radioactive Liquid Holdup Tanks

Applicability: At all times

Objective: To ensure that the limits of 10 CFR 20 are not exceeded.

Specification:

4.29.1 The quantity of radioactive material contained in an outside temporary radioactive liquid storage tank shall be determined to be within the limit of Specification 3.25.1 by analyzing a representative sample of the contents of the tank at least once per 7 days when radioactive materials are being added to the tank.

Bases:

This specification is provided to ensure that in the event of an uncontrolled release of the contents of the tank the resulting concentrations would be less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in the unrestricted area.

~~Effluents~~

~~4.29.1.1 Concentration~~

~~Applicability: At all times~~

~~Objective: To ensure that the limits of Specification 3.25.1.1 are met.~~

~~Specifications:~~

~~4.29.1.1 A. Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analyses program of Table 4.29-1.~~

~~B. The results of the radioactivity analyses shall be used in accordance with the ODCM to assure that the concentrations at point of release are maintained within the limits of Specification 3.25.1.1.~~

~~Bases:~~

~~This 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. This limitation provides additional assurance that the levels of radioactive materials in bodies of water outside the site will not result in exposures greater than the Section II A design objectives of Appendix I, CFR Part 50, to an individual. The concentration limit for noble gases is based upon the assumption that Xe-133 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 of Radiological Protection (ICRP) Publication 2.~~

4.29.2 Radioactive Gas Storage Tanks

Applicability: At all times

Objective: To ensure meeting the requirements of Specification 3.25.2.

Specification:

4.29.2 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the limits of Specification 3.25.2 at least once per 24 hours when radioactive materials are being added to the tank and the reactor coolant activity exceeds the limits of Specification 3.1.4.1.b.

Bases:

This specification is provided so that the requirements of Specification 3.25.2 are met.

~~Table 4.29-1~~

~~RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSES PROGRAM~~

~~Liquid Release Type~~	~~Sampling Frequency~~	~~Minimum Analyses Frequency~~	~~Type of Activity Analyses~~	~~Lower Limit of Detection (LLD) (µCi/ml) (a)~~
~~A. Batch Waste Release (d)~~	~~P Each Batch~~	~~P Each Batch~~	~~γisotopi (c)~~	~~5×10^{-7} (b)~~
			~~I-131~~	~~1×10^{-6}~~
	~~P One Batch/M~~	~~M~~	~~Dissolved and Entrained Gases (Gamma Emitters)~~	~~1×10^{-5}~~
	~~P Each Batch~~	~~M Composite (e)~~	~~H-3~~	~~1×10^{-5}~~
			~~Gross Alpha~~	~~1×10^{-7}~~
	~~P Each Batch~~	~~Q Composite (e)~~	~~Sr-89, Sr-90~~	~~5×10^{-8}~~
			~~Fe-55~~	~~1×10^{-6}~~

~~TABLE NOTATION~~

~~a. The Lower Limit of Detection (LLD) is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.~~

~~For a particular measurement system (which may include radio-chemical separation):~~

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

~~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 (in 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 transformations per minute per picocurie~~

~~Y is the fractional radiochemical yield (when applicable)~~

~~λ is the radioactive decay constant for the particular radionuclide~~

~~∇t is the elapsed time between sample collection (or end of the sample collection period) and time of counting~~

~~Typical values of E, V, Y and ∇t should be used in the calculation.~~

~~It should be recognized that the LLD is an a Priori (before the fact) limit representing the capability of measurement system and not an a Posteriori (after the fact) limit for a particular measurement.~~

(This page will be deleted)

~~b. For certain mixtures of gamma emitters, it may not be possible to measure radionuclides in concentrations near their sensitivity limits when other nuclides are present in the sample in much greater concentrations. Under these circumstances, it will be more appropriate to calculate the concentration of such radionuclides using observed ratios with those radionuclides which are measurable.~~

~~c. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.~~

~~d. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling, each batch shall be isolated and mixed to ensure representative sampling.~~

~~e. The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Mn54, Fe59, Co58, Co60, Zn65, Mo99, Cs134, Cs137, Ce141, and Ce144. 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.~~

~~D Daily~~
~~P Prior to Release~~
~~M Monthly~~
~~Q Quarterly~~
~~R Every 18 months~~

(This page will be deleted)

~~Radioactive Liquid Effluents~~

~~4.29.1.2 Liquid Holdup Tanks~~ **(Moved to page 110cc as specification 4.29.1)**

~~Applicability: At all times~~

~~Objective: To ensure that the limits of 10 CFR 20 are not exceeded.~~

~~Specifications:~~

~~4.29.1.2 The quantity of radioactive material contained in an outside temporary radioactive liquid storage tank shall be determined to be within the limit of Specification 3.25.1.4 by analyzing a representative sample of the contents of the tank at least once per 7 days when radioactive materials are being added to the tank.~~

~~Bases:~~

~~This specification is provided to ensure that in the event of an uncontrolled release of the contents of the tank the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in the unrestricted area.~~

(This page will be deleted)

~~Radioactive Liquid Effluents~~

~~4.29.1.3 Liquid Radioactive Effluent Instrumentation~~

~~Applicability: Applies to the instrumentation in the liquid radwaste system that is used to limit the amount of radioactivity released to the environs.~~

~~Objective: To provide surveillance specifications for the instruments required in Specification 3.5.6.~~

~~Specifications:~~

~~4.29.1.3 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and channel test at the frequencies shown in Table 4.29-2.~~

~~Bases:~~

~~To ensure that the instrumentation for the liquid radwaste system is operable.~~

~~The channel test demonstrates that automatic isolation of this pathway and control room alarm annunciation occur if the instrument indicates measured levels above the trip setpoint. The channel test also demonstrates that alarm annunciation occurs if any of the following conditions exist:~~

1. ~~Power to the detector is lost.~~
2. ~~The instrument indicates a downscale failure.~~
3. ~~Instrument controls are not set in the operate mode.~~

~~The initial channel calibration is performed using one or more of the reference standards certified by the National Bureau of Standards or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards permit calibrating the system over its intended range of energy and measurement range. For subsequent channel calibration, sources that have been related to the initial calibration are used.~~

(This page will be deleted)

~~Table 4.29-2~~

~~Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirement~~

~~Instrument~~	~~Channel Check~~	~~Source Check~~	~~Channel Calibration~~	~~Channel Test~~
~~Liquid radwaste effluent line~~				
~~Radiation monitor (automatic termination)~~	~~D*~~	~~P**~~	~~R~~	~~Q~~
~~Flow monitor~~	~~D*~~	~~NA~~	~~R~~	~~NA~~

~~Notation~~

~~*During releases via this pathway~~

~~**A check source is not required if the background activity is greater than the activity of the check source.~~

~~D Daily~~
~~P Prior to release~~
~~M Monthly~~
~~Q Quarterly~~
~~R Every 18 months~~

(This page will be deleted)

~~4.29.2 Radioactive Gaseous Effluents~~

~~4.29.2.1 Dose Rate~~

~~Applicability: At all times~~

~~Objective: To ensure that the dose rate, at any time, in unrestricted areas from gaseous effluents will be within the dose limits of 10 CFR 20.~~

~~Specifications:~~

~~4.29.2.1 A. The dose rate, due to noble gases in gaseous effluents shall be determined in accordance with the ODCM to be within the limits of Specification 3.25.2.1.~~

~~B. The dose rate in unrestricted areas, due to iodine-131, tritium, and all radionuclides in particulate form with half-lives greater than 8 days released in gaseous effluents, shall be determined in accordance with the ODCM to be within the required limits by using the results of the sampling and analyses program, specified in Table 4.29-3.~~

~~Bases:~~

~~This specification provides for sampling and analyses to ensure that Specification 3.25.2.1 is met.~~

(This page will be deleted)

~~TABLE 4.29-3~~

~~RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSES PROGRAM~~

~~Gaseous Reelease Type~~	~~Sampling frequency~~	~~Minimum Analyses Frequency~~	~~Type of Activity Analyses~~	~~Lower Limit of Detection (LLD) (μCii/ml) (a)~~
~~A. Waste Gas Storage Tank~~	~~P Each Tank Grab Sample~~	~~P Each Tank~~	~~Principal Gamma Emitters (b)~~	~~1×10^{-4} (g)~~
~~B. Reactor Building Purge~~	~~P Each Purge Grab Sample~~	~~P Each Purge~~	~~Principal Gamma Emitters (b)~~ ~~H-3~~	~~1×10^{-4} (g)~~ ~~1×10^{-6}~~
~~C. Unit Vents~~	~~M (c) (d) Grab Sample~~	~~M~~	~~Principal Gamma Emitters (b)~~ ~~H-3~~	~~1×10^{-4} (g)~~ ~~1×10^{-6}~~
~~(Auxiliary Bldg.)~~ ~~(Spent Fuel Pool Area Ventilation)~~ ~~(Rx Bldg. Ventilaiton)~~	~~Continuous (e)~~	~~W (f) Charcoal Sample~~	~~I-131~~	~~1×10^{-12}~~
	~~Continuous (e)~~	~~W (f) Particulate Sample~~	~~Principal Gamma Emitters (b)~~ ~~H-3~~	~~1×10^{-11}~~
	~~Continuous (e)~~	~~M Particulate Sample~~	~~Grpss Alpha~~	~~1×10^{-11}~~
	~~Continuous (e)~~	~~Q Composite Particulate Sample~~	~~Sr-89, Sr-90~~	~~1×10^{-11}~~
	~~Continuous (e)~~	~~Noble Gas Monitor~~	~~Noble Gases Gross Beta or Gamma~~	~~1×10^{-6} (Xe-133 equiv.)~~

(This page will be deleted)

~~TABLE 4.29-3 (Continued)~~

~~TABLE NOTATION~~

~~a. See definition in Table 4.29-1, Table Notation.~~

~~b. The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. 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 for that nuclide. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the semiannual effluent report.~~

~~c. Tritium grab samples shall be taken from the Reactor Building ventilation exhaust at least once per 24 hours when the refueling canal is flooded.~~

~~d. Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel area, whenever spent fuel is in the spent fuel pool.~~

~~e. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specification 3.25.2.1, 3.25.2.2, and 3.25.2.3.~~

~~f. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from the sampler).~~

~~g. 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 LLD. Under these circumstances, the LLD may be increased inversely proportional to the magnitude of the gamma yield (i.e., (1E-4/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 1.~~

~~D Daily~~
~~P Prior to Release~~
~~W Weekly~~
~~M Monthly~~
~~Q Quarterly~~
~~R Every 18 months~~

(This page will be deleted)

~~Radioactive Gaseous Effluents~~

~~4.29.2.2 Gas Storage Tanks~~ **(Moved to page 110dd as Specification 4.29.2)**

~~Applicability: At all times~~

~~Objective: To ensure meeting the requirements of Specification 3.25.2.5.~~

~~Specifications:~~

~~4.29.2.2 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the limits of Specification 3.25.2.5 at least once per 24 hours when radioactive materials are being added to the tank and the reactor coolant activity exceeds the limits of Specification 3.1.4.1.b.~~

~~Bases:~~

~~This specification is provided so that the requirements of Specification 3.25.2.5 are met.~~

(This page will be deleted)

~~Radioactive Gaseous Effluents~~

~~4.29.2.3 Radioactive Gaseous Effluent Monitoring Instrumentation~~

~~Applicability: Applies to the instrumentation in the gaseous radwaste system that is used to limit the amount of activity released to the environs.~~

~~Objective: To provide surveillance specifications for the instruments listed in Specification 3.5.7.~~

~~Specifications:~~

~~4.29.2.3 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and channel test at the frequencies shown in Table 4.29-4.~~

~~Bases:~~

~~To ensure that the instrumentation for the gaseous radwaste system is operable.~~

~~The channel test demonstrates that control room alarm annunciation occurs if any of the following conditions exist:~~

1. ~~The instrument indicates measured levels above the alarm/trip setpoint.~~
2. ~~Power to the detector is lost.~~
3. ~~The instrument indicates a downscale failure.~~
4. ~~Instrument controls are not set in the operate mode.~~

~~For the waste gas holdup system noble gas activity monitor, the channel test also demonstrates that automatic isolation of the release pathway occurs if the instrument indicates above the trip setpoint.~~

~~The initial channel calibration is performed using one or more of the reference standards certified by the National Bureau of Standards or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards permit calibrating the system over its intended range of energy and measurement range. For subsequent channel calibration, sources that have been related to the initial calibration are used.~~

(This page will be deleted)

~~Table 4.29-4~~

~~Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Requirements~~

~~Instrument~~	~~Channel Check~~	~~Source** Check~~	~~Channel Calibration~~	~~Channel Functional Test~~
~~1. Waste Gas Holdup System~~				
~~a. Noble Gas Activity Monitor (provides automatic termination of release~~	~~D*~~	~~P~~	~~R~~	~~Q~~
~~b. Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~2. Auxiliary Building Ventilation System~~				
~~a. Noble Gas Activity Monitor~~	~~D*~~	~~M~~	~~R~~	~~Q~~
~~b. Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~c. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~d. Iodine Sampler Cartridge~~	~~W*(1)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~e. Particulate Sampler Filter~~	~~W*(1)~~	~~N/A~~	~~N/A~~	~~N/A~~

(This page will be deleted)

~~Table 4.29-4 (Continued)~~

~~Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Requirements~~

~~Instrument~~	~~Channel Check~~	~~Source** Check~~	~~Channel Calibration~~	~~Channel Functional Test~~
~~3. Spent Fuel Pool Area Ventilation System~~				
~~a. Noble Gas Activity Monitor~~	~~D*~~	~~M~~	~~R~~	~~Q~~
~~b. Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~c. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~d. Iodine Sampler Filter~~	~~W*(1)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~e. Particulate Sampler Filter~~	~~W*(1)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~4. Reactor Building Purge System~~				
~~a. Noble Gas Activity Monitor~~	~~D*~~	~~M~~	~~R~~	~~P~~
~~b. Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~c. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~d. Iodine Sampler Filter~~	~~W*(1)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~e. Particulate Sampler Filter~~	~~W*(1)~~	~~N/A~~	~~N/A~~	~~N/A~~

(This page will be deleted)

~~Table 4.29-4 (Continued)~~

~~Table Notation~~

~~*During releases via this pathway.~~
~~**A check source is not required if the background activity is greater than the activity of the check source.~~

~~P Prior to release~~

~~W Weekly~~

~~D Daily~~

~~M Monthly~~

~~Q Quarterly~~

~~R Once per 18 Months~~

~~NA Not applicable~~

~~(1) Verify presence of cartridge or filter only.~~

(This page will be deleted)

~~4.29.3~~ ~~Dose Calculations for Radioactive Effluents~~

~~Applicability:~~ ~~At all times~~

~~Objective:~~ ~~To ensure that the requirements of 10 CFR50, Appendix I, Section IIIA are met.~~

~~Specifications:~~

~~4.25.3~~ ~~Cumulative dose contributions and dose projections for liquid effluents and for gaseous effluents shall be determined in accordance with the Offsite Dose Calculation Manual at least once per 31 days.~~

~~Bases:~~

~~These calculations provide the dose values to be compared to the limits of Specifications 3.25.1.2, 3.25.1.3, 3.25.2.2, 3.25.2.3, 3.25.2.4 and 3.25.3.~~

(This page will be deleted)

~~4.29.4~~ ~~Solid Radioactive Waste~~

~~Applicability:~~ ~~At all times~~

~~Objective:~~ ~~To ensure solid radioactive waste is processed in accordance with the Process Control Program to meet shipping and burial ground requirements.~~

~~Specification:~~

~~4.29.4~~ ~~Proper solidification of wet radioactive waste shall be verified in accordance with the surveillance requirements of the Process Control Program.~~

~~Bases:~~ ~~This specification provides for surveillance of radioactive waste solidification processes to ensure compliance with Specification 3.25.4.~~

(This page will be deleted)

~~4.30 RADIOLOGICAL ENVIRONMENTAL MONITORING~~

~~4.30.1 Radiological Environmental Monitoring Program Description~~

~~Applicability~~

~~Applies at all times.~~

~~Objective~~

~~To provide information on the radiological effects of station operation on the environment.~~

~~Specification~~

~~4.30.1.1 The radiological environmental monitoring samples shall be collected pursuant to Table 4.30-1 and shall be analyzed pursuant to the requirements of Tables 4.30-1 and 4.30-2. The sample locations shall be listed in Table 4-1 in the ODCM.~~

~~4.30.1.2 a. With the radiological environmental monitoring program not being conducted as specified in Table 4.30-1, prepare and submit to the Commission in the Annual Radiological Environmental Report a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. (Deviations are permitted from the required sampling schedule if specimens are not obtainable due to hazardous conditions, seasonal unavailability, or to malfunction of sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period.)~~

~~b. With the level of radioactivity as the result of plant effluents in an environmental sampling medium at one or more of the locations specified in Table 4.30-1 exceeding the limits of Table 4.30-3 when averaged over any calendar quarter, prepare and submit to the Commission, within 30 days from the end of the affected quarter, a Special Report which includes an evaluation of any release conditions, environmental factors or other aspects which caused the limits of Table 4.30-3 to be exceeded, and defines the actions taken to reduce radioactive effluents so that the potential annual dose to a member of the public is less than the calendar year limits of Specifications 3.25.1.2 and 3.25.2.2. When more than one of the radionuclides in Table 4.30-3 are detected in the sampling medium, this Special Report shall be submitted if:~~

$$\frac{\text{Concentration (1)}}{\text{reporting level (1)}} + \frac{\text{Concentration (2)}}{\text{reporting level (2)}} + \ldots \geq 1.0$$

~~When radionuclides other than those in Table 4.30-3 are detected and are the result of plant effluents, this Special Report shall be submitted if the potential annual dose to a member of the public is equal to or greater than the calendar~~

(This page will be deleted)

~~year limits of Specifications 3.25.1.2 and 3.25.2.2. This Special 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 Report.~~

~~c. With milk or fresh leafy vegetable samples unavailable from any of the sample locations required by Table 4.30-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the causes of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Semiannual Radioactive Effluent Release Report and also include in the report a revised table for the ODCM reflecting the new location(s).~~

~~d. The provisions of Specification 3.0.3 are not applicable.~~

~~4.30.1.3 The results of analyses performed on the radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Report.~~

~~Bases:~~

~~The radiological 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 effluents 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 the environmental exposure pathways. The initially specified monitoring 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 4.30-2 are state-of-the-art for routine environmental measurements in industrial laboratories. The LLD's for drinking water meet the requirements of 40 CFR 141.~~

(This page will be deleted)

~~TABLE 4.30-1~~

~~RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM~~

~~Exposure Pathway and/or Sample~~	~~Number of Sample Locations*~~	~~Sampling and Collection Frequency~~	~~Type of Frequency of Analyses~~
~~1. AIRBORNE~~			
~~a. Radioiodine and Particulates~~	~~5 Locations~~	~~Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days~~	~~Radioiodine canister. Analyze at least once per 7 days for I-131.~~ ~~Particulate sampler. Analyze for gross beta radioactivity > 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is > 10 times the mean of control sample. Perform gamma isotopic analysis on composite (by location) sample at least once every 92 days.~~
~~2. DIRECT RADIATION~~	~~40 Locations 2 dosimeter per location~~	~~At least once per 92 days~~	~~Gamma dose. At least once per 92 days.~~

~~*Sample locations are shown in the Offsite Dose Calculation Manual (ODCM).~~

(This page will be deleted)

~~Table 4.30-1 (Continued)~~

~~Exposure Pathway and/or Sample~~	~~Number of Sample Locations*~~	~~Sampling and Collection Frequency~~	~~Type of Emergency of Analyses~~
~~3. WATERBORNE~~			
~~a. Surface~~	~~2 Locations~~	~~Composite** sample collected over a period ≤ 31 days.~~	~~Gamma isotopic analysis of each sample by location. Tritium analysis of composite sample at least once every 92 days.~~
~~b. Ground~~	~~2 Locations~~	~~At least once per 92 days.~~	~~Gamma isotopic and tritium analyses of each sample.~~
~~c. Drinking~~	~~1 Location~~	~~Monthly grab sample.~~	~~I-131 analysis of each sample;~~ ~~and~~ ~~Gross beta and gamma isotopic analyses of each sample. Tritium analysis of composite sample at lease once every 92 days.~~
~~d. Sediment from Shoreline~~	~~2 Locations~~	~~At least once per 184 days.~~	~~Gamma isotopic analysis of each sample~~

~~*Sample locations are shown in the ODCM.~~
~~**Composite samples shall be collected by an aliquot at intervals not exceeding 24 hours.~~

(This page will be deleted)

~~Table 4.30-1 (Continued)~~

~~Exposure Pathway and/or Sample~~	~~Number of Sample Locations*~~	~~Sampling and Collection Frequency~~	~~Type of Emergency of Analyses~~
~~4. INGESTION~~			
~~a. Milk~~	~~4 Locations~~	~~At least once per 31 days when animals are on pasture.~~	~~Gamma isotopic and I-131 analyses of each sample.~~
~~b. Fish~~	~~2 Locations~~	~~One sample in season, or at least once per 184 days if not seasonal. One sample of each of the following species:~~	~~Gamma isotopic analysis on edible portions.~~
		~~1. Catfish~~	
		~~2. Crappie or Bass~~	
~~c. Food Products**~~	~~3 Locations~~	~~At time of harvest. One sample of each of the following classes of food products:~~	~~Gamma isotopic analysis on edible portions.~~
		~~1. Fruits~~	
		~~2. Flowering Vegetable~~	
		~~3. Tubular Vegetable~~	
	~~1 Location~~	~~At time of harvest. One sample of broad leaf vegetation.~~	~~I-131 analysis.~~

~~*Sample locations are shown in the ODCM.~~
~~**If these food products are available.~~

(This page will be deleted)

~~Table 4.30-2~~

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

~~Analyses~~	~~Water (pCi/l)~~	~~Airborne Particulate or Gas (pCi/m³)~~	~~Fish (pCi/kg, wet)~~	~~Milk (pCi/l)~~	~~Food Products (pCi/kg, wet)~~	~~Sediment (pCi/kg, dry)~~
~~gross beta~~	~~4[b]~~	~~1×10^{-2}~~				
~~^{3}H~~	~~(1000[b])~~					
~~^{54}Mn~~	~~15~~		~~130~~			
~~^{59}Fe~~	~~30~~		~~260~~			
~~$^{58, 60}Co$~~	~~15~~		~~130~~			
~~^{65}Zn~~	~~30~~		~~260~~			
~~$^{95}Zr\text{-}Nb$~~	~~15~~					
~~^{131}I~~	~~1*[b]~~	~~7×10^{-2}~~		~~1~~	~~60[c]~~	
~~$^{134, 137}Cs$~~	~~15(10[b]), 18~~	~~1×10^{-2}~~	~~130, 150~~	~~15, 18~~	~~60, 80~~	~~150, 180~~
~~$^{140}Ba\text{-}La$~~	~~15~~			~~15~~		

~~*For Monthly grab samples.~~

~~(a) See definition of LLD in table notation of Table 4.29-1.~~
~~(b) LLD for drinking water.~~
~~(c) LLD for leafy vegetables.~~

(This page will be deleted)

~~Table 4.30-3~~

~~Reporting Levels For Radioactivity Concentrations In Environmental Samples~~

~~Analyses~~	~~Water (pCi/l)~~	~~Airborne Particulate or Gases (pCi/m³)~~	~~Fish (pCi/kg,wet)~~	~~Milk (pCi/l)~~	~~Food Products (pCi/kg,wet)~~			
~~H-3~~	~~3×10^4 (a)~~							
~~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 (b)~~							
~~I-131~~	~~2~~	~~0.9~~		~~3~~	~~1×10^2~~	~~Cs-134~~	~~30 10~~	~~1×10^3~~
	~~1×10^3~~							
~~Cs-137~~	~~50~~	~~20~~	~~2×10^3~~	~~70~~	~~2×10^3~~			
~~Ba-La-140~~	~~2×10^2 (b)~~			~~3×10^2 (b)~~				

~~(a) For drinking water samples.~~
~~(b) Total for parent and daughter.~~

(This page will be deleted)

~~4.30.2 Land Use Census~~

~~Applicability: Applies at all times~~

~~Objectives: This specification will identify changes in use of the unrestricted areas.~~

~~Specifications:~~

~~4.30.2.1 A land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence, and the nearest garden* of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles from the ANO-1 reactor building.~~

~~4.30.2.2 The land use census shall be conducted at least once per 12 months between the dates of June 1 and October 1, by door-to-door survey, aerial survey, or by consulting local agricultural authorities.~~

~~4.30.2.3 a. With a land use census identifying a location(s) which yields a calculated dose commitment due to I-131, tritium, and radionuclides in particulate form greater than the values currently being calculated in Unit 1 Specification 4.29.3 and Unit 2 Specification 4.11.2.3 submit location description in the Semiannual Radioactive Effluent Release Report per Specification 6.12.2.6.~~

~~b. With a land use census identifying a location(s) which yields a calculated dose commitment (via the same exposure pathway) greater than at a location from which samples are currently being obtained in accordance with Specification 4.30.1.1, identify the new location in the Semiannual Radioactive Effluent Release Report per Specification 6.12.2.6. The new location shall be added to the radiological environmental monitoring program within 30 days, if possible. The sampling location having the lowest calculated 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.~~

~~4.30.2.4 The results of the land use census shall be included in the Annual Radiological Environmental Report.~~

~~4.30.2.5 The provisions of Specification 3.0.3 are not applicable.~~

~~*Broad leaf vegetation sampling may be performed at the site boundary in the direction sector with the highest D/Q in lieu of the garden census.~~

(This page will be deleted)

~~Bases:~~

~~This specification is provided to ensure 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. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathway via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26kg/year) of leafy vegetables assumed in Regulatory guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were used, 1) that 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of 2 kg/square meter.~~

(This page will be deleted)

~~4.30.3 Interlaboratory Comparison Program~~

~~Applicability: Applies to the off-site radiochemistry laboratory.~~

~~Objective: To provide independent checks on the accuracy of the measurements of radioactive material in environmental samples.~~

~~Specifications:~~

~~4.30.3.1 Analyses shall be performed on radioactive materials supplied as part of Interlaboratory Comparison Program which has been approved by NRC.~~

~~4.30.3.2 With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Report.~~

~~4.30.3.3 The results of analyses performed as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Report pursuant to Specification 6.12.2.5.~~

~~4.30.3.4 The provisions of Specification 3.0.3 are not applicable.~~

~~Bases:~~

~~The requirement for participation in an Interlaboratory Comparison Program is provided to ensure 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.~~

(This page will be deleted)

(This page will be deleted)

Poir
A

Delete Figure 5.1-1

~~FIGURE 5.1-1~~

~~MAXIMUM AREA BOUNDARY FOR RADIOACTIVE RELEASE CALCULATION~~
~~(EXCLUSION AREAS)~~

~~(GASES - 1046 METER RADIUS)~~
~~(LIQUIDS - END OF DISCHARGE CANAL (POINT A))~~

6.6 REPORTABLE EVENT ACTION

6.6.1 A REPORTABLE EVENT shall be any of those conditions specified in Section 50.73 to 10 CFR Part 50.

6.6.2 The following actions shall be taken for REPORTABLE EVENTS:

a. A report shall be submitted to the Commission pursuant to the requirements of Section 50.73 to 10 CFR Part 50, and

b. Each REPORTABLE EVENT shall be reviewed by the PSC, and the results of this review shall be submitted to the SRC and the Vice President, Operations ANO.

6.7 SAFETY LIMIT VIOLATION

6.7.1 The following actions shall be taken in the event a Safety Limit is violated:

a. The facility shall be placed in at least hot shutdown within one hour.

b. The Nuclear Regulatory Commission shall be notified pursuant to 10 CFR 50.72 and a report submitted pursuant to the requirements of 10 CFR 50.36 and Specification 6.6.

6.8 PROCEDURES AND PROGRAMS

6.8.1 Written procedures shall be established, implemented and maintained covering the activities referenced below:

a. The applicable procedures recommended in Appendix "A" of Regulatory Guide 1.33, November, 1972.

b. Refueling operations.

c. Surveillance and test activities of safety related equipment.

d. (Deleted)

e. (Deleted)

f. Fire Protection Program Implementation.

g. New and spent fuel storage.

h. Offsite Dose Calculation Manual and Process Control Program implementation at the site.

i. Post accident sampling (includes sampling of reactor coolant, radioactive iodines and particulates in plant gaseous effluents, and the containment atmosphere).

6.8.2 Each procedure of 6.8.1 above, and changes in intent thereto, shall be reviewed and approved as required by the QAMO prior to implementation and reviewed periodically as set forth in administrative procedures.

6.8.3 Changes to procedures of 6.8.1 above may be made and implemented prior to obtaining the review and approval required in 6.8.2 above provided:

a. The intent of the original procedure is not altered.

b. The change is approved by two members of the plant management staff, at least one of whom holds a Senior Reactor Operator's license on Unit 1.

c. The change is documented, reviewed and approved as required by the QAMO, within 14 days of implementation.

6.8.4 The following program shall be established, implemented, and maintained:

a. Radioactive Effluent Controls Program

This program conforms with 10 CFR 50.36a for the control of radioactive effluents and for maintaining the doses to MEMBERS OF THE PUBLIC from radioactive effluents as low as reasonably achievable. The program shall be contained in the ODCM, shall be implemented by procedures, and shall include remedial actions to be taken whenever the program limits are exceeded. The program shall include the following elements:

1) Limitations on the functional capability of radioactive liquid and gaseous monitoring instrumentation including surveillance tests and setpoint determination in accordance with the methodology in the ODCM;

2) Limitations on the concentrations of radioactive material released in liquid effluents to UNRESTRICTED AREAS conforming to 10 CFR Part 20, Appendix B, Table 2, Column 2;

3) Monitoring, sampling, and analysis of radioactive liquid and gaseous effluents in accordance with 10 CFR 20.1302 and with the methodology and parameters in the ODCM;

4) Limitations on the annual and quarterly doses or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released from each unit to UNRESTRICTED AREAS, conforming to 10 CFR 50, Appendix I;

5) Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM at least every 31 days;

6) Limitations on the functional capability and use of the liquid and gaseous effluent treatment systems to ensure that appropriate portions of these systems are used to reduce releases of radioactivity when the projected doses in a period of 31 days would exceed 2% of the guidelines for the annual dose or dose commitment, conforming to 10 CFR 50, Appendix I;

7) Limitations on the dose rate resulting from radioactive material released in gaseous effluents to areas beyond the site boundary conforming to the dose associated with 10 CFR 20, Appendix B, Table 2, Column 1;

8) Limitations on the annual and quarterly air doses resulting from noble gases released in gaseous effluents from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I;

9) Limitations on the annual and quarterly doses to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives > 8 days in gaseous effluents released from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I; and

10) Limitations on the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources, conforming to 40 CFR 190.

h. Records of in-service inspections performed pursuant to these Technical Specifications.

i. Records of Quality Assurance activities required by Section 17 of the Quality Assurance Manual for Operations.

j. Records of reviews performed for changes made to procedures or equipment or reviews of tests and experiments pursuant to 10CFR50.59.

k. Records of meetings of the PSC and the SRC.

l. Records of reviews performed for changes made to the Offsite Dose Calculation Manual and Process Control Program. ~~(DELETED)~~

m. Records of the service lives of the seals of all hydraulic snubbers applicable to Specification 3.16 including the date at which the service life commences and associated installation and maintenance records.

n. Records of analyses required by the Radiological Environmental Monitoring Program.

6.10 RADIATION PROTECTION PROGRAM

Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure.

6.11 HIGH RADIATION AREA

6.11.1 In lieu of the "control device" or "alarm signal" required by paragraph 20.203(c)(2) of 10CFR20, each high radiation area (as defined in 20.202(b)(3) of 10CFR20) in which the intensity of radiation is 1000 mrem/hr or less shall be barricaded and conspicuously posted as a high radiation area and shall be controlled by requiring the issuance of a radiation work permit. Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following:

a. A radiation monitoring device which continuously indicates the radiation dose rate in the area.

b. A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a pre-set integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate level in the area has been established and personnel have been made knowledgeable of them.

c. An individual qualified in radiation protection procedures who is equipped with a radiation dose rate monitoring device. This individual shall be responsible for providing positive control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified in the radiation work permit.

The dose assignments to various duty functions may be estimates based on pocket dosimeter, TLD, or film badge measurements. Small exposures totaling 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.

6.12.2.3 Monthly Operating Report

Routine reports of operating statistics which include:

(1) Average Daily Unit Power Level
(2) Operating Data Report
(3) Unit Shutdowns and Power Reductions
(4) Narrative Summary of Operating Experience

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

6.12.2.4 Annual Report

All challenges to the pressurizer electromatic relief valve (ERV) and pressurizer safety valves shall be reported annually.

6.12.2.5 Annual Radiological Environmental Operating Report+*

~~(a) Routine~~ The Annual ~~r~~Radiological ~~e~~Environmental Operating ~~r~~Report~~s~~ covering the operation of the unit during the previous calendar year shall be submitted ~~prior to~~ by May 15 of each year.

~~(b)~~ The ~~annual radiological environmental~~ report~~s~~ shall include summaries, interpretations, and analyses of trends ~~statistical evaluation~~ of the results of the radiological environmental monitoring program ~~surveillance activities~~ for the reporting period.~~,~~ The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C. ~~including a comparison with preoperational studies, operational controls (as appropriate) and previous environmental surveillance reports and an assessment of the observed impact of the plant operation on the environment. The report shall also include the results of the land use census or evidence of irreversible damage 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 Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual 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 in a supplementary report as soon as possible.

6.12.2.6 Radioactive Effluent Release Report **

The Radioactive Effluent Release Report covering the operation of the unit shall be submitted in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

~~+~~* A single submittal may be made for ANO~~-1 and ANO-2~~. The submittal should combine those sections that are common to both units. ~~at the station.~~

** A single submittal may be made for ANO. The submittal should combine those sections that are common to both units. The submittal shall specify the releases of radioactive material from each unit.

~~The annual radiological environmental reports shall include summarized and tabulated results of all radiological environmental samples 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 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; the result of Land Use Census required by the Specification 4.30.2, and the results of licensee participation in the Interlaboratory Comparison Program required by Specification 4.30.3.~~

~~6.12.2.6 Semiannual Radioactive Effluent Release Report**~~ (Moved to page 141)

~~(a) Routine radioactive effluent release reports covering the operation 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.~~

~~(b) The radioactive effluent release reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste release from the unit. The data will be summarized on a quarterly basis following the format of Regulatory Guide 1.21, Rev. 1.~~

~~(c) The radioactive effluent release report shall include the following information for all unplanned releases to unrestricted areas of radioactive material in gaseous and liquid effluents:~~

~~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.~~

~~(d) This report shall contain a description of any changes to the ODCM and PCP made during the period of the report.~~

~~**A single submittal may be made for ANO-1 and ANO-2.~~

(This page will be deleted)

~~(e) The first report filed each year shall contain:~~

~~1. A summary of the hourly meteorological data collected over the previous calendar year. In lieu of including this summary in the report, the data may be retained by the Licensee for NRC review and noted as such in the report.~~

~~2. A summary of radiation doses due to radiological effluents during the previous calendar year calculated in accordance with the methodology specified in the OFFSITE DOSE CALCULATION MANUAL.~~

~~3. The radiation dose to members of the public due to their activities inside the site boundary. This calculated dose shall include only those dose contributions directly attributed to operation of the unit and shall be compared to the limits specified in 40CFR190.~~

~~(f) The first report filed each year shall include a description of licensee initiated major changes to the radioactive waste systems (liquid, gaseous and solid) during the previous calendar year.***~~

~~***This information may be included in the annual FSAR update in lieu of inclusion in this report.~~

(This page will be deleted)

6.12.5 Special Reports

Special reports shall be submitted to the Administrator of the appropriate Regional Office 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. Tendon Surveillance, Specification 4.4.2.2

b. Inoperable Containment Radiation Monitors, Specification 3.5.1, Table 3.5.1-1.

c. Deleted ~~Radioactive Effluents, Specifications 3.25.1, 3.25.2, 3.25.3, and 3.25.4.~~

~~This report shall include the following:~~

~~1) Description of occurrence.~~

~~2) Identify the cause(s) for exceeding the limit(s)~~

~~3) Explain corrective action(s) taken to mitigate occurrence.~~

~~4) Define action(s) taken to prevent recurrence.~~

~~5) Summary of consequence(s) of occurrence.~~

~~6) Describe levels exceeding 40CFR190 in accordance with 10CFR20.405(c), as applicable.~~

d. Steam Generator Tubing Surveillance - Category C-3 Results, Specification 4.18.

e. Miscellaneous Radioactive Materials Source Leakage Tests, Specification 3.12.2.

f. Deleted~~Radiological Environmental Monitoring Sample Analysis, Specification 4.30.1.~~

g. Deleted~~An unplanned offsite release during any one hour period 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 be submitted within 30 days of the occurrence and 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.~~

h. Inoperable Fire Detection Instrumentation

i. Inoperable Fire Suppression Systems

j. Degraded Auxiliary Electrical Systems, Specification 3.7.2.H.

k. Inoperable Reactor Vessel Level Monitoring Systems, Table 3.5.1-1

l. Inoperable Hot Leg Level Measurement Systems, Table 3.5.1-1

m. Inoperable Main Steam Line Radiation Monitors, Specification 3.5.1, Table 3.5.1-1.

~~h. Inoperable Fire Detection Instrumentation~~

~~i. Inoperable Fire Suppression Systems~~

~~j. Degraded Auxiliary Electrical Systems, Specification 3.7.2.H.~~

~~k. Inoperable Reactor Vessel Level Monitoring Systems, Table 3.5.1-1~~

~~l. Inoperable Hot Leg Level Measurement Systems, Table 3.5.1-1~~

~~m. Inoperable Main Steam Line Radiation Monitors, Specification 3.5.1, Table 3.5.1-1.~~

(The contents of this page have been moved to page 146a and this page is being deleted.)

6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the radiological environmental monitoring program.

The ODCM shall also contain the radioactive effluent controls and radiological environmental monitoring activities and descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Specifications 6.12.2.5 and 6.12.2.6.

Licensee initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

   1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s), and

   2. A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations;

b. Shall become effective after approval of the General Manager, Plant Operations; and

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed and shall also indicate the date (i.e., month and year) the change was implemented.

~~6.14.1 The ODCM shall describe 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 consistent with the applicable LCO's contained in these Technical Specifications.~~

~~6.14.2 Any change to the ODCM made by the licensee shall:~~

~~1. be reviewed and found acceptable by the PSC and SRC,*~~

~~2. be submitted to the Commission** by inclusion in the Semiannual Radioactive Effluent Release Report (Specification 6.12.2.6) for the period during which the change was made effective,~~

~~3. become effective upon a date specified and agreed to by both the PSC and SRC following their review and acceptance of the change.~~

~~*Changes to the locations of environmental sampling stations, required by Specification 4.30.1, shall not require review by the PSC and SRC prior to implementation.~~

~~**This submittal shall include:~~

6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the radiological environmental monitoring program.

The ODCM shall also contain the radioactive effluent controls and radiological environmental monitoring activities and descriptions of the information that should be included in the Annual Radiological Environmental Operating and Radioactive Effluent Release Reports required by Specifications 6.12.2.5 and 6.12.2.6.

Licensee initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

   1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s), and

   2. A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations;

b. Shall become effective after approval of the General Manager, Plant Operations; and

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed and shall also indicate the date (i.e., month and year) the change was implemented.

~~6.14.1 The ODCM shall describe 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 consistent with the applicable LCO's contained in these Technical Specifications.~~

~~6.14.2 Any change to the ODCM made by the licensee shall:~~

~~1. be reviewed and found acceptable by the PSC and SRC,*~~

~~2. be submitted to the Commission** by inclusion in the Semiannual Radioactive Effluent Release Report (Specification 6.12.2.6) for the period during which the change was made effective,~~

~~3. become effective upon a date specified and agreed to by both the PSC and SRC following their review and acceptance of the change.~~

~~*Changes to the locations of environmental sampling stations, required by Specification 4.30.1, shall not require review by the PSC and SRC prior to implementation.~~

~~**This submittal shall include:~~

~~a. sufficiently detailed information to totally support the rationale for the change. Information submitted should consist of a package of those pages of the ODCM to be changed with each page numbered and provided together with appropriate analyses or evaluations justifying the change;~~

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

MARKUP OF CURRENT ANO-2 TECHNICAL SPECIFICATIONS

(FOR INFO ONLY)

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES

SECTION PAGE

ADMINISTRATIVE CONTROLS

AXIAL SHAPE INDEX

1.22 The AXIAL SHAPE INDEX shall be the power generated in the lower half of the core less the power generated in the upper half of the core divided by the sum of these powers.

REACTOR TRIP SYSTEM RESPONSE TIME

1.23 The REACTOR TRIP SYSTEM RESPONSE TIME shall be the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until electrical power is interrupted to the CEA drive mechanism.

ENGINEERED SAFETY FEATURE RESPONSE TIME

1.24 The ENGINEERED SAFETY FEATURE RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays where applicable.

PHYSICS TESTS

1.25 PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation and 1) described in Chapter 14.0 of the FSAR, 2) authorized under the provisions of 10 CFR 50.59, or 3) otherwise approved by the Commission.

SOFTWARE

1.26 The digital computer SOFTWARE for the reactor protection system shall be the program codes including their associated data, documentation and procedures.

PLANAR RADIAL PEAKING FACTOR F_{xy}

1.27 The PLANAR RADIAL PEAKING FACTOR is the ratio of the peak to plane average power density of the individual fuel rods in a given horizontal plane, excluding the effects of azimuthal tilt.

~~SOURCE CHECK~~

~~1.28 A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to the radioactive source.~~

~~OFFSITE DOSE CALCULATION MANUAL (ODCM)~~ **(Moved to Specification 6.14)**

~~1.29 An OFFSITE DOSE CALCULATION MANUAL (ODCM) shall be 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.~~

LIQUID RADWASTE TREATMENT SYSTEM

1.28 A LIQUID RADWASTE TREATMENT SYSTEM is a system designed and installed to reduce radioactive liquid effluents from the unit. This is accomplished by providing for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the environment.

MEMBER(S) OF THE PUBLIC

1.29 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

PURGE-PURGING

1.30 PURGE or PURGING is the controlled process of discharging air or gas from a confinement to reduce airborne radioactive concentrations in such a manner that replacement air or gas is required to purify the confinement.

~~LIQUID RADWASTE TREATMENT SYSTEM~~ **(Moved to Page 1-5)**

~~1.30 A LIQUID RADWASTE TREATMENT SYSTEM is a system designed and installed to reduce radioactive liquid effluents from the unit. This is accomplished by providing for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the environment.~~

~~GASEOUS RADWASTE TREATMENT SYSTEM~~

~~1.31 A GASEOUS RADWASTE TREATMENT SYSTEM is any system designed and installed to reduce radioactive gaseous effluents from the plant by collecting offgases from radioactive systems and providing for decay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.~~

~~VENTILATION EXHAUST TREATMENT SYSTEM~~

~~1.32 A VENTILATION EXHAUST TREATMENT SYSTEM is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment. Such a system is not considered to have any effect on noble gas effluents. Atmospheric cleanup systems that are Engineered Safety Feature (ESF) actuated are not considered to be VENTILATION EXHAUST TREATMENT SYSTEMS.~~

~~MEMBER(S) OF THE PUBLIC~~ **(Moved to Page 1-5)**

~~1.33 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.~~

~~PURGE-PURGING~~ **(Moved to Page 1-5)**

~~1.34 PURGE or PURGING is the controlled process of discharging air or gas from a confinement to reduce airborne radioactive concentrations in such a manner that replacement air or gas is required to purify the confinement.~~

EXCLUSION AREA

1.31 The EXCLUSION AREA is that area surrounding ANO within a minimum radius of .65 miles of the reactor buildings and controlled to the extent necessary by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

UNRESTRICTED AREA

1.32 An UNRESTRICTED AREA shall be any area at or beyond the exclusion area boundary.

CORE OPERATING LIMITS REPORT

1.33 The CORE OPERATING LIMITS REPORT is the ANO-2 specific document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Technical Specification 6.9.5 Plant operation within these operating limits is addressed in individual specifications.

~~EXCLUSION AREA~~ **(Moved to Page 1-6)**

~~1.35 The EXCLUSION AREA is that area surrounding ANO within a minimum radius of .65 miles of the reactor buildings and controlled to the extent necessary by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.~~

~~UNRESTRICTED AREA~~ **(Moved to Page 1-6)**

~~1.36 An UNRESTRICTED AREA shall be any area at or beyond the exclusion area boundary.~~

~~CORE OPERATING LIMITS REPORT~~ **(Moved to Page 1-6)**

~~1.37 The CORE OPERATING LIMITS REPORT is the ANO-2 specific document that provides core operating limits for the current operating reload cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Technical Specification 6.9.5 Plant operation within these operating limits is addressed in individual specifications.~~

THIS PAGE INTENTIONALLY LEFT BLANK

~~FIRE DETECTION INSTRUMENTATION~~3/4.3.4 TURBINE OVERSPEED PROTECTION

LIMITING CONDITION FOR OPERATION

~~DELETED~~ 3.3.4.1 At least one turbine overspeed protection system shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a. With one stop valve and/or one control valve inoperable, within 4 hours either restore the inoperable valve(s) to OPERABLE status or close the inoperable valve(s); otherwise, isolate the turbine from the steam supply within the next 6 hours.

b. With one combined stop and intercept valve inoperable, within 4 hours either restore the inoperable valve to OPERABLE status or close the inoperable valve; otherwise, isolate the turbine from the steam supply within the next 6 hours.

c. With the above required turbine overspeed protection system otherwise inoperable, within 6 hours either restore the system to OPERABLE status or isolate the turbine from the steam supply.

SURVEILLANCE REQUIREMENTS

4.3.4.1.1 The provisions of Specification 4.0.4 are not applicable.

4.3.4.1.2 The above required turbine overspeed protection system shall be demonstrated OPERABLE:

a. At least once per 92 days by direct observation of the movement of each of the following valves through at least one complete cycle from the running position:

1. Four high pressure turbine stop valves.

2. Four high pressure turbine control valves.

3. Four low pressure turbine combined stop and intercept valves.

b. At least once per 18 months by performance of a CHANNEL CALIBRATION on the turbine overspeed protection systems.

c. At least once per 40 months by disassembling at least one of each of the above valves and performing a visual and surface inspection of valve seats, disks and stems and verifying no unacceptable flaws or corrosion.

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.3.3.9 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.3-12 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.11.2.1 are not exceeded.~~

~~APPLICABILITY: During releases via this pathway.~~

~~ACTION:~~

~~a. With the following gaseous effluent monitoring instrumentation channels alarm/trip setpoint less conservative than required by the above specification, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel.~~

~~1. Waste Gas Holdup System Noble Gas Activity Monitor (during periods of gaseous releases.)~~

~~2. Containment Purge and Ventilation System Noble Gas Activity Monitor (during periods of containment building PURGE.)~~

~~b. With less than the minimum number of monitoring instrumentation channels OPERABLE, take the action shown in Table 3.3-12.~~

~~c. Return the instruments to OPERABLE status within 30 days or, in lieu of any other report, explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected.~~

~~d. The provisions of Specifications 3.0.3 and 4.0.4 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.3.3.9 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 4.3-12.~~

~~TABLE 3.3-12~~

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION~~

~~INSTRUMENT~~	~~MINIMUM CHANNELS OPERABLE~~	~~APPLICABILITY~~	~~PARAMETER~~	~~ACTION~~
~~1. Waste Gas Holdup System~~				
~~a. Noble Gas Activity Monitor (provides alarm and automatic termination of release)~~	~~1~~	~~*~~	~~Radioactivity~~	~~25~~
~~b. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~26~~
~~2. Containment Purge and Ventilation System~~				
~~a. Noble Gas Activity Monitor~~	~~1~~	~~*~~	~~Radioactivity~~	~~27, 29~~
~~b. Iodine Sampler Cartridge~~	~~1~~	~~*~~	~~Verify Presence of Cartridge~~	~~28~~
~~c. Particulate Sampler Filter~~	~~1~~	~~*~~	~~Verify Presence of Filter~~	~~28~~
~~d. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~26~~
~~e. Sampler Flow Monitor~~	~~1~~	~~*~~	~~Sampler Flow~~	~~26~~

~~TABLE 3.3-12 (Continued)~~

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION~~

~~INSTRUMENT~~	~~MINIMUM CHANNELS OPERABLE~~	~~APPLICABILITY~~	~~PARAMETER~~	~~ACTION~~
~~3. Spent Fuel Area Ventilation System~~				
~~a. Noble Gas Activity Monitor~~	~~1~~	~~*~~	~~Radioactivity~~	~~27~~
~~b. Iodine Sampler Cartridge~~	~~1~~	~~*~~	~~Verify Presence of Cartridge~~	~~28~~
~~c. Particulate Sampler Filter~~	~~1~~	~~*~~	~~Verify Presence of Filter~~	~~28~~
~~d. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~26~~
~~e. Sampler Flow Monitor~~	~~1~~	~~*~~	~~Sampler Flow~~	~~26~~
~~4. Auxiliary Building Area Ventilation System~~				
~~a. Noble Gas Activity Monitor~~	~~1~~		~~Radioactivity~~	~~27~~
~~b. Iodine Sampler Cartridge~~	~~1~~	~~*~~	~~Verify Presence of Cartridge~~	~~28~~
~~c. Particulate Sampler Filter~~	~~1~~	~~*~~	~~Verify Presence of Filter~~	~~28~~
~~d. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~26~~
~~e. Sampler Flow Monitor~~	~~1~~	~~*~~	~~Sampler Flow~~	~~26~~

~~TABLE 3.3-12 (Continued)~~

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION~~

~~INSTRUMENT~~	~~MINIMUM CHANNELS OPERABLE~~	~~APPLICABILITY~~	~~PARAMETER~~	~~ACTION~~
~~5. Auxiliary Building Extension Ventilation System~~				
~~a. Noble Gas Activity Monitor~~	~~1~~	~~*~~	~~Radioactivity~~	~~27~~
~~b. Iodine Sample Cartridge~~	~~1~~	~~*~~	~~Verify Presence of Cartridge~~	~~28~~
~~c. Particulate Sampler Filter~~	~~1~~	~~*~~	~~Verify Presence of Filter~~	~~28~~
~~d. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~26~~
~~e. Sampler Flow Monitor~~	~~1~~	~~*~~	~~Sampler Flow~~	~~26~~
~~6. Radwaste Storage Building HVAC Exhaust System~~				
~~a. Noble Gas Activity Monitor~~	~~1~~	~~*~~	~~Radioactivity~~	~~30~~
~~b. Iodine Sample Cartridge~~	~~1~~	~~*~~	~~Verify Presence of Cartridge~~	~~31~~
~~c. Particulate Sampler Filter~~	~~1~~	~~*~~	~~Verify Presence of Filter~~	~~31~~
~~d. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~32~~
~~e. Sampler Flow Monitor~~	~~1~~	~~*~~	~~Sampler Flow~~	~~32~~

~~TABLE 3.3-12 (Conntinued)~~

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION~~

~~INSTRUMENT~~	~~MINIMUM CHANNELS OPERABLE~~	~~APPLICABILITY~~	~~PARAMETER~~	~~ACTION~~
~~5. Auxiliary Building Extension Ventilation System~~				
~~a. Noble Gas Activity Monitor~~	~~1~~	~~*~~	~~Radioactivity~~	~~27~~
~~b. Iodine Sample Cartridge~~	~~1~~	~~*~~	~~Verify Presence of Cartridge~~	~~28~~
~~c. Particulate Sampler Filter~~	~~1~~	~~*~~	~~Verify Presence of Filter~~	~~28~~
~~d. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~26~~
~~e. Sampler Flow Monitor~~	~~1~~	~~*~~	~~Sampler Flow~~	~~26~~
~~6. Radwaste Storage Building HVAC Exhaust System~~				
~~a. Noble Gas Activity Monitor~~	~~1~~	~~*~~	~~Radioactivity~~	~~30~~
~~b. Iodine Sample Cartridge~~	~~1~~	~~*~~	~~Verify Presence of Cartridge~~	~~31~~
~~c. Particulate Sampler Filter~~	~~1~~	~~*~~	~~Verify Presence of Filter~~	~~31~~
~~d. Effluent System Flow Monitor~~	~~1~~	~~*~~	~~System Flow~~	~~32~~
~~e. Sampler Flow Monitor~~	~~1~~	~~*~~	~~Sampler Flow~~	~~32~~

~~TABLE 3.3-12 (Continued)~~

~~TABLE NOTATION~~

~~*During releases via this pathway.~~

~~ACTION 30~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours. Otherwise, suspend all compaction activities within the Radwaste Storage Building.~~

~~ACTION 31~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided samples are collected with auxiliary sampling equipment. Iodine sample cartridges and particulate sample filters shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing in accordance with Table 4.11-2. Otherwise, suspend all compaction activities within the Radwaste Storage Building.~~

~~ACTION 32~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours. Otherwise, suspend all compaction activities within the Radwaste Storage Building.~~

~~TABLE 3.3-12 (Continued)~~

~~TABLE NOTATION~~

~~*During releases via this pathway.~~

~~ACTION 25~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank may be released to the environment provided that prior to initiating the release:~~

~~1. At least two independent samples of the tank's contents are analyzed; and~~

~~2. At least two technically qualified members of the Facility Staff independently verify the computer input data; and~~

~~3. At least two technically qualified members of the Facility Staff independently verify the discharge valve lineup.~~

~~Otherwise, suspend release of radioactive effluents via this pathway.~~

~~ACTION 26~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours.~~

~~ACTION 27~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours.~~

~~ACTION 28~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided samples are collected with auxiliary sampling equipment. Iodine sample cartridges and particulate sample filters shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing in accordance with Table 4.11-2.~~

~~ACTION 29~~ ~~With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, suspend all operations involving movement of fuel assemblies or CEAs within the pressure vessel.~~

~~TABLE 4.3-12~~

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS~~

~~INSTRUMENT~~	~~CHANNEL CHECK~~	~~SOURCE CHECK~~	~~CHANNEL CALIBRATION~~	~~CHANNEL FUNCTIONAL TEST~~
~~1. Waste Gas Holdup System~~				
~~a. Gas Activity Monitor (provides alarm and automatic termination of release)~~	~~D*~~	~~p**~~	~~R~~	~~Q~~
~~b. System Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~2. Containment Purge and Ventilation System~~				
~~a. Gas Activity Monitor~~	~~D*~~	~~p**~~	~~R~~	~~M (1), P~~
~~b. Iodine Sampler Cartridge~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~c. Particulate Sampler Filter~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~d. System Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~e. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~

~~TABLE 4.3-12 (Continued)~~

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS~~

~~INSTRUMENT~~	~~CHANNEL CHECK~~	~~SOURCE CHECK~~	~~CHANNEL CALIBRATION~~	~~CHANNEL FUNCTIONAL TEST~~
~~3. Spent Fuel Area Ventilation System~~				
~~a. Gas Activity Monitor~~	~~D*~~	~~M**~~	~~R~~	~~Q~~
~~b. Iodine Sampler Cartridge~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~c. Particulate Sampler Filter~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~d. System Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~e. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~4. Auxiliary Building Area Ventilation System~~				
~~a. Gas Activity Monitor~~	~~D*~~	~~M**~~	~~R~~	~~Q~~
~~b. Iodine Sampler Cartridge~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~c. Particulate Sampler Filter~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~d. System Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~e. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~

~~TABLE 4.3-12 (Continued)~~

~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS~~

~~INSTRUMENT~~	~~CHANNEL CHECK~~	~~SOURCE CHECK~~	~~CHANNEL CALIBRATION~~	~~CHANNEL FUNCTIONAL TEST~~
~~5. Auxiliary Building Extension Ventilation System~~				
~~a. Gas Activity Monitor~~	~~D*~~	~~M**~~	~~R Q~~	
~~b. Iodine Sampler Cartridge~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~c. Particulate Sampler Filter~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~d. System Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~e. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~6. Radwaste Storage Building HVAC Exhaust System~~				
~~a. Gas Activity Monitor~~	~~D*~~	~~M**~~	~~R~~	~~Q~~
~~b. Iodine Sampler Cartridge~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~c. Particulate Sampler Filter~~	~~W*(2)~~	~~N/A~~	~~N/A~~	~~N/A~~
~~d. System Effluent Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~
~~e. Sampler Flow Monitor~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~

~~TABLE 4.3-12 (Continued)~~

~~TABLE NOTATION~~

~~*During releases via this pathway.~~

~~**A SOURCE CHECK is not required if the background activity is greater than the activity of the check source.~~

~~(1) During Containment Building ventilation operations.~~

~~(2) Verify presence of cartridge or filter only.~~

~~RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.3.3.10 The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.3-13 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.11.1.1 are not exceeded.~~

~~APPLICABILITY: During releases via this pathway.~~

~~ACTION:~~

~~a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, immediately suspend the release of radioactive liquid effluents monitored by the affected channel, until the set point is changed to an acceptable conservative value.~~

~~b. With less than the minimum number of monitoring instrumentation channels OPERABLE, take the action shown in Table 3.3-13.~~

~~c. Return the instruments to OPERABLE status within 30 days or, in lieu of any other report, explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected.~~

~~d. The provisions of Specifications 3.0.3 and 4.0.4 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.3.3.10 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 4.3-13.~~

~~TABLE 3.3-13~~

~~RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION~~

~~INSTRUMENT~~	~~MINIMUM CHANNELS OPERABLE~~	~~APPLICABILITY~~	~~ACTION~~
~~1. Gross Radioactivity Monitor(s) (provides alarm and automatic termination of release)~~			
~~a. Liquid Radwaste Effluent Line~~	~~1~~	~~During release via this pathway~~	~~18~~
~~2. Flow Monitor(s)~~			
~~a. Liquid Radwaste Effluent Line~~	~~1~~	~~During releases via this pathway~~	~~19~~

~~TABLE NOTATION~~

~~ACTION 18 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may be resumed provided that prior to initiating a release:~~

~~1. At least two independent samples are analyzed, and~~

~~2. At least two technically qualified members of the Facility Staff independently verify the release rate computer input data, and~~

~~3. At least two technically qualified members of the Facility Staff independently verify the discharge valve lineup.~~

~~Otherwise, suspend release of radioactive effluents via this pathway.~~

~~ACTION 19 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump curves may be used to estimate flow.~~

~~TABLE 4.3-13~~

~~RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS~~

~~INSTRUMENT~~	~~CHANNEL CHECK~~	~~SOURCE CHECK~~	~~CHANNEL CALIBRATION~~	~~CHANNEL FUNCTIONAL TEST~~
~~1. Gross Radioactivity Monitor(s) (provides alarm and automatic isolation)~~				
~~a. Liquid Radwaste Effluents Line~~	~~D*~~	~~P**~~	~~R~~	~~Q~~
~~2. Flow Monitor(s)~~				
~~a. Liquid Radwaste Effluent Line~~	~~D*~~	~~N/A~~	~~R~~	~~N/A~~

~~* During releases via this pathway~~

~~** A SOURCE CHECK is not required if the background activity is greater than the activity of the check source.~~

~~3/4.3.4 TURBINE OVERSPEED PROTECTION~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.3.4.1 At least one turbine overspeed protection system shall be OPERABLE.~~

~~APPLICABILITY: MODES 1, 2 and 3.~~

~~ACTION:~~

~~a. With one stop valve and/or one control valve inoperable, within 4 hours either restore the inoperable valve(s) to OPERABLE status or close the inoperable valve(s); otherwise, isolate the turbine from the steam supply within the next 6 hours.~~

~~b. With one combined stop and intercept valve inoperable, within 4 hours either restore the inoperable valve to OPERABLE status or close the inoperable valve; otherwise, isolate the turbine from the steam supply within the next 6 hours.~~

~~c. With the above required turbine overspeed protection system otherwise inoperable, within 6 hours either restore the system to OPERABLE status or isolate the turbine from the steam supply.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.3.4.1.1 The provisions of Specification 4.0.4 are not applicable.~~

~~4.3.4.1.2 The above required turbine overspeed protection system shall be demonstrated OPERABLE:~~

~~a. At least once per 92 days by direct observation of the movement of each of the following valves through at least one complete cycle from the running position:~~

~~1. Four high pressure turbine stop valves.~~

~~2. Four high pressure turbine control valves.~~

~~3. Four low pressure turbine combined stop and intercept valves.~~

~~b. At least once per 18 months by performance of a CHANNEL CALIBRATION on the turbine overspeed protection systems.~~

~~c. At least once per 40 months by disassembling at least one of each of the above valves and performing a visual and surface inspection of valve seats, disks and stems and verifying no unacceptable flaws or corrosion.~~

(This Specification moved to page 3/4 3-45)

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1 LIQUID HOLDUP TANKS*

LIMITING CONDITION FOR OPERATION

3.11.1 The quantity of radioactive material contained in each unprotected outside temporary radioactive liquid storage tank shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material exceeding the above limit, immediately suspend all additions of radioactive material to the affected tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluents Release Report pursuant to Specification 6.9.3.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1 The quantity of radioactive material contained in each unprotected outside temporary radioactive liquid storage tank shall be determined to be within the above limit by analyzing a representative sample of the contents of the tank at least once per 7 days when radioactive materials are being added to the tank.

*Tanks included in this specification are those outdoor temporary tanks that 1) are not surrounded by liners, dikes, or walls capable of holding the tank contents, and 2) do not have overflows and surrounding area drains connected to the liquid radwaste treatment system.

~~LIQUID EFFLUENTS~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.1.1 The concentration of radioactive material released from the site in liquid effluents to the discharge canal shall be limited to the concentrations 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 released shall be limited to 2 x 10-4 µCi/ml.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the concentration of radioactive material released exceeding the above limits, immediately initiate actions to restore concentrations to within the above limits. Provide notification to the Commission within 24 hours and in lieu of any other report, submit a Special Report pursuant to Specification 6.9.2.h within 30 days.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.1.1.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analyses program of Table 4.11-1.~~

~~4.11.1.1.2 The results of the radioactivity analyses shall be used in accordance with the methods in the ODCM to assure that the concentrations at the point of release are maintained within the limits of Specification 3.11.1.1.~~

~~TABLE 4.11-1~~

~~RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSES PROGRAM~~

~~Liquid Release Type~~	~~Samplinng Frequency~~	~~Minimum Analyses Frequency~~	~~Type of Activity Analyses~~	~~Lower Limit of Detection (LLD) (uCi/ml) (a)~~
~~A. Batch Waste Release (d)~~	~~P Each Batch~~	~~P Each Batch~~	~~γ isotopic (c)~~	~~5 x 10^{-7} (b)~~
			~~I-131~~	~~1 x 10^{-6}~~
	~~P One Batch/M~~	~~M~~	~~Dissolved and Entrained Gases (Gamma Emitters)~~	~~1 x 10^{-5}~~
	~~P Each Batch~~	~~M Composite (e)~~	~~H-3~~	~~1 x 10-5~~
			~~Gross Alpha~~	~~1 x 10^{-7}~~
			~~Sr-89, Sr-90~~	~~5 x 10^{-8}~~
	~~P Each Batch~~	~~Q Composite (e)~~	~~Fe-55~~	~~1 x 10^{-6}~~

~~TABLE NOTATION~~

~~a. The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.~~

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

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

~~Where:~~

~~LLD is the lower limit of detection as defined above (as picocurie 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)~~

3/4.11.2 GAS STORAGE TANKS

LIMITING CONDITION FOR OPERATION

3.11.2 The quantity of radioactivity contained in each gas storage tank shall be limited to less than or equal to 300,000 curies noble gases (considered as Xe-133).

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limit and describe the events leading to the condition in the next Radioactive Effluent Release Report pursuant to Specification 6.9.3.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank and the reactor coolant activity exceeds the limits of Specification 3.4.8.

RADIOACTIVE EFFLUENTS

EXPLOSIVE GAS MIXTURE

LIMITING CONDITION FOR OPERATION

3.11.3 The concentration of the hydrogen/oxygen shall be limited in the waste gas storage tanks to Region "A" of Figure 3.11-1.

APPLICABILITY: At all times.

ACTION:

a. When the concentration of hydrogen/oxygen in the waste gas storage tanks enters Region "B" of Figure 3.11.1, corrective action shall be taken to return the concentration values to Region "A" within 24 hours.

b. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.3 The concentration of hydrogen/oxygen in the waste gas noldup system shall be determined to be within the above limits, with the waste gas system in operation, by continuously monitoring with the hydrogen/oxygen monitors required OPERABLE by Table 3.11-3.

~~Table 4.11-1 (Continued)~~

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

~~2.22 is the number of transformations per minute per picocurie.~~

~~Y is the fractional radiochemical yield (when applicable).~~

~~λ is the radioactive decay constant for the particular radionuclide, and~~

~~Δt is the elapsed time between midpoint of sample collection and time of counting (for plant effluents, not environmental samples).~~

~~Typical values of E, V, Y, and Δt shall be used in the calculation.~~

~~It should be recognized that the LLD is an *a priori* (before the fact) limit representing the capability of a measurement system and not an *a posteriori* (after the fact) limit for a particular measurement.~~

~~b. For certain mixtures of gamma emitters, it may not be possible to measure radionuclides in concentrations near their sensitivity limits when other nuclides are present in the sample in much greater concentrations. Under these circumstances, it will be more appropriate to calculate the concentration of such radionuclides using observed ratios with those radionuclides which are measurable.~~

~~c. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.~~

~~d. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling, each batch shall be isolated and mixed to assure representative sampling.~~

~~e. The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Mn54, Fe59, Co58, Co60, Zn65, Mo99, Cs134, Cs137, Ce141, and Ce144. 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 3.11-3

EXPLOSIVE GAS MONITORING INSTRUMENTATION

Instrument	Minimum Channels Operable	Applicability	Action
1. Waste Gas Holdup System Explosive Gas Monitoring System			
a. Hydrogen monitor	1	*	1
b. Oxygen monitor	1	*	1

*During waste gas compressing operation (treatment for primary system off gases.)

ACTION 1 - With both channels inoperable, operation may continue provided grab samples are taken 1) every 4 hours during degassing operations, and 2) daily during other operations. The analysis of these samples shall be completed within 8 hours of taking the sample.

~~RADIOACTIVE EFFLUENTS~~

~~DOSE~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.1.2 The dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released from ANO-2 to the discharge canal shall be limited:~~

~~a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and~~

~~b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of any other report submit a Special Report pursuant to Specification 6.9.2.h within 30 days.~~

~~b. The provisions of specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.1.2 Dose Calculations. Cumulative dose contributions from liquid effluents shall be determined in accordance with the ODCM at least once per 31 days.~~

~~RADIOACTIVE EFFLUENTS~~

~~LIQUID RADWASTE TREATMENT~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.1.3 The LIQUID RADWASTE TREATMENT SYSTEM shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent, from ANO-2 to the discharge canal, would exceed .18 mrem to the total body or .625 mrem to any organ in any calendar quarter.~~

~~APPLICABILITY: At all times.~~

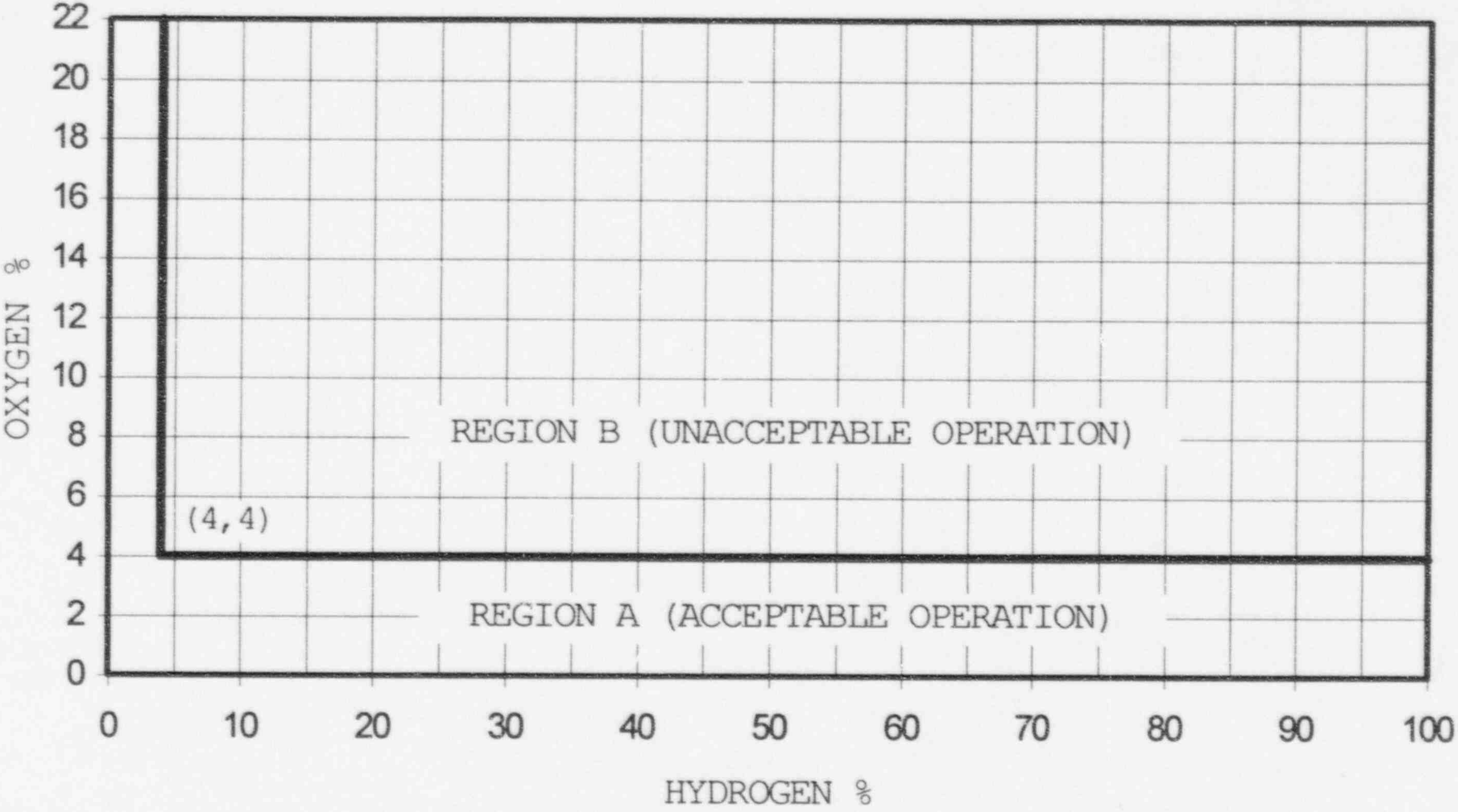
~~ACTION:~~

~~a. With radioactive liquid waste being discharged without treatment and in excess of the above limits, in lieu of any other report, submit a Special Report pursuant to Specification 6.9.2.h within 30 days.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.1.3.1 Doses due to liquid releases shall be projected at least once per 31 days in accordance with the ODCM.~~



<u>HYDROGEN - OXYGEN LIMITS FOR ANO-2 WASTE GAS SYSTEM</u>

<u>Figure 3.11-1</u>

~~RADIOACTIVE EFFLUENTS~~

~~LIQUID HOLDUP TANKS*~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.1.4 The quantity of radioactive material contained in each unprotected outside temporary radioactive liquid storage tank shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the quantity of radioactive material exceeding the above limit, immediately suspend all additions of radioactive material to the affected tank and within 48 hours reduce the tank contents to within the limit.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.1.4 The quantity of radioactive material contained in each unprotected outside temporary radioactive liquid storage tank shall be determined to be within the above limit by analyzing a representative sample of the contents of the tank at least once per 7 days when radioactive materials are being added to the tank.~~

~~*Tanks included in this Specification are those outdoor temporary tanks that do not have 1) liners, dikes or walls capable of holding the tank contents, or 2) tank overflows and surrounding area drains connected to the LIQUID RADWASTE TREATMENT SYSTEM.~~

(This Specification moved to page 3/4 11-1)

~~3/4.11.2 GASEOUS EFFLUENTS~~

~~DOSE RATE~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.2.1 The dose rate due to radioactive materials released in gaseous effluents from the site to UNRESTRICTED AREAS (see Figure 5.1-3) shall be limited to the following:~~

~~a. For noble gases: Less than or equal to the 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin.~~

~~b. For iodine-131, for tritium and for all radionuclides in particular form with half lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.~~

~~During periods of containment purging the dose rate may be averaged over a one hour interval.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the dose rate(s) exceeding the above limits, without delay restore the release rate to comply with the above limit(s).~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.2.1.1 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methods and procedures of the ODCM.~~

~~4.11.2.1.2 The dose rate due to iodine-131, tritium, and all radionuclides in particulate form with half-lifes greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with the methods and procedures of the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 4.11-2.~~

(This page will be deleted)

~~TABLE 4.11-2~~

~~RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSES PROGRAM~~

~~Gaseous Release Type~~	~~Sampling Frequency~~	~~Minimum Analyses Frequency~~	~~Type of Activity Analysis~~	~~Lower Limit of Detection (LLD)[a] (uCi/ml)~~
~~A. Waste Gas Storage Tank~~	~~P Each Tank Grab Sample~~	~~P Each Tank~~	~~Principal Gamma Emitters(b)~~	~~1×10^{-4} (g)~~
~~B. Reactor Bldg. Purge~~	~~P Each Purge Grab Sample~~	~~P Each Purge~~	~~Principal Gamma Emitters(b)~~ ~~H-3~~	~~1×10^{-4} (g)~~ ~~1×10^{-6}~~
~~C. Unit Vents~~	~~M (c) (d) Grab Sample~~	~~M~~	~~Principal Gamma Emitters(b)~~ ~~H-3~~	~~1×10^{-4} (g)~~ ~~1×10^{-6}~~
~~(Auxiliary Bldg. Ext.) (Spent Fuel Pool Area Ventilation)~~	~~Continuous(e)~~	~~W(f) Charcoal Sample~~	~~I-131~~	~~1×10^{-12}~~
~~(Rx Bldg. Ventilation) (Radwaste Area Ventilation)~~	~~Continuous(e)~~	~~W(f) Particulate Sample~~	~~Principal Gamma Emitters(b) (I-131, Others)~~	~~1×10^{-11}~~
~~(Low-Level Radwaste Storage Building) (HVAC Exhaust Ventilation)~~	~~Continuous(e)~~	~~M Particulate Sample~~	~~Gross alpha~~	~~1×10^{-11}~~
	~~Continuous(e)~~	~~Q Composite Particulate Sample~~	~~Sr-89, Sr-50~~	~~1×10^{-11}~~
	~~Continuous(e)~~	~~Noble Gas Monitor~~	~~Noble Gases Gross Beta or Gamma~~	~~1×10^{-6} (Xe-133 equiv.)~~

(This page will be deleted)

~~TABLE NOTATION~~

a. ~~The Lower Limit of Detection (LLD) is defined in Table Notation a. of Table 4.11-1 of Specification 3.11.1.1.~~

b. ~~The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. 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 for that nuclide. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the Semiannual Radioactive Effluent Release Report.~~

c. ~~Tritium grab samples shall be taken from the Reactor Building ventilation exhaust at least once per 24 hours when the refueling canal is flooded.~~

d. ~~Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel area, whenever spent fuel is in the spent fuel pool.~~

e. ~~The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.11.2.1, 3.11.2.2, and 3.11.2.3.~~

f. ~~Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from the sampler).~~

g. ~~For certain radionuclides with low gamma yield or low energies, or for certain radionuclide mixtures, it may not be possible to measure radionuclides in concentrations near the LLD. Under these circumstances, the LLD may be increased inversely proportional to the magnitude of the gamma yield (i.e., 1 x E-4/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 I.~~

(This page will be deleted)

~~RADIOACTIVE EFFLUENTS~~

~~DOSE - NOBLE GASES~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.2.2 The dose due to noble gases released in gaseous effluents from ANO-2 to UNRESTRICTED AREAS (see Figure 5.1-3) shall be:~~

~~a. During any calendar quarter, less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation, and~~

~~b. During any calendar year, less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the calculated dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, in lieu of any other report, submit a Special Report pursuant to Specification 6.9.2.h within 30 days~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.2.2 Dose Calculations. Cumulative dose contributions for noble gases for the current calendar quarter and current calendar year shall be determined in accordance with the ODCM at least once per 31 days.~~

(This page will be deleted)

~~DOSE - IODINE-131, TRITIUM, AND RADIONUCLIDES IN PARTICULATE FORM~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.2.3 The dose to a MEMBER OF THE PUBLIC from iodine-131, from tritium, and from all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released from ANO-2 to UNRESTRICTED AREAS (see Figure 5.1-3) shall be:~~

~~a. During any calendar quarter, less than or equal to 7.5 mrems to any organ, and~~

~~b. During any calendar year, less than or equal to 15 mrems to any organ.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the calculated dose from the release of iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, in lieu of any other report, submit a Special Report pursuant to Specification 6.9.2.h within 30 days.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.2.3 Dose Calculations. Cumulative dose contributions for the current calendar quarter and current calendar year for iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the ODCM at least once per 31 days.~~

(This page will be deleted)

~~RADIOACTIVE EFFLUENTS~~

~~GASEOUS RADWASTE TREATMENT~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.2.4 The VENTILATION EXHAUST TREATMENT SYSTEMS shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent doses from ANO-2 to UNRESTRICTED AREAS (see Figure 5.1-3) would exceed .625 mrad for gamma radiation and 1.25 mrad for beta radiation in any calendar quarter; or when the projected doses due to iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days would exceed 1.0 mrem to any organ over a calendar quarter.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With gaseous waste being discharged without treatment and in excess of the above limits, in lieu of any other report, submit a Special Report pursuant to Specification 6.9.2.h within 30 days.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.2.4.1 Doses due to gaseous releases from the site shall be projected at least once per 31 days in accordance with the ODCM.~~

(This page will be deleted)

~~RADIOACTIVE EFFLUENTS~~

~~GASEOUS RADWASTE TREATMENT~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.2.5 When degasifying the reactor coolant system, the GASEOUS RADWASTE TREATMENT SYSTEM shall be used to reduce radioactive material in gaseous waste prior to their discharge when the projected gaseous effluent doses for ANO-2 to UNRESTRICTED AREAS (see Figure 5.1-3) would exceed .625 mrad for gamma radiation and 1.25 mrad for beta radiation in any calendar quarter.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With gaseous waste being discharged without treatment and in excess of the above limits, in lieu of any other report, submit a Special Report pursuant to Specification 6.9.2.h within 30 days.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.2.5.1 Doses due to gaseous releases from the site shall be projected at least once per 31 days in accordance with the ODCM.~~

(This page will be deleted)

~~GAS STORAGE TANKS~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.2.6 The quantity of radioactivity contained in each gas storage tank shall be limited to less than or equal to 300,000 curies noble gases (considered as Xe-133).~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limit.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.2.6 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank and the reactor coolant activity exceeds the limits of Specification 3.4.8.~~

(This Specification moved to page 3/4 11-2 and this page will be deleted)

~~RADIOACTIVE EFFLUENTS~~

~~EXPLOSIVE GAS MIXTURE~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.2.7 The concentration of the hydrogen/oxygen shall be limited in the waste gas storage tanks to Region "A" of Figure 3.11.1.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. When the concentration of hydrogen/oxygen in the waste gas storage tanks enters Region "B" of Figure 3.11.1, corrective action shall be taken to return the concentration values to Region "A" within 24 hours.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.2.7 The concentration of hydrogen/oxygen in the waste gas holdup system shall be determined to be within the above limits, with the waste gas system in operation, by continuously monitoring with the hydrogen/oxygen monitors required OPERABLE by Table 3.11-3.~~

(This Specification moved to page 3/4 11-3 and this page will be deleted)

~~TABLE 3.11-3~~

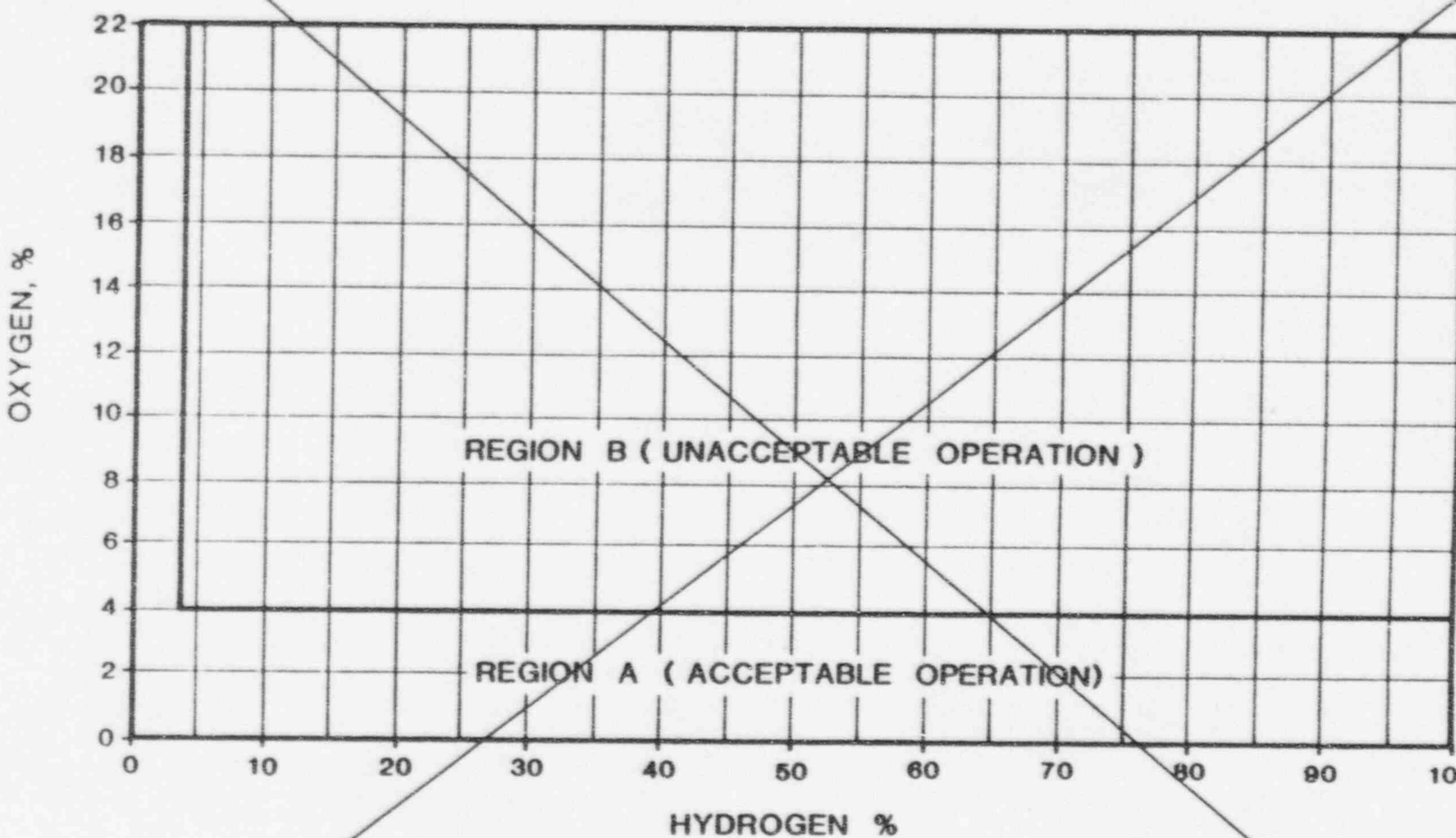
~~RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION~~

~~Instrument~~	~~Minimum Channels Operable~~	~~Applicability~~	~~Action~~
~~1. Waste Gas Holdup System Explosive Gas Monitoring System~~			
~~a. Hydrogen monitor~~	~~(1)~~	~~*~~	~~(1)~~
~~b. Oxygen monitor~~	~~(1)~~	~~*~~	~~(1)~~

~~*During waste gas compressing operation (treatment for primary system off gases.)~~

~~ACTION 1 - With both channels inoperable, operation may continue provided grab samples are taken and analyzed 1) every 4 hours during degassing operations, and 2) daily during other operations. The analysis of these samples shall be completed within 8 hours of taking the sample.~~

(This Specification moved to page 3/4 11-4 and this page will be deleted)



HYDROGEN - OXYGEN LIMITS FOR ANO - 2 WASTE GAS SYSTEM

Figure 3.11 - 1

(This specification moved to page 3/4 11-5 and this page will be deleted)

~~RADIOACTIVE EFFLUENTS~~

~~3/4.11.3 TOTAL DOSE~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.3 The calculated doses from the release of radioactive materials in liquid or gaseous effluents shall not exceed twice the limits of Specifications 3.11.1.2.a, 3.11.1.2.b, 3.11.2.2.a, 3.11.2.2.b, 3.11.2.3.a, or 3.11.2.3.b.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the calculated doses exceeding the above limits, prepare and submit a Special Report pursuant to 10 CFR Part 20.405c.~~

~~b. If the limits of 40 CFR 190 have been exceeded, obtain a variance from the Commission to permit further releases in excess of 40 CFR 190 limits. A variance is granted until staff action on the request is complete.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.3 Dose Calculations. Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Specifications 4.11.1.2, 4.11.2.2, and 4.11.2.3, and in accordance with ODCM.~~

(This page will be deleted)

~~3/4.11.4 SOLID RADIOACTIVE WASTE~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.11.4 The solid radwaste system shall be used in accordance with a PROCESS CONTROL PROGRAM to process wet radioactive wastes to meet shipping and burial ground requirements.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the provisions of the PROCESS CONTROL PROGRAM not satisfied, suspend shipment of defectively processed or defectively packaged solid radioactive wastes from the site.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.11.4 Proper solidification of wet radioactive waste shall be verified in accordance with the surveillance requirements of the Process Control Program.~~

(This page will be deleted)

~~3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING~~

~~3/4.12.1 MONITORING PROGRAM~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.12.1 The radiological environmental monitoring samples shall be collected pursuant to Table 3.12-1 and shall be analyzed pursuant to the requirements of Table 3.12-1 and 3.12-2. The sample locations shall be shown in Table 4-1 in the ODCM.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With the radiological environmental monitoring program not being conducted as specified in Table 3.12-1, prepare and submit to the Commissiored in the Annual Radiological Environmental Report a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. (Deviations are permitted from the required sampling schedule if specimens are not obtainable due to hazardous conditions, seasonal unavailability, or to malfunction of sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period).~~

~~b. With the level of radioactivity as the result of plant effluents in an environmental sampling medium at one or more of the locations specified in Table 3.12-1 exceeding the limits of Table 3.12-3 when averaged over any calendar quarter, prepare and submit to the Commission, within 30 days from the end of the affected quarter, a Special Report which includes an evaluation of any release conditions, environmental factors or other aspects which caused the limits of Table 3.12-3 to be exceeded, and defines the actions taken to reduce radioactive effluents so that the potential annual dose to a member of the public is less than the calendar year limits of Specifications 3.11.1.2, 3.11.2.2 and 3.11.2.3. When more than one of the radionuclides in Table 3.12-3 are detected in the sampling medium, this Special Report shall be submitted if:~~

$$\cancel{\frac{\text{Concentration (1)}}{\text{reporting level (1)}} + \frac{\text{Concentration (2)}}{\text{reporting level (2)}} + \ldots\ldots \geq 1.0}$$

~~When radionuclides other than those in Table 3.12-3 are detected and are the result of plant effluents, this Special Report shall be submitted if the potential annual dose to a MEMBER OF THE PUBLIC is equal to or greater than the calendar year limits of Specifications 3.11.1.2, 3.11.2.2 and 3.11.2.3. This Special 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 Report.~~

(This page will be deleted)

~~LIMITING CONDITION FOR OPERATION (Continued)~~

~~c. With milk or fresh leafy vegetable samples unavailable from any of the sample locations required by Table 3.12-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the causes of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Semiannual Radioactive Effluent Release Report and also include in the report a revised table for the ODCM reflecting the new location(s).~~

~~d. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.12.1 The results of analyses performed on the radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Report.~~

(This page will be deleted)

~~TABLE 3.12-1~~

~~RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM~~

~~Exposure Pathway and/or Sample~~	~~Number of Sample Location*~~	~~Sample and Collection Frequency~~	~~Type and Frequency of Analyses~~
~~1. AIRBORNE~~			
~~a. Radioiodine and Particulates~~	~~5 locations~~	~~Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days.~~	~~Radioiodine canister. Analyze at least once per 7 days for I-131.~~ ~~Particulate sampler. Analyze for gross beta radioactivity ≥ 24 hours following filter change Perform gamma isotopic analysis on each sample when gross beta activity is > 10 times the mean of control sample. Perform gamma isotopic analysis on composite (by location) sample at least every 92 days.~~
~~2. DIRECT RADIATION~~	~~40 locations 2 dosimeter per location~~	~~At least once per 92 days~~	~~Gamma dose. At least once 92 days.~~

~~*Sample locations are shown in the Offsite Dose Calculation Manual (ODCM).~~

(This page will be deleted)

~~TABLE 3.12-1 (Continued)~~

~~Exposure Pathway and/or Sample~~	~~Number of Sample Locations*~~	~~Sampling and Collection Frequency~~	~~Type and Frequency of Analyses~~
~~3. WATERBORNE~~			
~~a. Surface~~	~~2 Locations~~	~~Composite** sample collected over a period ≤ 31 days.~~	~~Gamma isotopic analysis of each sample by location. Tritium analysis of composite sample at least once every 92 days.~~
~~b. Ground~~	~~2 Locations~~	~~At least once per 92 days.~~	~~Gamma isotopic and tritium analyses of each sample.~~
~~c. Drinking~~	~~1 Location~~	~~Monthly grab sample~~	~~I-131 analysis of each sample;~~ ~~and~~ ~~Gross beta and gamma isotopic analyses of each gamma sample. Tritium analysis of composite sample at least once every 92 days.~~
~~d. Sediment from Shoreline~~	~~2 Locations~~	~~At least once per 184 days~~	~~Gamma isotopic analysis of each sample.~~

~~*Sample locations are shown in the ODCM.~~

~~**Composite samples shall be collected by an aliquot at intervals not exceeding 24 hours.~~

(This page will be deleted)

~~TABLE 3.12-1 (Continued)~~

~~Exposure Pathway and/or Sample~~	~~Number of Sample Locations*~~	~~Sampling and Collection Frequency~~	~~Type and Frequency of Analyses~~
~~4. INGESTION~~			
~~a. Milk~~	~~4 Locations~~	~~At least once per 31 days when animals are on pasture.~~	~~Gamma isotopic and I-131 analyses of each sample.~~
~~b. Fish~~	~~2 Locations~~	~~One sample in season, or at least once per 184 days if not seasonal. One sample of each of the following species:~~ ~~1. Catfish~~ ~~2. Crappie or Bass~~	~~Gamma isotopic analysis on edible portions.~~
~~c. Food Products**~~	~~3 Locations~~	~~At time of harvest. One sample of each of the following classes of food products:~~ ~~1. Fruits~~ ~~2. Flowering Vegetable~~ ~~3. Tubular Vegetable~~	~~Gamma isotopic analysis on edible portions.~~
	~~1 Location~~	~~At time of harvest. One sample of broad leaf vegetation.~~	~~I-131 analysis.~~

~~*Sample locations are shown in the ODCM.~~
~~**If these food products are available.~~

(This page will be deleted)

~~TABLE 3.12-2~~

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

~~Analyses~~	~~Water (pCi/l)~~	~~Airborne Particulate or gas (pCi/m³)~~	~~Fish (pCi/kg, wet)~~	~~Milk (pCi/l)~~	~~Food Products (pCi/kg, wet)~~	~~Sediment (pCi/kg, dry)~~
~~gross beta~~	~~4(b)~~	~~1 x 10⁻²~~				
~~H-3~~	~~1000(b)~~					
~~Mn-56~~	~~15~~		~~130~~			
~~Fe-59~~	~~30~~		~~260~~			
~~Co-58, 60~~	~~15~~		~~130~~			
~~Zn-65~~	~~30~~		~~260~~			
~~Zr-Nb-95~~	~~15~~					
~~I-131~~	~~1*(b)~~	~~7 x 10⁻²~~		~~1~~	~~60(c)~~	
~~Cs-134, 137~~	~~15(10(b)), 18~~	~~1 x 10⁻²~~	~~130, 150~~	~~15, 18~~	~~60, 80~~	~~150,180~~
~~Ba-La-140~~	~~15~~			~~15~~		

~~*For monthly grap samples~~

~~(a) See definition of LLD in table notation of Table 4.11.1~~
~~(b) LLD for drinking water.~~
~~(c) LLD for leafy vegetables.~~

(This page will be deleted)

~~TABLE 3.12-3~~

~~REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES~~

~~Analyses~~	~~Water (pCi/l)~~	~~Airborne Particulate or gases (pCi/m³)~~	~~Fish (pCi/kg, wet)~~	~~Milk (pCi/l)~~	~~Food Products (pCi/kg, wet)~~
~~H-3~~	~~3×10^4 (a)~~				
~~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~~	~~3×10^3~~		~~1×10^4~~		
~~Zn-65~~	~~3×10^2~~		~~2×10^4~~		
~~Zr-Nb-95~~	~~4×10^2 (b)~~				
~~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 (b)~~			~~3×10^2 (b)~~	

~~(a) For drinking water samples.~~
~~(b) Total for parent and daughter.~~

(This page will be deleted)

~~3/4.12.2 LAND USE CENSUS~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.12.2 A land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence, and the nearest garden* of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With a land use census identifying a location(s) which yields a calculated dose commitment due to I-131, tritium, and radionuclides in particulate form greater than the values currently being calculated in Unit 2 Specification 4.11.2.3, submit location description in the Semiannual Radioactive Effluent Release Report per Specification 6.9.3.~~

~~b. With a land use census identifying a location(s) which yields a calculated dose commitment (via the sample exposure pathway) greater than at a location from which samples are currently being obtained in accordance with the Specification 3.12.1, identify the new location in the Semiannual Radioactive Effluent Release Report per Specification 6.9.3. The new location shall be added to the radiological environmental monitoring program within 30 days, if possible. The sampling location having the lowest calculated 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.~~

~~c. The provisions of specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.12.2 The land use census shall be conducted at least once per 12 months between the dates of June 1 and October 1 by door-to-door survey, aerial survey, or by consulting local agricultural authorities. The results of the land use census shall be included in the Annual Radiological Environment Report.~~

~~*Broad Leaf vegetation sampling may be performed at the site boundary in the direction sector with the highest D/Q in lieu of the garden census.~~

(This page will be deleted)

~~RADIOLOGICAL ENVIRONMENTAL MONITORING~~

~~3/4.12.3 INTERLABORATORY COMPARISON PROGRAM~~

~~LIMITING CONDITION FOR OPERATION~~

~~3.12.3 Analyses shall be performed on radioactive materials supplied as part of the Interlaboratory Comparison Program which has been approved by NRC.~~

~~APPLICABILITY: At all times.~~

~~ACTION:~~

~~a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Report.~~

~~b. The provisions of Specifications 3.0.3 are not applicable.~~

~~SURVEILLANCE REQUIREMENTS~~

~~4.12.3 The results of analyses performed as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Report.~~

(This page will be deleted)

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION

The OPERABILITY of the post-accident instrumentation ensures that sufficient information is available on selected plant parameters to monitor and assess these variables following an accident. This capability is consistent with the recommendations of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Plants to Assess Plant Conditions During and Following an Accident," December 1975 and NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations."

The Reactor Vessel Level Monitor is provided as a means of indicating level in the reactor vessel during accident conditions. A minimum of two operable level sensors in the upper plenum region and one operable level sensor in the dome region are required for RVLMS channel operability. When Reactor Coolant Pumps are running, all except the dome sensors are interlocked to read "invalid" due to flow induced variables that may offset the sensor outputs. If the equipment is inaccessible due to health and industrial safety concerns (for example, high radiation area, low oxygen content of the containment atmosphere) or due to physical location of the fault (for example, probe failure in the reactor vessel), then operation may continue until the next scheduled refueling outage and a report filed.

3/4.3.3.7 CHLORINE DETECTION SYSTEMS

The OPERABILITY of the chlorine detection system ensures that sufficient capability is available to promptly detect and initiate protective action in the event of an accidental chlorine release. This capability is required to protect control room personnel and is consistent with the recommendations of Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release," February 1975.

~~3/4.3.3.8 FIRE DETECTION INSTRUMENTATION~~

~~DELETED~~

~~3/4.3.4 TURBINE OVERSPEED PROTECTION~~

~~This specification is provided to ensure that the turbine overspeed protection instrumentation and the turbine speed control valves are OPERABLE and will protect the turbine from excessive overspeed. Protection from turbine excessive overspeed is required since excessive overspeed of the turbine could generate potentially damaging missiles which could impact and damage safety related components, equipment or structures.~~

~~3/4.3.3.9 RADIOACTIVE GASEOUS EFFLUENT INSTRUMENTATION~~

~~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 of gaseous effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with the procedures in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.~~

~~For the radioactive gaseous effluent instrumentation surveillance requirements, the CHANNEL FUNCTIONAL TEST demonstrates that control room alarm annunciation occurs if any of the following conditions exist:~~

(This page will be deleted)

~~1. The instrument indicates measured levels above the alarm/trip setpoint.~~

~~2. Power to the detector is lost.~~

~~3. The instrument indicates a downscale failure.~~

~~For the containment purge and the waste gas holdup system noble gas activity monitors, the CHANNEL FUNCTIONAL TEST also demonstrates the automatic isolation of the release pathway occurs if the instrument indicates above the trip setpoint.~~

~~The initial CHANNEL CALIBRATION is performed using one or more of the reference standards certified by the National Bureau of Standards or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards permit calibrating the system over its intended range of energy and measurment range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration are used.~~

~~3.4.3.3.10 RADIOACTIVE LIQUID EFFLUENT INSTRUMENTATION~~

~~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 of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with the procedures in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.~~

~~For the radioactive liquid effluent instrumentation surveillance requirements, the channel test demonstrates that automatic isolation of this pathway and control room alarm annunciation occur if the instrument indicates measured levels above the trip setpoint. The channel test demonstrates that alarm annunciation occurs if any of the following conditions exist:~~

~~1. Power to the detector is lost.~~

~~2. The instrument indicates a downscale failure.~~

~~3. Instrument controls are not set in the operate mode.~~

~~The initial CHANNEL CALIBRATION is performed using one or more of the reference standards certified by the National Bureau of Standards or using standards that have been obtained from suppliers that participate in~~

(This page will be deleted)

~~measurement assurance activities with NBS. These standards permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration are used.~~

~~3/4.3.4 TURBINE OVERSPEED PROTECTION~~ (**This Spec is being moved to pg B 3/4 3-3**)

~~This specification is provided to ensure that the turbine overspeed protection instrumentation and the turbine speed control valves are OPERABLE and will protect the turbine from excessive overspeed. Protection from turbine excessive overspeed is required since excessive overspeed of the turbine could generate potentially damaging missiles which could impact and damage safety related components, equipment or structures.~~

(This page will be deleted)

3/4.11.1 LIQUID HOLDUP TANKS

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that, in the event of an uncontrolled release of the contents of the tanks, the resulting concentrations would be less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an UNRESTRICTED AREA.

3/4.11.2 GAS STORAGE TANKS

Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that, in the event of an uncontrolled release of the tank's contents, the resulting total body exposure to a MEMBER OF THE PUBLIC at the nearest EXCLUSION AREA boundary will not exceed 0.5 rem. This is consistent with Branch Technical Position ETSB 11-5 in NUREG-0800, July 1981.

3/4.11.3 EXPLOSIVE GAS MIXTURE

It is expected that the hydrogen/oxygen concentration will be kept within the limits and therefore not enter the flammable or detonable region concentrations within the waste gas storage tanks.

These levels provide reasonable assurance that no hydrogen/oxygen explosion could occur to allow rupture of the waste gas storage tanks. The hydrogen and oxygen limits are based on information in NUREG/CR-2726, "Light Water Reactor Hydrogen Manual."

Grab samples are to be taken every 4 hours during degassing operations when both hydrogen/oxygen analyzers are out of service. These samples are to be analyzed within 8 hours to assure that the hydrogen/oxygen concentration is within the limits in Figure 3.11-1. During other Waste Gas Compressor operations, the hydrogen/oxygen concentration is not as subject to change, therefore grab samples are to be taken every 24 hours.

~~This specification applies to the release of liquid effluents from each reactor at the site. For units with shared radwaste treatment systems, the liquid effluents from the shared system are proportioned among the units sharing that system.~~

~~3/4.11.1 LIQUID EFFLUENTS~~

~~3/4.11.1.1 CONCENTRATION~~

~~This specification is provided to ensure that the concentration of radioactive materials released in liquid waste effluents in unrestricted areas will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a MEMBER OF THE PUBLIC, and (2) the limits of 10 CFR Part 20, 106(e) to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-133 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.~~

~~3/4.11.1.2 DOSE~~

~~Provides assurance that releases of liquid effluents will result in concentrations below the limits of 10 CFR 20. The specification provides the required operating flexibility and at the same time assures that the release of radioactive material in liquid effluents will be kept "as low as is reasonably achievable." The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation 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 1, October 1977, and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I", April 1977.~~

~~3/4.11.1.3 LIQUID RADWASTE TREATMENT~~

~~The requirement 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." The specified limits governing the use of appropriate portions of the LIQUID RADWASTE TREATMENT SYSTEM were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.~~

~~The values of .18 mrem and .625 mrem are approximately 25% of the yearly design objectives on a quarterly basis. The yearly design objectives are given in 10 CFR 50, Appendix I, Section II.~~

~~3/4.11.1.4 LIQUID HOLDUP TANKS~~

~~Restricting the quantity of radioactive material contained in the specified tanks provides assurance that, in the event of an uncontrolled release of the contents of the tanks, the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in an UNRESTRICTED AREA.~~

~~3/4.11.2 GASEOUS EFFLUENTS~~

~~3/4.11.2.1 DOSE RATE~~

~~This specification is provided to ensure that the dose at any time in UNRESTRICTED AREAS from gaseous effluents from all units on the site will be within the limits of 10 CFR Part 20.105(b). This specification applies to the release of gaseous effluents from all reactors at the site.~~

~~3/4.11.2.2 DOSE-NOBLE GASES~~

~~This specification is provided to implement the requirements of Sections II.B, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.B of Appendix I. The action statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable." The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculations established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation 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 1, 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," Revision 1, July 1977. The ODCM equations provided for determining the air doses at and beyond the site boundary are based upon the historical average atmospheric conditions.~~

(This page will be deleted)

~~3/4.11.2.3 DOSE - IODINE-131, TRITIUM, AND RADIONUCLIDES IN PARTICULATE FORM~~

~~This specification is provided to implement the requirements of Sections II.C, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Conditions for Operation are the guides set forth in Section II.C of Appendix I. The action statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable". The ODCM calculational methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through 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 are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation 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 1, 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," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent on the existing radionuclide pathways to man in the areas at or beyond the site boundary. The pathways that were examined in the development of these calculations were: 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.~~

~~3/4.11.2.4 and 5 GASEOUS RADWASTE TREATMENT~~

~~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 the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents. This specification applies to gaseous radwaste from Arkansas Nuclear One, Unit No. 2.~~

(This page will be deleted)

~~3/4.11.2.6 GAS STORAGE TANKS~~

~~Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that, in the event of an uncontrolled release of the tank's contents, the resulting total body exposure to a MEMBER OF THE PUBLIC at the nearest EXCLUSION AREA boundary will not exceed 0.5 rem. This is consistent with Branch Technical Position ETSB 11-5 in NUREG-0800, July 1981.~~

~~3/4.11.2.7 EXPLOSIVE GAS MIXTURE~~

~~It is expected that the hydrogen/oxygen concentration will be kept within the above limits and therefore not enter the flammable or detonable region concentrations within the waste gas storage tanks.~~

~~These levels provide reasonable assurance that no hydrogen/oxygen explosion could occur to allow rupture of the waste gas storage tanks. The hydrogen and oxygen limits are based on information in NUREG/CR-2726, "Light Water Reactor Hydrogen Manual."~~

~~Grab samples are to be taken every 4 hours during degassing operations when both hydrogen/oxygen analyzers are out of service. These samples are to be analyzed within 8 hours to assure that the hydrogen/oxygen concentration is within the limits in Figure 3.11-1. During other Waste Gas Compressor operations, the hydrogen/oxygen concentration is not as subject to change, therefore grab samples are to be taken every 24 hours.~~

~~3/4.11.3 TOTAL DOSE~~

~~This specification is provided to meet the dose limitations of 40 CFR Part 190 that have now been incorporated into 10 CFR Part 20 by 46 FR 18525. The specification requires the preparation and submittal of a Special Report whenever the calculated doses from plant radioactive effluents exceed twice the design objective doses of Appendix I. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within the reporting requirement level. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance~~

(This page will be deleted)

~~with the provision of 40 CFR Part 190.11 and 10 CFR Part 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in Specifications 3.11.1 and 3.11.2. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.~~

~~3/4.11.4 SOLID RADIOACTIVE WASTE~~

~~This specification implements the requirements of 10 CFR 50.36a and General Design Criterion 60 of Appendix A to 10 CFR 50.~~

(This page will be deleted)

~~3/4.12.1 MONITORING PROGRAM~~

~~The radiological 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 effluents 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 the environmental exposure pathways. The initially specified monitoring 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 3.12-2 are state-of-the-art for routine environmental measurements in industrial laboratories. The LLDs for drinking water meet the requirements of 40 CFR 141.~~

~~3/4.12.2 LAND USE CENSUS~~

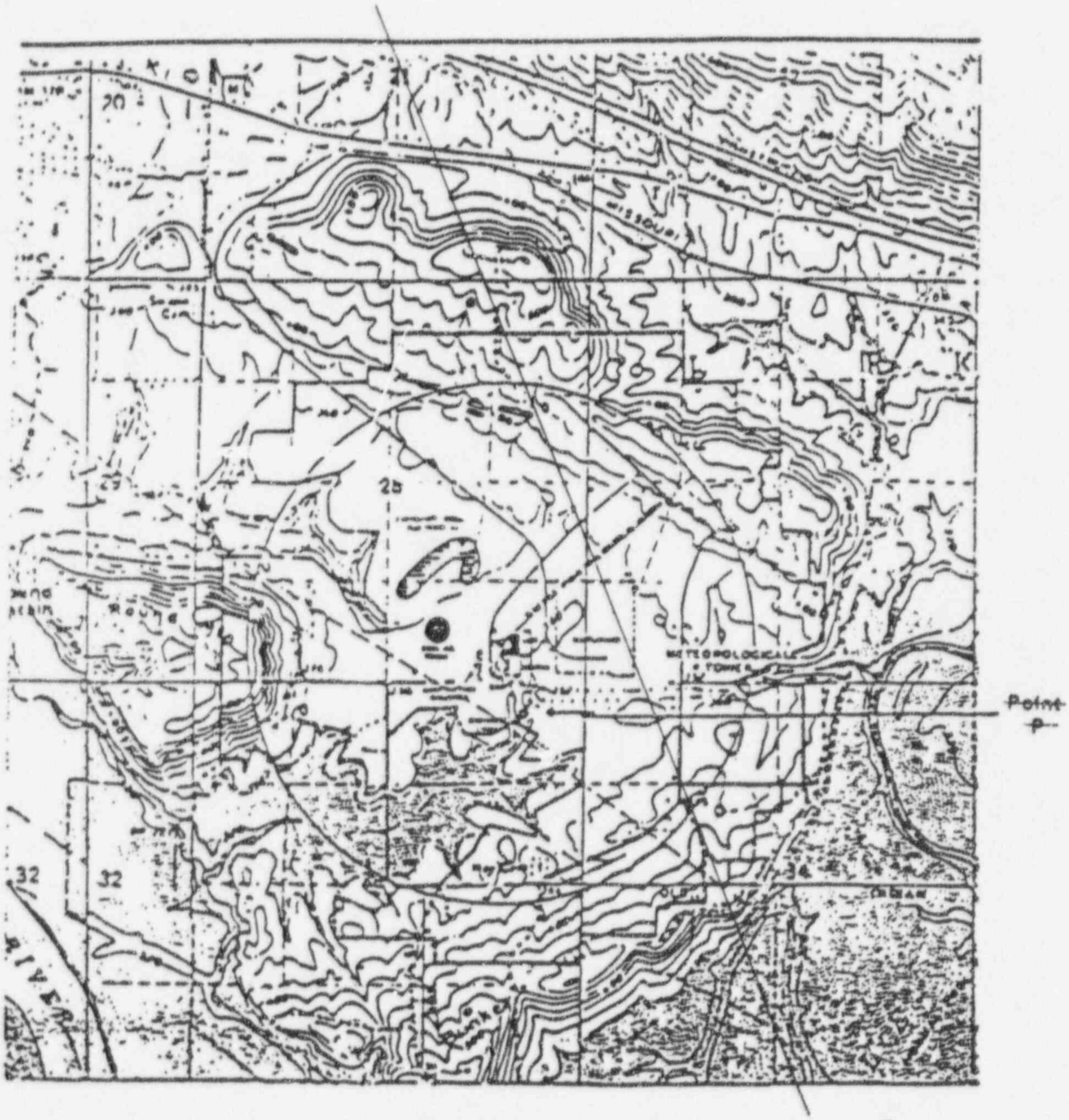
~~This specification is provided to ensure that changes in the use of unrestricted areas are identified and that modifications to the monitoring program are made if required by the results of this census. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathway via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were used: 1) that 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/square meter.~~

~~3/4.12.3 INTERLABORATORY COMPARISON PROGRAM~~

~~The requirement for participation in an Interlaboratory Comparison Program is provided to ensure 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.~~

(This page will be deleted)

(This page will be Deleted)



~~FIGURE 5.1-3~~

DELETED

~~MAXIMUM AREA BOUNDARY FOR RADIOACTIVE RELEASE CALCULATION~~
~~(EXCLUSION AREAS)~~
~~1046 METER RADIUS FOR GASES~~
~~AT END OF DISCHARGE CANAL CANAL FOR LIQUIDS (POINT P)~~

6.7 SAFETY LIMIT VIOLATION

6.7.1 The following actions shall be taken in the event a Safety Limit is violated:

a. The unit shall be placed in at least HOT STANDBY within one hour.
b. The Vice President, Operations ANO and the SRC shall be notified within 24 hours.
c. The Nuclear Regulatory Commission shall be notified pursuant to 10CFR50.72 and a report submitted pursuant to the requirements of 10CFR50.36 and Specification 6.6.

6.8 PROCEDURES AND PROGRAMS

6.8.1 Written procedures shall be established, implemented and maintained covering the activities referenced below:

a. The applicable procedures recommended in Appendix "A" of Regulatory Guide 1.33, Revision 2, February 1978.
b. Refueling operations.
c. Surveillance and test activities of safety related equipment.
d. (Deleted)
e. (Deleted)
f. Fire Protection Program implementation.
g. Modification of Core Protection Calculator (CPC) Addressable Constants. These procedures should include provisions to assure that sufficient margin is maintained in CPC Type I addressable constants to avoid excessive operator interaction with the CPCs during reactor operation.

NOTE: Modifications to the CPC software (including changes of algorithms and fuel cycle specific data) shall be performed in accordance with the most recent version of "CPC Protection Algorithm Software Change Procedure," CEN-39(A)-P that has been determined to be applicable to the facility. Additions or deletions to CPC addressable constants or changes to addressable constant software limit values shall not be implemented without prior NRC approval.

h. New and spent fuel storage.
i. ODCM and PCP implementation.
j. Post_accident sampling (includes sampling of reactor coolant, radioactive iodines and particulates in plant gaseous effluent, and the containment atmosphere).

6.8.2 Each procedure of 6.8.1 above, and changes in intent thereto, shall be reviewed and approved as required by the QAMO prior to implementation and reviewed periodically as set forth in administrative procedures.

6.8.3 Changes to procedures of 6.8.1 above may be made and implemented prior to obtaining the review and approval required in 6.8.2 above provided:

a. The intent of the original procedure is not altered.

b. The change is approved by two members of the plant management staff, at least one of whom holds a Senior Reactor Operator's License on Unit 2.

c. The change is documented, reviewed and approved as required by the QAMO, within 14 days of implementation.

6.8.4 The following program shall be established, implemented, and maintained:

a. Radioactive Effluent Controls Program

This program conforms with 10 CFR 50.36a for the control of radioactive effluents and for maintaining the doses to MEMBERS OF THE PUBLIC from radioactive effluents as low as reasonably achievable. The program shall be contained in the ODCM, shall be implemented by procedures, and shall include remedial actions to be taken whenever the program limits are exceeded. The program shall include the following elements:

1) Limitations on the functional capability of radioactive liquid and gaseous monitoring instrumentation including surveillance tests and setpoint determination in accordance with the methodology in the ODCM;

2) Limitations on the concentrations of radioactive material released in liquid effluents to UNRESTRICTED AREAS conforming to 10 CFR Part 20, Appendix B, Table 2, Column 2;

3) Monitoring, sampling, and analysis of radioactive liquid and gaseous effluents in accordance with 10 CFR 20.1302 and with the methodology and parameters in the ODCM;

4) Limitations on the annual and quarterly doses or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released from each unit to UNRESTRICTED AREAS, conforming to 10 CFR 50, Appendix I;

5) Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM at least every 31 days;

6) Limitations on the functional capability and use of the liquid and gaseous effluent treatment systems to ensure that appropriate portions of these systems are used to reduce releases of radioactivity when the projected doses in a period of 31 days would exceed 2% of the guidelines for the annual dose or dose commitment, conforming to 10 CFR 50, Appendix I;

7) Limitations on the dose rate resulting from radioactive material released in gaseous effluents to areas beyond the site boundary conforming to the dose associated with 10 CFR 20, Appendix B, Table 2, Column 1;

8) Limitations on the annual and quarterly air doses resulting from noble gases released in gaseous effluents from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I;

9) Limitations on the annual and quarterly doses to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives > 8 days in gaseous effluents released from each unit to areas beyond the site boundary, conforming to 10 CFR 50, Appendix I; and

10) Limitations on the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources, conforming to 40 CFR 190.

6.9 REPORTING REQUIREMENTS

ROUTINE REPORTS

6.9.1 In addition to the applicable reporting requirements of Title 10, Code of Federal Regulations, the following reports shall be submitted to the Administrator of the Regional Office unless otherwise noted.

STARTUP REPORT

6.9.1.1 A summary report of plant startup and power escalation testing shall be submitted following (1) receipt of an operating license, (2) amendment to the 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 plant.

6.9.1.2 The startup report shall address each of the tests identified in the FSAR and shall include a description of the measured values of the operating conditions or characteristics obtained during the test program and a comparison of these values with design predictions and specifications. Any corrective actions that were required to obtain satisfactory operation shall also be described. Any additional specific details required in license conditions based on other commitments shall be included in this report.

6.9.1.3 Startup reports shall be submitted within (1) 90 days following completion of the startup test program, (2) 90 days following resumption or commencement of commercial power operation, or (3) 9 months following initial criticality, whichever is earliest. If the Startup Report does not cover all three events (i.e., initial criticality, completion of 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 have been completed.

h. Deleted ~~Radioactive Effluents, Specifications 3.11.1.1, 3.11.1.2, 3.11.1.3, 3.11.2.2, 3.11.2.3, 3.11.2.4, 3.11.2.5, and 3.11.3.~~

~~This report shall include the following:~~

~~1) Description of occurrence.~~

~~2) Identify the cause(s) for exceeding the limit(s)~~

~~3) Explain corrective action(s) taken to mitigate occurrence.~~

~~4) Define action(s) taken to prevent recurrence.~~

~~5) Summary of consequence(s) of occurrence.~~

~~6) Describe levels exceeding 40CFR190 in accordance with 10CFR20.405(c).~~

i. Inoperable Containment Radiation Monitors, Specification 3.3.3.1.

j. Steam Generator Tubing Surveillance -- Category C-3 Results, Specification 4.4.5.5.

k. Maintenance of Spent Fuel Pool Structural Integrity, Specification 3.7.12.

l. Deleted ~~Radiological Environmental Monitoring Sample Analysis, Specification 3.12.1.~~

m. Deleted ~~Unplanned Offsite Release during one hour period 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. This report shall be submitted within 30 days of the occurrence of the event and shall include the following information:~~

~~1. Description of the occurrence.~~

~~2. Identify the cause(s) of exceeding the limit(s).~~

~~3. Explain corrective action(s) taken to mitigate occurrence.~~

~~4. Define action(s) taken to prevent recurrence.~~

~~5. Summary of the consequence(s) of occurrence.~~

n. Inoperable Reactor Vessel Level Monitoring System (RVLMS), Specification 3.3.3.6, Table 3.3-10 Item 14.

o. Inoperable Main Steam Line Radiation Monitors, Specification 3.3.3.1, Table 3.3-6.

~~SEMI-ANNUAL~~ RADIOACTIVE EFFLUENT RELEASE REPORT *

6.9.3 The ~~Routine r~~Radioactive ~~e~~Effluent ~~r~~Release ~~r~~Reports covering the operation~~g~~ of the unit ~~during the previous 6 months of operations~~ shall be submitted ~~within 60 days after January 1 and July 1 of each year~~in accordance with 10 CFR 50.36a.

~~6.9.3.1~~ The ~~radioactive effluent release~~ report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste release from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1. ~~The data will be summarized on a quarterly basis following the format of Regulatory Guide 1.21, Revision 1.~~

~~6.9.3.2 Any changes in the OFFSITE DOSE CALCULATION MANUAL and PCP shall be included in the semiannual report for the period in which the change(s) was made effective.~~

~~6.9.3.3 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:~~

~~1. Description of the occurrence.~~

~~2. Identify the cause(s) for exceeding the limit(s).~~

~~3. Explain corrective actions taken to mitigate occurrence.~~

~~4. Define action(s) taken to prevent recurrence.~~

~~5. Summary of consequence(s) of occurrence.~~

---

* A single submittal may be made for ~~a multiple unit station~~ANO. The submittal should combine those sections that are common to both units.~~all units at the station; however, for units with separate radwaste system, t~~The submittal shall specify the releases of radioactive material from each unit.

~~6.9.3.4 The first report filed each year shall contain:~~

~~1. A summary of the hourly meteorological data collected over the previous calendar year. In lieu of including this summary in the report, the data may be retained by the licensee for NRC review and noted as such in the report.~~

~~2. A summary of radiation doses due to radiological effluent during the previous calendar year calculated in accordance with the methodology specified in the OFFSITE DOSE CALCULATION MANUAL.~~

~~3. The radiation dose to members of the public due to their activities inside the site boundary. This calculated dose shall include only those dose contributions directly attributed to operation of the unit and shall be compared to the limits specified in 40 CFR 190.~~

~~6.9.3.5 The first report filed each year shall contain description of licensee initiated major changes to the radioactive waste systems (liquid, gaseous and solid) during the previous calendar year.*~~

~~*This information may be included in the annual FSAR update in lieu of inclusion in this report.~~

<u>THIS PAGE INTENTIONALLY LEFT BLANK</u>

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT *

6.9.4 ~~Routine~~ The Annual ~~r~~Radiological ~~e~~Environmental ~~o~~Operating ~~r~~Report~~s~~ covering the operation of the unit during the previous calendar year shall be submitted ~~prior to~~ by May 15 of each year.

~~a.~~ The ~~annual radiological environmental operating~~ report shall include summaries, interpretations, and ~~an~~ analyses~~is~~ of trends of the results of the radiological environmental monitoring program ~~surveillance activities~~ for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.~~, 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 land use censuses required by Specification 3.12.2. If harmful effects or evidence of irreversible damage 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 Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements. In the event that some individual 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 in a supplementary report as soon as possible.

~~b. The annual radiological environmental operating reports shall include summarized and tabulated results of all radiological environmental samples 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.~~

~~c. The report shall also include the following: a summary description of the radiological environmental monitoring program; a map of all sampling locations keyed to a table giving distances and directions from one reactor; and the results of licensee participation in the Interlaboratory Comparison Program, required by Specification 3.12.3.~~

---

*A single submittal may be made for ANO ~~a multiple unit station~~. The submittal should combine those sections that are common to both ~~all~~ units. ~~at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.~~

f. Records of reactor tests and experiments.

g. Records of training and qualification for current members of the unit staff.

h. Records of in-service inspections performed pursuant to these Technical Specifications.

i. Records of Quality Assurance activities required by the QA Manual.

j. Records of reviews performed for changes made to procedures or equipment or reviews of tests and experiments pursuant to 10CFR50.59.

k. Records of meetings of the PSC and the SRC.

l. Records of changes to the Core Protection Calculator System (CPCS) SOFTWARE. Changes to the CPCS SOFTWARE shall be made in accordance with methods approved by the NRC. These records shall include the following:

    1. Purpose of change.

    2. Detailed description of changes including algorithms, changes to the assembly listings, checksums and disk identification numbers.

    3. Summary of validation test results.

m. Records of reviews performed for changes made to the Offsite Dose Calculation Manual and Process Control Program. ~~(DELETED)~~

n. Records of the service lives of the seals of all hydraulic snubbers required by Specification 3.7.8, including the date at which the service life commences and associated installation and maintenance records.

6.11 RADIATION PROTECTION PROGRAM

Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure.

6.12 (DELETED)

6.14 OFFSITE DOSE CALCULATION MANUAL* (ODCM)

The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the radiological environmental monitoring program.

The ODCM shall also contain the radioactive effluent controls and radiological environmental monitoring activities and descriptions of the information that should be included in the Radioactive Effluent Release and Annual Radiological Environmental Operating Reports required by Specifications 6.9.3 and 6.9.4.

Licensee initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

   1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s),

   2. A determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations;

b. Shall become effective after approval of the General Manager, Plant Operations; and

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed and shall also indicate the date (i.e., month and year) the change was implemented.

~~FUNCTION~~

~~6.14.1 The ODCM shall describe 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 consistent with the applicable LCOs contained in these Technical Specifications.~~

~~6.14.2 Changes to the ODCM made by the licensee shall:~~

~~1. Be reviewed and found acceptable by the PSC and SRC.~~

~~2. Be submitted to the Commission by the inclusion in the Semiannual Radiological Effluent Release Report pursuant to Specification 6.9.3 for the period in which the change(s) was made effective and shall contain:~~

   ~~a. Sufficiently detailed information to totally support the rationale for the change. Information submitted should consist of a package of those pages of the ODCM to be changed with each page numbered and provided 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.~~

~~3. Shall become effective upon a date specified and agreed to by both the PSC and SRC following their review and acceptance of the change(s).~~

~~*This document is the same document as the ODCM required in the ANO-1 Technical Specifications.~~

DRAFT REVISION OF THE ODCM WITH CHANGES INCORPORATED

(FOR INFO ONLY)

(The proposed changes to the this draft revision to the ODCM have been included to assist in the review process. Pages 1 through 9 lists the proposed changes to the ODCM.)

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
All	Added revision number to header
1	Deleted "for"; added List of Affected Pages.
2	Made subsections lowercase; deleted quotation marks; added "(Final Effluent)" before "monitor"; changed "24" to "21".
3	Made figure/table/appendix titles lowercase; moved figures and tables below their respective headers; added "Figure" to "4-1" and "4-2"; added "Table" to "4-1"; added Appendices header; added Appendix 1 and Appendix 2.
4	Changed "specification" to "appendix and limitation" and "limitation"; added "(App. 1)" and "(App. 2)".
5	Changed "specification" to "limitation"; changed "specifications" to "limitations"; added spaces to "10CFR20"; changed "2E-4" to 2×10^{-4}"; changed "Technical Specifications" to "Appendix 1, Limitation 3.25.1.1.A and Appendix 2, Limitation 3.11.1.1"; deleted ", per Technical Specifications,".
6	Changed "specification" to "limitation";
7	Changed "specification" to "limitation"; changed "Technical Specification" to "Appendix 1 and Appendix 2 Limitations"; changed "Sport Freshwater Fish" to lowercase.
10	Changed "sector(s)" to "sector"; removed comma before "stored".
12	Added [containment]".
13	Changed "XE-133" to "Xe-133"; added "a" before "site".
14	Added "[containment]"; made "Noble" lowercase.
15	Changed "1.05km" to "1.05 km".
16	Added "(containment)".
17	Added "(containment)".
18	Added "(containment)".
19	Added "(containment)"; deleted "("; changed "DF^7" to "DF^7,"; changed "Technical Specifications" to "Appendix 1 and Appendix 2 Limitations".
20	Changed "FSAR" to "SAR"; added "[containment]"; changed "meat" to "the cow"; deleted hyphen from "contribu-tion".
22	Changed "1.05km" to "1.05 km".
25	Changed "carbon 14" to "carbon-14"; deleted comma after "designated".
26	Changed "m^2hr/kg" to "m^2-hr/kg".
28	Changed "m^2hr/kg" to "m^2-hr/kg"; changed "*" to "x".
29	Added spaces around "="; changed "C^{14}" to "C-14" and "H^3" to "H-3".
31	Deleted hyphen from "esti-mated".
32	Deleted quotation marks.
34	Changed section title words to capitals; changed "FSAR" to "SAR"; changed "the ODCM" to "this manual"; added space around "=".
35	**Changed "1000" to "1046";** changed "Technical Specifications" to "Appendix 1 and Appendix 2 Limitations".
36	Changed "Radiological Sample Stations" to "Figures".

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
37	Added "Radiological Sample Stations"; made map bigger for readability.
38	Rearranged page information; updated map for readability; deleted "/Point P".
39	Added Tables cover page.
42	Changed "from turn" to "from ANO. Turn"; deleted "(approximately 30 yards)".
43	Added hyphen to "Flat Rock Piney Bay"; deleted duplicate period at end of sentence.
44	Changed "mile" to "miles".
46	Deleted "No. 26"; changed "North" to lowercase; moved ")".
47	Deleted "just before pavement ends" and "just after pavement begins"; added "The"; deleted "112".
48	Added "The"; deleted "114" and "115".
49	Added hyphen to "Flat Rock Piney Bay".
53	Added "The"; deleted "133" and "134".
54	Added "The"; deleted "135" and "136".
55	Added "The"; deleted "141".
57	Added Appendices cover page.

Note: Appendix 1 and Appendix 2 are the incorporation of the Radiological Technical Specifications. All pages of these appendices were inserted in this revision as new pages. Changes listed from this point in the document forward are changes from the original wording in the associated unit's Technical Specification.

58	Added Appendix 1 cover page.
59	Added "As defined in Unit 1 Technical Specifications,"; changed "functions(s)" to "function(s)".
60	Added "As defined in Unit 1 Technical Specifications,"; changed ".65" to "0.65"; changed "atomspheric" to "atmospheric".
61	Changed "Specification" to "Limitation" or "Appendix 1, Limitation"; **deleted "Semiannual"; deleted Specification 3.5.6.4;** changed "the ODCM" to "this manual".
63	Changed "Specification" to "Appendix 1, Limitation".
64	Changed "Specification" to "Limitation" or "Appendix 1, Limitation"; **deleted "Semiannual"; deleted Specification 3.5.7.4;** changed "the ODCM" to "this manual".
65	Added "Minimum Channels" to "Operable".
66	Added "Minimum Channels" to "Operable".
68	Changed "Specifications" to "Limitations"; added period to "3 25.1.1"; superscripted exponential dash; changed "specification" to "limitation" or "Appendix 1, Limitation; changed "3O" to "30"; added period at end of sentence; **deleted Specification 3.25.1.1.C;** added period between "II A"; changed "limitation" to "limit".

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
69	Added period between "IV A"; changed "Specifications" to "Limitations"; added period after "A" designator; deleted hyphen from "radio-active"; changed "specification" to "Appendix 1, Limitation" or "limitation"; **deleted Specification 3.25.1.2.C;** added spaces to "10CFR20".
70	Changed "Specifications" to "Limitations" and added colon; changed "specification" to "limitation" or "Appendix 1, Limitation"; **deleted Specification 3.25.1.3.D;** added period between "II A".
71	Changed "Specifications" to "Limitations"; Changed "5.1-1" to "4-2"; **deleted Specification 3.25.2.1.C;** changed "specification" to "limitation"; added period to end of sentence.
72	Added period between "IV A"; changed "Specifications" to "Limitations"; deleted last period from "3.25.2.2."; changed "5.1-1" to "4-2"; changed "specification" to "Appendix 1, Limitation" or "limitation"; **deleted Specification 3.25.2.2.C;** removed hyphens from "dis-charged" and "indi-vidual".
73	Added period to "IV A"; changed "Specifications" to "Limitations"; changed "5.1-1" to "4-2"; changed "Specification" to "Appendix 1, Limitation" or "Limitation"; **deleted Specification 3.25.2.3.C;** changed "Section 11 C" to "Section II.C".
74	Changed "Specifications" to "Limitations" or "Appendix 1, Limitations"; changed "5.1-1" to "4-2"; changed "Specification" to "Appendix 1, Limitation"; **deleted Specification 3.25.2.4.D;** added periods to "II B" and "II C".
75	Changed "Specifications" to "Limitations" or "Appendix 1, Limitations"; changed "Specification" to "Appendix 1, Limitation" or "limitation"; added spaces to "10CFR" and "40CFR190"; **deleted Specification 3.25.3.4;** changed "limitations" to "limits"; changed "the limitation of" to "limiting"; changed "limitation of" to "limits in".
76	Changed "Specification" to "Appendix 1, Limitation" or "limitation"; changed "Specifications" to "Limitations"; changed "the ODCM" to "this manual"; added period to "II A"; changed "limitation" to "limit".
77	Changed "γisotopi" to "γ isotopic".
78	Changed bullets to stars; "sb" to "Sb".
79	Inserted blank line between header lines; changed "specification" to "limitation"; added dashes between isotope names (e.g., "Mn54" to "Mn-54"); **deleted "Semiannual".**
80	Changed "Specifications" to "Limitations"; changed "Specification" to "Appendix 1, Limitation"; changed "Bureau of Standards" to "Institute of Standards and Technology"; changed "NBS" to "NIST".
81	Changed "Requirement" to "Limitation"; realigned column headings and shortened underline length.
82	Changed "Specifications" to "Limitations"; changed "the ODCM" to "this manual"; changed "Specification" to "Limitation" or "Appendix 1, Limitation".

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
84	Changed "specification" to "limitation" or "Appendix 1, Limitation"; **deleted "Semiannual";** added "Radioactive" before "Effluent"; added "Release" before "Report"; changed "1E-4" to "1×10^{-4}".
85	Changed "Specifications" to "Limitations"; changed "Specifications" to "Limitations; changed "Bureau of Standards" to "Institute of Standards and Technology"; changed "NBS" to "NIST".
86	Changed "Requirements" to "Limitations"; realigned column headers and shortened underlines; added ")" after "release"; deleted hyphen from "Ventila-tion.
87	Changed "Requirements" to "Limitations"; realigned column headers and shortened underlines".
88	Added blank line between starred footnotes.
89	Added space to "CFR50"; added period to "IIIA"; changed "Specifications" to "Limitations" or "Appendix 1, Limitations"; changed "the Offsite Dose Calculation Manual" to "this manual".
90	Added missing underline segments in section title; deleted blank lines between "Applicability/Objective" and supporting information; added colons after section headers; changed "Specification" to "Limitations"; deleted "in the ODCM"; added "Operating" before "Report"; changed "Specifications" to "Appendix 1, Limitations".
91	Changed "Specifications" to "Appendix 1, Limitations"; added "Operating" before "Report"; **deleted "Semiannual";** capitalized "table"; inserted "4-1" after "Table; deleted "for the ODCM"; deleted Specification 4.30.1.2.d; changed "specification" to "limitation"; deleted hyphens from "state-of-the-art".
92	Changed "the Offsite Dose Calculation Manual (ODCM)" to "Figure 4-1".
93	Changed "the ODCM" to "Figure 4-1".
94	Changed "the ODCM" to "Figure 4-1".
95	Capitalized "gross beta"; reformatted isotope names (e.g., "^{3}H" to "H-3").
96	Deleted space from "I -131".
97	Changed "specification" to "limitation" or "Appendix 1, Limitation"; changed "Specifications" to "Limitations"; changed "Unit" to "Appendix"; **deleted "Semiannual";** added "Operating" before "Report; **deleted Specification 4.30.2.5.**
98	Changed "specification" to "limitation"; added space in "26kg/year".
99	Changed "Specifications" to "Limitations"; added "Operating" before "Report"; changed "specification" to "Appendix 1, Limitation"; **deleted Specification 4.30.3.4.**
100	**New section (required by Generic Letter 89-01).**

Document: Offsite Dose Calculation Manual

Revision: RETS

Page Changes

101 Added "Operating" before "Report"; changed "+" to "*"; added "The Radiological Environmental Monitoring Report shall be in accordance with Unit 1 Technical Specification 6.12.2.5 requirements"; changed "Routine" to "The"; changed "reports" to "report; **changed "May 1" to "May 15"; changed "statistical evaluation" to "analyses of trends";** changed "surveillance activities" to "monitoring program"; deleted "The report shall also include the results of the land use census required by Specification 4.30.2."; added "and of all environmental radiation measurements; **deleted "including a comparison with...on the environment";** added "if"; added "becomes available, it"; changed "one reactor" to "the reactor buildings"; added "the"; deleted "licensee participation in"; added "participation"; changed "report" to "reporting"; changed "Specification" to "Appendix 1, Limitation"; added "required by this manual"; added "Radiological Environmental Operating" before "reports"**; deleted "including sampling methods ...and measuring equipment used;";** deleted ""-1 and ANO-2"; deleted "at the station".

102 **Deleted "Semiannual";** changed "Routine" to "The"; **changed "reports" to "report"; changed "previous 6 months of operation" to "calendar year"; changed "within 60 days after January 1 and July 1 of each year" to "annually";** added "The report must be submitted as specified in 10 CFR 50.4, and the time between submission of reports must be no longer than 12 months"; deleted "on a quarterly basis"; changed "This" to "The radioactive effluent release"; changed "The first" to "The radioactive effluent release"; added "(Refer to Unit 1 Technical Specification 6.14.c for potential reporting requirements.)"; **deleted "filed each year";** changed "the Offsite Dose Calculation Manual" to "this manual"; added spaces to "40CFR190"; deleted "-1 and ANO-2"; **changed "annual FSAR" to "periodic SAR".**

103 Changed "specification" to "limitation" or "Appendix 1, Limitation"; changed comma to semicolon; changed "Specifications" to "Appendix 1, Limitations"; added spaces in "40CFR190" and "10CFR20.405(c)".

104 Added Appendix 2 cover page.

Note: All block-capitalized words (i.e. definition words) in Appendix 2 were changed to lower case.

105 Added "As defined in Unit 2 Technical Specifications,".

106 Added "As defined in Unit 2 Technical Specifications,"; changed ".65" to "0.65".

107 Changed "Limiting Condition for Operation" to "Limitation"; changed "Specification" to "Appendix 2, Limitation" or "limitation"; deleted hyphens from "instrumenta-tion", "con-servative" and "instrumenta-tion"; **deleted "Semiannual"; deleted Specification 3.3.3.9.d;** changed "Requirements" to "Limitations.

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
113	Changed "Requirements" to "Limitations"; shortened underline on "Check" and "Test".
114	Changed "Requirements" to "Limitations"; shortened underline on "Check" and "Test".
115	Changed "Requirements" to "Limitations"; shortened underline on "Check" and "Test".
117	Changed "Limiting Condition for Operation" to "Limitation"; changed "Specification" to "Appendix 2, Limitation" or "limitation"; **deleted "Semiannual"; deleted Specification 3.3.3.10.d;** changed "Requirements" to "Limitations".
120	Changed "Requirements" to "Limitations"; shortened underline on "Check" and "Test".
121	Changed "Limiting Condition for Operation" to "Limitation"; changed "Specification" to "Appendix 2, Limitation"; **deleted Specification 3.11.1.1.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".
122	Finished broken lower cell border; deleted hyphens from "probabil-ity" and "pico-curie"; changed bullets to stars in equation.
123	Deleted hyphen from "radio-nuclide"; changed "specification" to "limitation; added dashes to isotope names (e.g., "Mn54" to "Mn-54"); **deleted "Semiannual".**
124	Changed "Limiting Condition for Operation" to "Limitation"; changed "Specification" to "Appendix 2, Limitation"; **deleted Specification 3.11.1.2.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".
125	Changed "Limiting Condition for Operation" to "Limitation"; added "0" to ".18" and ".625"; changed "Specification" to "Appendix 2, Limitation"; **deleted Specification 3.11.1.3.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".
126	Changed "Limiting Condition for Operation" to "Limitation"; changed "5.1-3" to "4-2); **deleted Specification 3.11.2.1.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".
127	Changed "Reactor Bldg." to "Containment"; changed "Rx." to "Cont."; deleted hyphen from "venti-lation".
128	Changed "4.11.2" to "4.11-2"; added parentheses around "a."; changed "Specification" to "Appendix 2, Limitation" or "limitation"; **deleted "Semiannual";** changed "Reactor" to "Containment"; changed "Specifications" to "Appendix 2, Limitations"; changed "E -4" to "10^{-4}".
129	Changed "Limiting Condition for Operation" to "Limitation"; changed "5.1-3" to "4-2); changed "Specification" to "Appendix 2, Limitation"; added period after "days"; **deleted Specification 3.11.2.2.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
130	Changed "Limiting Condition for Operation" to "Limitation"; changed "5.1-3" to "4-2"; changed "Specification" to "Appendix 2, Limitation"; **deleted Specification 3.11.2.3.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".
131	Changed "Limiting Condition for Operation" to "Limitation"; changed "5.1-3" to "4-2"; added "0" before ".625"; changed "Specification" to "Appendix 2, Limitation"; **deleted Specification 3.11.2.4.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".
132	Changed "Limiting Condition for Operation" to "Limitation"; changed "5.1-3" to "4-2"; added "0" before ".625"; changed "Specification" to "Appendix 2, Limitation"; **deleted Specification 3.11.2.5.b;** changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual".
133	Changed "Limiting Condition for Operation" to "Limitation"; changed "Specifications" to "Appendix 2, Limitations"; changed "Requirements" to "Limitations"; changed "ODCM" to "this manual".
134	Changed "Limiting Condition for Operation" to "Limitation"; changed "the ODCM" to "this manual"; changed "Commissioned" to "Commission"; added "Operating" before "Report; changed "Specifications" to "Appendix 2, Limitations".
135	Changed "Limiting Condition for Operation" to "Limitation"; **deleted "Semiannual";** capitalized "table"; added "4-1" after "Table"; deleted "for the ODCM"; **deleted Specification 3.12.1.d;** changed "Requirements" to "Limitations"; deleted hyphen from "Environ-mental"; added "Operating" before "Report".
136	Changed "the Offsite Dose Calculation Manual (ODCM)" to "Figure 4-1".
137	Changed "the ODCM" to "Figure 4-1".
138	Changed "the ODCM" to "Figure 4-1".
139	**Changed "Mn-56" to "Mn-54";** changed "grap" to "grab"; changed "4.11.1" to 4.11-1".
141	Changed "Limiting Condition for Operation" to "Limitation"; changed "Unit" to "Appendix"; removed hyphens from "radio-nuclide" and "lo-cation"; changed "Specification" to "Limitation" or "Appendix 2, Limitation"; **deleted "Semiannual"; deleted Specification 3.12.2.c;** changed "Requirements" to "Limitations"; changed "Environment" to "Environmental"; added "Operating" before "Report".
142	Changed "Limiting Condition for Operation" to "Limitation"; added "Operating" before "Report"; **deleted Specification 3.12.3.b;** changed "Requirements" to "Limitations".
143	Changed "the ODCM" to "this manual"; changed "Bureau of Standards" to "Institute of Standards and Technology"; changed "NBS" to "NIST"; changed "measurment" to "measurement".

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
144	Changed "the ODCM" to "this manual"; deleted "3. Instrument controls are not set in the operate mode."; changed "Bureau of Standards" to "Institute of Standards and Technology"; changed "NBS" to "NIST".
145	Deleted "This specification applies to the release of liquid effluents from each reactor at the site. For units with shared radwaste treatment systems, the liquid effluents from the shared system are proportioned among the units sharing that system."; changed "specification" to "limitation"; changed "limitation" to "limit"; changed "20, 106(e)" to "20.106(e)"; added "This limitation" before "provides"; changed "the ODCM" to "this manual"; added "0" before ".18" and ".625".
146	Changed "specification" to "limitation"; changed "Requirements" to "Limitations"; changed "the ODCM" to "this manual"; deleted "ODCM"; added "in this manual".
147	Changed "specification" to "limitation"; deleted "ODCM"; added "in this manual"; changed "specifications" to "limitations"; changed "Arkansas Nuclear One Unit No. 2" to "ANO-2".
148	Changed "specification" to "limitation"; changed "limitations" to "limits"; changed "Specifications" to "Appendix 2, Limitations"; changed "the limitation of" to "limiting"; changed "limitation of" to "limits in".
149	Changed "specification" to "limitation"; deleted hyphens from "state-of-the-art".
150	**New section (required by Generic Letter 89-01).**
151	Added "Limitation" to header; added blank line between "Reports" and "6.9.2"; changed "specification" to "limitation" or "Appendix 2, Limitation"; changed comma to semicolon; changed "Specifications" to "Appendix 2, Limitations" added spaces to "40CFR190" and "10CFR20.405".
152	Added "Limitation" to header; **deleted "Semi-annual";** changed "Routine" to "The"; **changed "reports" to "report**"; changed "operating" to "operation"; **changed "previous 6 months of operations" to "calendar year"; changed "within 60 days after January 1 and July 1 of each year" to "annually";** added "The report must be submitted as specified in 10 CFR 50.4, and the time between submission of reports must be no longer than 12 months."; changed "release" to "released"; deleted "on a quarterly basis"; changed "Offsite Dose Calculation Manual" to "ODCM"; added "Radioactive Effluent Release" before "report"; **changed "reports" to "report";** deleted "first" and "filed each year"; added "radioactive effluent release"; changed "the Offsite Dose Calculation Manual" to "this manual"; changed "multiple unit station" to "ANO"; changed "all" to "both"; deleted "at the station; however for units with separate radwaste system".
153	Added "Limitation" to header; added "a"; **changed "annual FSAR" to "periodic SAR".**

Document: Offsite Dose Calculation Manual

Revision: RETS

Page	Changes
154	Added "Limitation" to header; **deleted "Annual";** added "The Radiological Environmental Operating Report shall be in accordance with Unit 2 Technical Specification 6.9.4."; changed "Routine" to "The"; **changed "May 1" to "May 15";** changed "surveillance activities" to "monitoring program"; **deleted "including a comparison with...on the environment"; changed "reports" to "report";** moved "The report shall also include the results of the land use censuses required by Specification 3.12.2" to paragraph c.; added "the"; **changed "censuses" to "census";** deleted "licensee participation in"; added "participation"; changed "Specification" to "Appendix 2, Limitation"; added "radioactive environmental operating" before "report"; added "and of all environmental radiation measurements; added "if"; added "becomes available, it"; changed "one reactor" to "the reactor buildings"; changed "multiple unit station" to "ANO"; changed "all" to "both"; deleted "at the station"; deleted "however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit".

Offsite Dose Calculation Manual

Arkansas Nuclear One

Revision RETS

List of Affected Pages

Page	Revision	Page	Revision	Page	Revision	Page	Revision
1	#	51	#	101	#	151	#
2	#	52	#	102	#	152	#
3	#	53	#	103	#	153	#
4	#	54	#	104	#	154	#
5	#	55	#	105	#		
6	#	56	#	106	#		
7	#	57	#	107	#		
8	#	58	#	108	#		
9	#	59	#	109	#		
10	#	60	#	110	#		
11	#	61	#	111	#		
12	#	62	#	112	#		
13	#	63	#	113	#		
14	#	64	#	114	#		
15	#	65	#	115	#		
16	#	66	#	116	#		
17	#	67	#	117	#		
18	#	68	#	118	#		
19	#	69	#	119	#		
20	#	70	#	120	#		
21	#	71	#	121	#		
22	#	72	#	122	#		
23	#	73	#	123	#		
24	#	74	#	124	#		
25	#	75	#	125	#		
26	#	76	#	126	#		
27	#	77	#	127	#		
28	#	78	#	128	#		
29	#	79	#	129	#		
30	#	80	#	130	#		
31	#	81	#	131	#		
32	#	82	#	132	#		
33	#	83	#	133	#		
34	#	84	#	134	#		
35	#	85	#	135	#		
36	#	86	#	136	#		
37	#	87	#	137	#		
38	#	88	#	138	#		
39	#	89	#	139	#		
40	#	90	#	140	#		
41	#	91	#	141	#		
42	#	92	#	142	#		
43	#	93	#	143	#		
44	#	94	#	144	#		
45	#	95	#	145	#		
46	#	96	#	146	#		
47	#	97	#	147	#		
48	#	98	#	148	#		
49	#	99	#	149	#		
50	#	100	#	150	#		

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

The Offsite Dose Calculation Manual (ODCM) provides guidance for making release rate and dose calculations for radioactive liquid and gaseous effluents from Arkansas Nuclear One - Units 1 and 2. The methodology is drawn from NUREG-0133, Rev. 0. Parameters contained within this manual were taken from NUREG-0133 and Regulatory Guide 1.109 except as noted for site specific values. These numbers and the calculational method may be changed as provided for in the Technical Specifications.

A limitation for a given item will have a different appendix and limitation number for each; therefore, in the ODCM, references to limitations will be made to the limitation subjects. The limitation subjects and numbers are presented below:

	Limitation Number	
Subject	ANO-1	ANO-2
	(App. 1)	(App. 2)
Radioactive Gaseous Effluents - Instrumentation	3.5.7	3.3.3.9
Radioactive Liquid Effluents - Instrumentation	3.5.6	3.3.3.10
Radioactive Liquid Effluents - Concentration	3.25.1.1	3.11.1.1
Radioactive Liquid Effluents - Dose	3.25.1.2	3.11.1.2
Radioactive Liquid Effluents - Waste Treatment	3.25.1.3	3.11.1.3
Radioactive Gaseous Effluents - Dose Rate	3.25.2.1	3.11.2.1
Radioactive Gaseous Effluents - Dose, Noble Gases	3.25.2.2	3.11.2.2
Radioactive Gaseous Effluents - Dose, Particulates	3.25.2.3	3.11.2.3
Radioactive Gaseous Effluents - Radwaste Treatment	3.25.2.4	3.11.2.4
Radioactive Gaseous Effluents - Gas Storage Tanks	3.25.2.5	3.11.2.6
Radiological Environmental Monitoring	4.30	3.12

2.0 LIQUID EFFLUENTS

2.1 Radioactive Liquid Effluent Monitor Setpoint

The Radioactive Liquid Effluent Instrumentation Limitation requires that the radioactive liquid effluents be monitored with the alarm/trip setpoints adjusted to ensure that the limits of the radioactive liquid effluent concentration limitations are not exceeded. These concentrations are for the site. The alarm/trip setpoint on the liquid effluent monitor is dependent upon the dilution water flowrate, radwaste tank flowrate, isotopic composition of the radioactive liquid to be discharged, a gross gamma count of the liquid to be discharged, background count rate of the monitor, and the efficiency of the monitor. Due to the fact that these are variables, an adjustable setpoint is used. The setpoint must be calculated and the monitor setpoint set prior to the release of each batch of radioactive liquid effluents. The following methodology is used for the setpoint determination for the following monitors.

ANO-1: RE-4642 Liquid Radwaste Monitor

ANO-2: 2RE-2330 Liquid Radwaste Monitor
2RE-4423 Liquid Radwaste Monitor

1) A sample from each tank (batch) to be discharged is obtained and counted for gross gamma (Cs-137 equivalent) and a gamma isotopic analysis is performed.

2) A dilution factor (DF) for the tank is calculated based upon the results of the gamma isotopic analysis and the Maximum Permissible Concentration (MPC) of each detected radionuclide.

DF is calculated as follows:

$$DF = \Sigma_i \ (C_i/MPC_i) + C_{TNG}/MPC_{TNG}$$

where:

DF = dilution factor;

C_i = concentration of isotope "i", (μCi/ml);

MPC_i = maximum permissible concentration of isotope "i", (from 10 CFR 20, Appendix B, Table II, column 2 in μCi/ml);

C_{TNG} = total concentration of noble gases (μCi/ml); and

MPC_{TNG} = 2×10^{-4} (μCi/ml) per Appendix 1, Limitation 3.25.1.1.A and Appendix 2, Limitation 3.11.1.1.

3) The dilution water flowrate is the number of ANO-1 circulating water pumps in operation at the time of release. (Each circulating water pump has an approximate flowrate of 191,500 gpm.)

4) The theoretical release rate, F_m, of the tank (batch) to be released is expressed in terms of the dilution water flowrate, such that for each volume of dilution water released, a given volume of liquid radwaste may be combined. This may be expressed as follows:

$$F_m = PMPNUM \times 191{,}500/DF$$

where:

F_m = theoretical release rate (gpm);

PMPNUM = number of ANO-1 circulating water pumps in operation;

191,500 = approximate flowrate of an ANO-1 circulating water pump (gpm); and

DF = dilution factor as calculated in Step 2 above.

> NOTE
>
> In the above equation, the theoretical release rate (F_M) approaches zero as the dilution factor increases. The actual flowrate (F_A) will normally be equal to the theoretical release rate for high activity releases. For low activity releases, the theoretical release rate becomes large and may exceed the capacity of the pump discharging the tank. In these cases, the actual release rate may be set to the maximum flowrate of the discharge pump.

5) The monitor setpoint is calculated by incorporating the monitor reading prior to starting the release (i.e., background countrate), and a factor which is the amount of increase in the release concentration that would be needed to exceed the radioactive liquid concentration limitation. The monitor setpoint is expressed as follows:

$$M_L = A^*(K^*F_M/F_A) + B$$

where:

M_L = monitor setpoint (CPM);

A = allocation fraction for the specific unit. (Typically, these values are set at 0.45, but may be adjusted up or down as needed. However, the total site allocation can not exceed 1.0.)

K = monitor countrate (CPM) expected based on the gross activity of the release. (This value is obtained from a graph of activity (µCi/ml) versus output countrate for the monitor (CPM));

F_M/F_A = number of times the activity would have to increase to exceed the radioactive liquid effluent-concentration limitation; and

B = background countrate (CPM) prior to the release.

To permit the computer to calculate the setpoint, an equation for the expected countrate (K) is expressed as follows:

$$K = Slope * 10^{S_A} + Offset$$

where:

$$Slope = \frac{\text{Log of the detector response in CPM}}{\text{Log of activity concentration in } \mu Ci/ml}$$

S_A = Gross gamma (Cs-137 equivalent) activity for the tank ($\mu Ci/ml$); and

Offset = detector response (CPM) for the minimum detectable sample activity calculated from the calibration data.

> NOTE
> I&C personnel use varying concentrations of Cs-137 to determine the response curve; therefore, a Cs-137 equivalent activity must be used to accurately predict the countrate.

Combining terms, the equation for determining the monitor setpoint may be expressed as follows:

$$M_L = A * [(Slope * 10^{S_A} + Offset) * F_M/F_A] + B$$

2.2 Liquid Dose Calculation

The "dose" or "dose commitment" to an individual in the unrestricted area shall be less than or equal to the limits specified in Radioactive Liquid Effluents-Dose Appendix 1 and Appendix 2 Limitations. The dose limits are on a per reactor basis. This value is calculated using the Adult as the maximum exposed individual via the aquatic foods (Sport Freshwater Fish) and the potable water pathways.

2.2.1 Dose Calculations for Aquatic Foods

The concentrations of radionuclides in aquatic foods are assumed to be directly related to the concentrations in water. The equilibrium ratios between the two concentrations are called "bioaccumulation factors".

Two different pathways are calculated for aquatic foods: sport and commercial freshwater fish.

The internal dose "d" from the consumption of aquatic foods in pathway "p" to organ "j" of individuals of age group "a" from all nuclides "i" is computed as follows: (See Chapter 4 of NUREG-0133 and Regulatory Guide 1.109-12, equation A-3).

$$d_p\ (r,\theta,a,j) = \Sigma_i\ (1100 * e^{-\lambda_i t_p} * B_i) * M * U_a * F^{-1} * Q_i * D_{aij}$$

The total dose from both aquatic food pathways is then:

$$D(r,\theta,a,j) = \sum_p d_p\ (r,\theta,a,j)$$

where:

r = user-selected distance from the release point to the receptor location, in kilometers. It may be different from the controlling distance specified for the potable water pathway (0.4 km);

θ = user-selected sector (one of sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE, ... etc). This sector may be different from the controlling sector specified for the potable water pathway (S);

a = user-selected age group: infant, child, teen, adult. It is the same controlling age group used in the potable water pathway (adult);

j = user-selected organ: bone, liver, total body, thyroid, kidney, lung, GI-LLI. It is the same controlling organ used in the potable water pathway (liver);

( ) = represents the concentration factor stored in the database;

NOTE
Only one concentration factor is needed to represent the two pathways since sport and commercial use the same bioaccumulation factor for a given pathway.

1100 = factor to convert from (Ci/yr)/(ft³/sec) to ρCi/liter;

λ_i = decay constant of nuclide "i" in hr^{-1};

t_p = environmental transit time, release to receptor;

> **NOTE**
>
> This value should be set to 0 hours (i.e., no decay correction) for the above equation in order to be consistent with the equation presented in Chapter 4 of NUREG-0133. For maximum individual dose calculations, this value is set to 24 hours, which is the minimum transit time recommended by Regulatory Guide 1.109, Appendix A, 2.b.

B_i = bioaccumulation factor for nuclide "i", in ρCi/kg per ρCi/liter. Cesium has a site specific number based on carnivorous and bottom feeder sport fish of 400 ρCi/kg per ρCi/liter (0CAN048408, dated April 13, 1984);

M = dimensionless mixing ratio (reciprocal of the dilution factor) at the point of exposure;

U_a = annual usage factor that specifies the intake rate for an individual of age group "a", in kilograms/year. The program selects this usage factor in accordance with the controlling age group "a" as specified previously by the user;

F = average flow rate in ft^3/sec. This value is based on total dilution volume for the quarter divided by time into the quarter;

Q_i = number of curies of nuclide "i" released; and

D_{aij} = ingestion dose factor for age group "a", nuclide "i", and organ "j", in mrem per ρCi ingested. The program selects the ingestion dose factor according to the user-specified controlling age group "a" and controlling organ "j".

2.2.2 Dose Calculations for Potable Water

The dose "D" from ingestion of water to organ "j" of individuals of age group "a" due to all nuclides "i" is calculated as follows (See Chapter 4 of NUREG-0133 and NRC Reg. Guide 1.109-12, equation A-2):

NOTE

The potable water pathway is used only during the time that the Russellville Water System is using the Arkansas River as a water source. The Russellville Water Works will notify ANO when they are using the Arkansas River as a water source.

$$D(r,\theta,a,j) = \Sigma_i \left[(1100 * e^{-\lambda_i t_P}) * M * U_a * F^{-1} * Q_i * D_{aij} \right]$$

where:

r = user-selected distance (0.4 km) from the release point to the receptor location, in kilometers. It may be different from the controlling distance selected for the aquatic food pathway;

θ = user-selected sector; (one of the sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE, ... etc.). It may be different from the controlling sector for the aquatic food pathway;

a = user-selected age group (infant, child, teen, adult). The same controlling age group is used for all liquid pathways (adult);

j = user-selected organ (bone, liver, total body, thyroid, kidney, lung, GI-LLI). The same controlling organ is used for all liquid pathways (liver).

() = the expression in brackets represents the concentration factor stored in the database;

1100 = factor to convert from (Ci/yr)/(ft³/sec) to ρCi/liter;

M = dimensionless mixing ratio (reciprocal of the dilution factor) at the point of exposure;

λ_i = decay constant of nuclide "i" in hr^{-1}; and

t_P = environmental transit time, release to receptor.

NOTE

This value is set to 0 hours (i.e., no decay correction) for the above equation to be consistent with the equation presented in Chapter 4 of NUREG-0133.

U_a = annual usage factor that specifies the intake rate for an individual of age group "a", in liters/year. The program selects this usage factor according to the user-specified controlling age group "a";

F = average flow rate in ft^3/sec; this value is based on total dilution volume for one quarter divided by time into the quarter;

Q_i = number of curies of nuclide "i" in the release; and

D_{aij} = ingestion dose factor, for age group "a", nuclide "i", and organ "j", in mrem per ρCi ingested. The program selects the ingestion dose factor according to the user-specified controlling age group "a" and controlling organ "j".

2.3 Liquid Projected Dose Calculation

The quarterly projected dose is based upon the methodology of Section 2.2 and is expressed as follows:

$$D_{QP} = 92*(D_{QC} + D_{RP})/T$$

where:

D_{QP} = quarterly projected dose (mrem);

92 = number of days per quarter;

D_{QC} = cumulative dose for the quarter (mrem);

D_{RP} = dose for current release (mrem); and

T = current days into quarter;

3.0 GASEOUS EFFLUENTS

3.1 Gaseous Monitor Setpoints

NOTE

Sections 3.1.1 and 3.1.2 below detail two methods of calculating setpoints at ANO. These methods cover two different sets of monitors of which only one will be in-service at any one time.

3.1.1 Batch Release Setpoint Calculations

3.1.1.a This section applies to the following gaseous radiation monitors (These releases are also monitored by the SPING monitors in Section 3.1.2):

ANO-1

RE-4830*	Waste gas holdup system monitor

ANO-2

2RE-8233	Containment purge
2RE-2429*	Waste gas holdup system monitor

* These monitors provide automatic isolation for the waste gas holdup systems.

The setpoints to be used during a batch type of release (i.e., reactor building [containment] purge, release from the waste gas holdup system or any other non-routine release) will be calculated for each release before it occurs.

3.1.1.b The basic methodology for determining a monitor setpoint is based upon the expected concentration at the monitor (C_M). This is in turn based upon the fraction of an MPC assigned to this release point. Batch releases are maintained below the assigned MPC fraction by controlling the release rate. The calculated value of S may not exceed the equivalent of 1 MPC at site boundary.

$$S = 1.1 * (C_M * K) + (2.0 * B)$$

where:

S = monitor setpoint (counts/sec);

C_M = Xe-133 equivalent concentration at the monitor (µCi/ml);

K = conversion factor determined from response curve of monitor (counts/sec per µCi/ml); and

2.0 = factor to accommodate random count rate fluctuations;

B = background count rate at the monitor (counts/sec).

3.1.2 Eberline SPING (Final Effluent) Monitor Setpoint Calculations

3.1.2.a This section applies to the following gaseous radiation monitors:

ANO-1

RX-9820	Containment Purge
RX-9835	Hydrogen Purge/Emerg. Pen. Room Vent.
RX-9830	Fuel Handling Area
RX-9825	Radwaste Area

ANO-2

2RX-9820	Containment Purge
2RX-9840	PASS Bldg.
2RX-9845	Aux. Bldg. Ventilation
2RX-9835	Hydrogen Purge/Emerg. Pen. Room Vent.
2RX-9830	Fuel Handling Area
2RX-9825	Radwaste Area
2RX-9850	Low-Level Radwaste Storage Building

The determination of setpoints for the above monitors is based on an assigned fraction of the MPC of noble gas activity at the site boundary, (Xe-133 equivalent) released from the above release points. The total of these fractions is always less than 1.00. The assigned fractions are based on the vent flow rates, atmospheric dilution rate, and the ventilation system(s) in operation.

NOTE

The fact that an effluent monitor is in alarm does not necessarily mean that radioactive gases are being released at such a rate that the MPC limit is being exceeded. The alarm would indicate that radioactive gases are being released at a rate that is exceeding the fractional allocation of an MPC allotted to that particular release point. Consideration must be given to the release rate of radioactive gases via all of the release pathways.

The initial fractions of an MPC allocated to the release points are given below. The allocations may be changed as needed, to allow for operational transients, but may not exceed a site total of 1.00.

Monitor Number	Monitor Name	Fractional Allocation
RX-9820	Containment Purge	0.1000
RX-9835	Hydr. Purge/Emerg. Pen. Rm. Vent.	0.0001
RX-9830	Fuel Handling Area	0.1500
RX-9825	Radwaste Area	0.2000

Monitor Number	Monitor Name	Fractional Allocation
2RX-9820	Containment Purge	0.1000
2RX-9840	PASS Bldg.	0.0100
2RX-9845	Aux. Bldg. Ventilation	0.0100
2RX-9835	Hydr. Purge/Emerg. Pen. Rm. Vent.	0.0001
2RX-9830	Fuel Handling Area	0.1500
2RX-9825	Radwaste Area	0.2000
2RX-9850	Radwaste Storage Bldg.	0.0100

NOTE

The setpoints to be used during a batch release (i.e., reactor building [containment] purge, release from the waste gas holdup system) will be calculated for each release before it occurs.

3.1.2.b SPING monitor setpoints may be calculated as follows:

$$\text{Setpoint } (\mu Ci/cc) = A * \left[\frac{\text{Xe-133 eq } (\mu Ci/cc)}{F * 1.3215E\text{-}9 * TMPC} \right]$$

where:

A = allocation fraction (the fraction of an MPC at the site boundary (of noble gas Xe-133 eq activity) assigned to the particular release point);

Xe-133 eq = Xenon-133 equivalent concentration;

F = discharge flow of the particular release point in CFM;

$$1.3215E\text{-}9 = 2.8317E\text{-}2(cm/cf) * \left[\frac{2.8E\text{-}6(sec/m^3)}{60(sec/min)} \right]$$

where:

2.8E-6 = the annual average gaseous dispersion factor (corrected for radioactive decay) as defined in Section 2.3 of the ANO-2 SAR; and

TMPC = total MPCs at site boundary.

3.2 Airborne Release Dose Rate Effects

3.2.1 Noble Gas Release Rate

3.2.1.a To calculate the noble gas release dose rate, the average ground-level concentration of radionuclide "i" at the receptor location must first be determined from the following equation. (See Regulatory Guide 1.109-20 equation B-4).

$$x_i\ (\theta) = 3.17 \times 10^4 * Q_i * D1X/Q(\theta)$$

where:

$x_i\ (\theta)$ = average ground level concentration in $\rho Ci/m^3$ of nuclide "i" at the user-specified controlling distance in sector θ (1.05 km);

(θ) = one of the sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE, ... etc. (WNW);

3.17×10^4= number of ρCi per Ci divided by the number of seconds/year;

Q_i = release rate of nuclide "i" in curies/yr and

$D1X/Q(\theta)$ = annual average gaseous dispersion factor (corrected for radioactive decay) in the sector at angle "θ" at the receptor location in sec/m^3. This value is 2.8E-6 sec/m^3 for short term releases.

The annual dose to the total body and skin due to noble gas can be calculated according to Sections 3.1.2.b and 3.2.1.c.

3.2.1.b Annual Total Body Dose Rate

The annual average total body dose rate to the maximally exposed individual is calculated as follows:

$$D^T(\theta) = RBPF * S_F * \Sigma_i\ [x_i(\theta) * DFB_i]$$

where:

$D^T(\theta)$ = total body dose rate due to immersion in a semi-infinite cloud of gas at the controlling distance in sector "θ", in mrem/yr. The program computes one total body dose rate value for each sector in which the user has specified a controlling distance and reports only the maximum value;

θ = one of sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE, ... etc.; (WNW);

RBPF = Reactor Building (Containment) Purge Factor - This factor is used to calculate the length of time (fractional duty cycle) that the purge fans will be in operation. It is calculated by comparing the highest dose rate (DOSER) to its applicable release limit, taking into account the allocation factor for the release point (RBPF = Allocation* Limit/DOSER). This factor is calculated only for Unit One and Two Reactor Building (Containment) Purges. For all other releases, this factor is set to 1.0;

S_F = dimensionless attenuation factor accounting for the dose reduction due to shielding by residential structures. The NRC recommended value is 0.7 (for maximum individual);

$x_i(\theta)$ = average ground-level concentration of nuclide "i" at the receptor location in the sector at angle "θ" from the release point, as defined in Section 3.2.1.a; and

DFB_i = total body dose factor for a semi-infinite cloud of radionuclide "i", which includes the attenuation of 5 g/cm² of tissue, in mrem-m³/ρCi-yr

3.2.1.c Annual Skin Dose Rate

The annual dose rate to the skin of the maximally exposed individual due to noble gases is calculated as follows. (See Regulatory Guide 1.109-20 equation B-9)

$$D^S(\theta) = RBPF \left[1.11 * S_F * \Sigma_i (x_i(\theta) * DF_i^\gamma) + \Sigma_i (x_i(\theta) * DFS_i) \right]$$

where:

$D^S(\theta)$ = skin dose due to immersion in a semi-infinite cloud of gas at the user-specified controlling distance in sector "θ", in mrem;

> NOTE
> The program computes a skin dose value for each sector in which the user has specified a controlling distance, but prints out only the maximum value.

RBPF = Reactor Building (Containment) Purge Factor as defined in Section 3.2.1.b.

1.11 = average ratio of tissue to air energy absorption coefficient;

S_F = dimensionless attenuation factor accounting for the dose reduction due to shielding by residential structures. The value is 0.7 (for maximum individual);

$x_i(\theta)$ = is the average ground-level concentration of nuclide "i" at the receptor location in the sector at angle "θ" from the release point, as defined in Section 3.2.1;

θ = one of sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE, ... etc., (WNW);

DF_i^γ = gamma air dose factor for a semi-infinite cloud of radionuclide "i", in mrad-m³/ρCi-yr; and

DFS_i = beta skin dose factor for a semi-infinite cloud of radionuclide "i", which includes the attenuation by the outer "dead" layer of skin, in mrem-m³/ρCi-yr.

3.2.2 I-131, Tritium and Particulate Release Dose Rate Effects

The annual dose rate to the maximally exposed individual for I-131, tritium and radionuclides in particulate form with half-lives greater than eight days is calculated as follows:

$$DR^{TOT} = RBPF * \left[DR^{I} + DR^{G} + DR^{M} \right]$$

where:

RBPF = Reactor Building (Containment) Purge Factor as defined in Section 3.2.1.b;

DR^{I} = dose rate to the controlling age group (infant) associated with the inhalation of radioiodines and particulates, as calculated in Section 3.4.1.b;

DR^{G} = dose rate from direct exposure to activity deposited on the ground plane, as calculated in Section 3.4.1.a; and

DR^{M} = dose rate to the controlling age group (infant) and the controlling organ for ingestion of food (milk), as calculated in Section 3.4.1.d.

Calculation of the annual dose rate considers the infant as the most restrictive age group. The organs that are considered as contributing to the dose rate are: skin, bone, liver, total body, thyroid, kidney, lung, and GI-LLI. The food pathway for the infant is considered to be from milk only. All three pathways will contribute to the total body dose, while the skin will be affected by only the ground plane pathway. The other organs are affected only by the inhalation and food pathways.

3.3 Dose Due to Noble Gases

The air dose in unrestricted areas due to noble gases released in gaseous effluents shall be less than or equal to 5 mrad for gamma radiation and 10 mrad for beta radiation for any calendar quarter for each unit. The objective of less than or equal to 10 mrad of gamma radiation and 20 mrad of beta radiation for a calendar year per unit (2.5 mrad and 5 mrad respectively per quarter) should be used for planning releases.

NOTE
The following equations have been simplified from equations in NUREG-0133, Rev. 0, in that there are no free-standing stacks at ANO. The equations were further simplified in that there are no long term (i.e., continuous) releases. The individual stack vents are sampled weekly and are assigned a release period of 168 hours per sample (i.e., considered as short term (batch) releases). Individual samples are to be taken for each waste gas tank release and reactor building (containment) purge.

3.3.1 Beta and Gamma Air Doses from Noble Gas Releases

Using the average ground level concentration of radionuclide "i" at the receptor location calculated in Section 3.2.1.a, the associated annual gamma or beta air dose may be calculated by the following equation. (See Regulatory Guide 1.109-20 equation B-5.)

$$D^{\gamma}(\theta) \text{ \underline{or} } D^{\beta}(\theta) = \Sigma_i \left[x_i(\theta) * (DF_i^{\gamma} \text{ \underline{or} } DF_I^{\beta}) \right]$$

where:

$D^{\gamma}(\theta)$ or $D^{\beta}(\theta)$ = the gamma or beta air dose for the controlling distance in sector "θ". (Only the maximum value is reported), and

DF_i^{γ} or DF_i^{β} = gamma or beta air dose factors for a uniform semi-infinite cloud of nuclide "i", in mrad-m³/ρCi-yr.

3.4 Dose Due to I-131, Tritium, and Particulates in Gaseous Effluents

The calculational methodology for determining the dose to an individual from I-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to unrestricted areas as specified in the Appendix 1 and Appendix 2 Limitations is in this section.

The child is the controlling age group unless stated otherwise.

The inhalation and ground plane pathways are considered to exist at all locations. The grass-cow-milk, grass-cow-meat, and vegetation pathways are used where applicable.

It is assumed that iodines are in the elemental form.

A dispersion parameter of 2.8E-6 sec/m³ (per ANO-2 SAR, Section 2.3.4.4) is used for "w" in the inhalation pathway since the majority of gaseous activity released from the site is within the 8 to 24 hours time frame (i.e., reactor building [containment] purges and waste gas decay tanks).

The equation is:

$$D^{TOT} = D^{G} + D^{I} + D^{V} + D^{L} + D^{M} + D^{F}$$

where:

D^{TOT} = total dose;

D^{G} = dose contribution from ground plane deposition as calculated in Section 3.4.1.a;

D^{I} = dose contribution from inhalation of radioiodines, tritium, and particulates (>8 days) as calculated in Section 3.4.1.b;

D^{V} = dose contributions from consumption of vegetation (defined as produce) for humans and stored feed for cattle. See Section 3.4.1.c for calculations;

D^{L} = dose contributions from consumption of fresh leafy vegetables (defined as garden products) for humans and pasture grass for cattle. See Section 3.4.1.c for calculations;

D^{M} = dose contribution from consumption of cow's milk; and

> NOTE
>
> Consumption by the cow of both stored feeds and pasture grasses is taken into account when calculating this dose contribution. Concentration factors for both food sources are calculated.

D^{F} = dose contribution from consumption of meat.

> NOTE
>
> Consumption by the cow of both stored feeds and pasture grasses is taken into account when calculating this dose contribution. Concentration factors for both types of animal are calculated.

3.4.1 Total Dose from Atmospherically Released Radionuclide

After the calculation of the concentration factors from the applicable parts of Section 3.4.1, the maximum individual dose as calculated for controlling age group "a" and controlling organ "j", in sector θ at the controlling distance "r" is given from:

$D^G(r,\theta,j,a)$ (Section 3.4.1.a) for ground plane deposition

$D^I(r,\theta,j,a)$ (Section 3.4.1.b) for inhalation

$$D^V(r,\theta,j,a) = \sum_i DFI_{ija} U_a^V C_i^V(r,\theta) \quad \text{for produce}$$

$$D^L(r,\theta,j,a) = \sum_i DFI_{ija} U_a^L C_i^L(r,\theta) \quad \text{for leafy vegetables}$$

$$D^M(r,\theta,j,a) = \sum_i DFI_{ija} U_a^m C_i^m(r,\theta) \quad \text{for cow's milk}$$

$$D^F(r,\theta,j,a) = \sum_i DFI_{ija} U_a^F C_i^F(r,\theta) \quad \text{for meat}$$

where:

a = controlling age group (infant, child, teen, or adult);

j = controlling organ (bone, liver, total body, thyroid, kidney, lung, or GI-LLI);

r = user-selected distance from the release point to the receptor location in a particular sector, in kilometers. (The controlling distance is the same for all airborne pathways, 1.05 km.);

θ = one of sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE, ... etc., (WNW);

DFI_{ija} = dose conversion factor for ingestion of nuclide "i", organ "j", and age group "a", in mrem/ρCi;

NOTE
Values used in these tables are taken from Tables E-11 through E-14 of Regulatory Guide 1.109. DFI_{ija} is selected according to the controlling organ and age group as specified in the database.

$U_a^V, U_a^L, U_a^M, U_a^F$ = ingestion rates for produce, leafy vegetables, cow's milk, and meat, respectively, for individuals in age group "a". Values used are taken from Table E-5 of Regulatory Guide 1.109.);

$C_i^V, D_i^L, C_i^M, D_i^F$ = concentration of nuclide "i" for produce, leafy vegetables, cow's milk, and meat, respectively, in ρCi/kg or ρCi/liter.

The program calculates that maximum individual dose for each sector surrounding the plant in which the user has specified a controlling distance for each of the following pathways: A) ground plane deposition; B) inhalation and the ingestion of; C) produce; D) leafy vegetables; E) cow's milk; and F) meat. Only the receptor point receiving the maximum dose value is printed.

3.4.1.a Dose from Ground Plane Deposition

The dose D^G from direct exposure to activity deposited on the ground plane is calculated as follows (see Regulatory Guide 1.109-24, equations C-1 and C-2):

$$D^G(r,\theta,j,a) = \{S_F * 1.0 \times 10^{12} * \Sigma_i \left[\lambda_i^{-1} * (1 - e^{-\lambda_i t_b}) \right] \} * DOQ(r,\theta) * Q_i * DFG_{ij}$$

where:

r = user-selected distance from the release point to the receptor location in a particular sector, in kilometers. The controlling distance is the same for all airborne pathways (1.05 km);

θ = one of sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE ... etc., (WNW);

a = user-selected age group (infant, child, teen, adult) which is the same controlling age group used for all airborne pathways (child);

j = user-selected organ (bone, liver, total body, thyroid, kidney, lung, GI-LLI) which is the same controlling organ used for all airborne pathways;

{ } = represents the concentration factor stored in the database;

S_F = dimensionless attenuation factor accounting for the dose reduction due to shielding by residential structures. The value is 0.7 (for maximum individual);

1.0×10^{12} = number of ρCi per Ci;

λ_i = decay constant of nuclide "i" in hr^{-1};

t_b = length of time over which the accumulation is evaluated (nominally 15 years which is the approximate midpoint of facility operating life or 1.31×10^5 hours);

$DOQ(r,\theta)$ = average relative deposition of the effluent at the receptor location "r" in sector "θ", considering depletion of the plume during transport, in m^{-2};

Q_i = release of nuclide "i" in curies, and

DFG_{ij} = open field ground plane dose conversion factor for organ "j" (total body or skin) from radionuclide "i", in mrem-m²/ρCi-hr. The dose factor is selected according to the user-specified controlling age group "a" and controlling organ "j".

3.4.1.b Dose from Inhalation of Radionuclides in Air

The dose D^I to organ "j" of age group "a" associated via inhalation of radioiodines and particulates is (see Reg. Guide 1.109-25, Equations C-3 and C-4):

$$D^I(r,\theta,j,a) = 3.17 \times 10^4 * R_a * \Sigma_i \left[Q_i * D2DPX/Q(r,\theta) * DFA_{ija} \right]$$

where:

r = user-selected distance from the release point to the receptor location in a particular sector, in kilometers. The controlling distance is the same for all airborne pathways (1.05 km);

θ = one of sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE ... etc., (WNW);

j = user-selected organ (bone, liver, total body, thyroid, kidney, lung, GI-LLI) and is the same controlling organ as that used for all airborne pathways;

a = user-selected age group (infant, child, teen, adult) and is the same controlling age group as that used for all airborne pathways;

3.17×10^4 = number of ρCi/Ci divided by the number of seconds/year;

R_a = annual air intake for individuals in age group "a" (in m^3/year). The air intake factor is selected in accordance with the user-specified controlling age group;

Q_i = release of nuclide "i" in curies;

$D2DPX/Q(r,\theta)$ = annual average atmospheric dispersion factor of the radionuclide at the receptor location "r" in sector "θ" (in sec/m^3) as calculated; and

> **NOTE**
> This includes depletion (for radioiodines and particulates) and radioactive decay of the plume.

DFA_{ija} = inhalation dose factor for radionuclide "i", organ "j", and age group "a". The inhalation dose factor is selected in accordance with the user-specified controlling age group "a" and controlling organ "j".

3.4.1.c Dose from Nuclide Concentrations in Vegetation

> **NOTE**
> To reduce the computational overhead of the computer, the calculations for dose resulting from nuclide concentrations in forage, produce and leafy vegetables is performed in three steps.

First, the concentration factors (CF) are computed and stored in the database. The concentration factor includes all the parameters that are considered constant for each nuclide and agricultural activity, such as the radioactive decay constant, removal rate constant, exposure time, etc.

Second, the deposition rate from the plume is multiplied by the concentration factor and the nuclide activity to produce the nuclide concentration as follows:

$$C_i^V(r,\theta) = CF_i * DOQ(r,\theta) * Q_i$$

where:

$C_i^V(r,\theta)$ = concentration of nuclide "i" at the receptor location (r,θ);

CF_i = concentration factor of nuclide "i";

$DOQ(r,\theta)$ = relative deposition of nuclide "i". For the short term dispersion option, DOQ is replaced by (F x DOQ), where F is the short term dispersion correction factor;

Q_i = quantity of nuclide "i" released in curies.

For carbon-14 and tritium, the nuclide concentration is calculated from the concentration factor times the decayed and depleted X/Q for radioiodines and particulates (D2DPX/Q), times the quantity of nuclide "i" released in curies. For the short term dispersion option, D2DPX/Q is replaced by F x D2DPX/Q, where F is the short term dispersion correction factor.

$C_T^V(r,\theta) = CF_T * D2DPX/Q(r,\theta) * Q_T$ for tritium, and

$CF^V_{14}\ (r,\theta) = CF_{14} * D2DPX/Q(r,\theta) * Q_{14}$ for carbon-14

Third, the nuclide concentrations for a particular pathway (produce, leafy vegetables, cow's milk, and meat) are summed and multiplied by: 1) the ingestion rate for a particular age group and 2) the dose conversion factor:

$$D(r,\theta,j,a) = \Sigma_i \left[(DFI_{ija} * U_a * C_i^V(r,\theta) \right]$$

where:

r = user-selected distance from the release point to the receptor location in a particular sector, in kilometers (1.05 km);

θ = one of sixteen 22.5° sectors surrounding the reactor site, designated N, NNE, NE ... etc., (WNW);

j = user-selected organ (bone, liver, total body, thyroid, kidney, lung, GI-LLI), and is the same controlling organ as that used for all airborne pathways;

a = user-selected age group (infant, child, teen, adult), and is the same controlling age group as that used for all airborne pathways;

DFI_{ija} = dose conversion factor for ingestion of nuclide "i", organ "j", and age group "a", in mrem/ρCi, according to the controlling organ and age group;

U_a = annual ingestion rate of food in a particular pathway (kilograms/year or liters/year) for individuals in age group "a", according to the controlling age group; and

$C_i^V(r,\theta)$ = concentration of nuclide "i" at the receptor location (r,θ).

3.4.1.c.1 Calculating Vegetation Concentration Factors

NUREG-0133 calculations for radioiodines and particulate radionuclides (except tritium and carbon-14), the concentration factor of nuclide "i" in and on vegetation is estimated as follows:

$$CF_i^V = CONST*\left(\frac{r}{y_v*\lambda_i}\right)*e^{-\lambda_i t_h}*f$$

where:

CF_i^V = concentration factor of radionuclide "i" in vegetation (forage, produce, or leafy vegetables), in m²-hr/kg;

CONST = 1.14×10^8 number of ρCi per Ci (10^{12}) divided by the number of hours per year (8760);

r = is the fraction of deposited activity retained on crops, leafy vegetables, or pasture grass, from airborne radioiodine and particulate deposition:

r = 1.00 for radioiodines

r = 0.20 for particulates

Y_v = agricultural productivity (yield or vegetation area density), in kg (wet weight)/m²:

- Y_s = 2.0 kg/m² for stored animal feed for grass-animal-man pathways
- Y_ρ = 0.7 kg/m² for pasture grass for grass-animal-man pathways
- Y_l = 2.0 kg/m² for leafy vegetation (fresh) for crop/vegetation-man pathways
- Y_g = 2.0 kg/m² for garden produce (stored vegetables) for crop/vegetation-man pathways

λ_i = is the decay constant of nuclide "i" in hr^{-1};

t_h = is a holdup time that represents the time interval between harvest and consumption of the food, in hours:

- t_h = 0 hours for pasture grass consumed by animals
- t_h = 2160 hours for stored feed consumed by animals
- t_h = 24 hours for leafy vegetables consumed by humans
- t_h = 1440 hours for produce consumed by humans

f = is the fraction of leafy vegetables or produce grown in garden of interest:

- f = 0.76 for the fraction of <u>produce</u> ingested, grown in garden of interest. (This is f_g in equation C-13 of Regulatory Guide 1.109)

f = 1.00 for the fraction of leafy vegetables grown in garden of interest. (This is f_l in equation C-13 of Regulatory Guide 1.109)

f = 1.00 for all other pathways

3.4.1.c.2 Concentration Factor for Carbon-14

For carbon-14, the concentration factor in and on vegetation is estimated as follows (see Regulatory Guide 1.109-26, equation C-8):

$$CF^V_{14} = 2.2 \times 10^7 * \rho$$

where:

CF^V_{14} = concentration factor of carbon-14 in and on vegetation, in m^2-hr/kg; and

ρ = is defined as the ratio of total annual release time (for C-14 atmospheric releases) to the total annual time during which photosynthesis occurs (taken to be 4400 hours), under the condition that the value of "ρ" should never exceed unity. For continuous C-14 releases, "ρ" is taken to be unity.

(Thus, the value of 2.2×10^7 is stored for CF^V_{14} in lieu of a site specific value for "ρ".)

3.4.1.c.3 Concentration Factor for Tritium

The concentration factor for tritium in vegetation is calculated from the tritium concentration in air surrounding the vegetation (see Regulatory Guide 1.109-27, equation C-9):

$$CF^V_T = \frac{1.2 \times 10^7}{H}$$

where:

CF^V_T = concentration factor for tritium in vegetation (in m^2-hr/kg); and

H = absolute humidity at the location of the vegetation, in g/m^3. (The regulatory default value for "H" is 8.0 grams/m^3.)

(Thus, the value 1.5×10^6 is stored for CF^V_T in lieu of a site specific value for "H".)

3.4.1.c.4 Nuclide Concentrations in Produce and Leafy Vegetables

The concentrations in and on produce and leafy vegetables of all radioiodine and particulate nulcides "i" (except carbon-14 and tritium) are calculated as follows:

$C_i^V(r,\theta) = CF_i^V * DOQ(r,\theta) * Q_i$ for produce; and

$C_i^L(r,\theta) = CF_i^L * DOQ(r,\theta) * Q_i$ for leafy vegetables

where:

CF_i^V = concentration factor of nuclide "i" in produce;

CF_i^L = concentration factor of nuclide "i" in leafy vegetables;

(Note that the difference between CF_i^V and CF_i^L are the values for t_h and f_l.)

$DOQ(r,\theta)$ = relative deposition of the radionuclide "i" at the receptor (r,θ); and

Q_i = release of nuclide "i" (in curies).

The C-14 and H-3 nuclide concentrations are calculated from the concentration factors times the decayed and depleted radioiodine relative deposition D2DPX/Q times the fraction grown in the garden of interest (f_g = 0.76, f_l = 1.0):

$C_T^V(r,\theta) = CF_T^V * D2DPX/Q(r,\theta) * Q_T * f_g$

$C_T^L(r,\theta) = CF_T^L * D2DPX/Q(r,\theta) * Q_T * f_l$ for tritium

$CF^V_{14}(r,\theta) = CF^V_{14} * D2DPX/Q(r,\theta) * Q_{14} * f_g$

$CF^L_{14}(r,\theta) = CF^L_{14} * D2DPX/Q(r,\theta) * Q_{14} * f_l$ for carbon-14

3.4.1.d Nuclide Concentration in Cow's Milk

The radionuclide concentration in cow's milk is dependent upon the quantity and contamination level of feed consumed by the animal. The concentration is estimated (see Regulatory Guide 1.109-27, equations C-10 and C-11) as follows:

$$C_i^m(r,\theta) = (F_m{*}Q_F{*}e^{-\lambda_i t_f}{*}[f_p{*}f_s{*}CF_i^V + (1 - f_p){*}CF_i^{V^1} + f_p{*}(1 - f_s){*}CF_i^{V^1}]){*}D(r,\theta) * Q_i$$

where:

$C_i^m(r,\theta)$ = is the concentration of nuclide "i" in cow's milk at the receptor location (r,θ), in ρCi/liter;

( ) = the expression in brackets represents the concentration factor. (Note that the concentration factor for cow's milk involves two different vegetation concentration factors (see below).);

F_m = average fraction of the cow's daily intake of radionuclide "i" (which appears in each liter of milk), in days/liter;

Q_F = amount of feed consumed by the cow per day, in kg/day (wet weight);

λ_i = decay constant of nuclide "i" in hr^{-1};

t_f = average transport time of the activity from the feed into the milk and to the receptor (a value of 2 days is assumed);

f_p = fraction of the year that cows graze on pasture;

f_s = fraction of daily feed that is pasture grass when the cow grazes on pasture;

CF_i^V = vegetation concentration factor of nuclide "i" on pasture grass with the holdup time t_h = 0 days, in ρCi/kg. (Refer to the explanation of the vegetation concentration factor calculation);

$CF_i^{V^1}$ = vegetation concentration factor of nuclide "i" in stored feeds with the holdup time t_h = 90 days, in ρCi/kg. (Refer to the explanation of the vegetation concentration factor calculations);

$D(r,\theta)$ = relative deposition $DOQ(r,\theta)$ of the radionuclides, except carbon-14 and tritium. For carbon-14 and tritium, the decayed and depleted dispersion factor $D2DPX/Q(r,\theta)$ for radioiodines and particulates (in sec/m³) is used; and

Q_i = is the release of nuclide "i" in curies.

3.4.1.e Nuclide Concentration in Meat

The radionuclide concentration in meat is dependent upon the quantity and contamination level of feed consumed by the animal. The concentration is estimated (see Regulatory Guide 1.109-27, equations C-11 and C-12) as follows:

$$C_i^f(r,\theta) = \{F_f * Q_F * e^{-\lambda_i t_s} * [f_p * f_s * CF_i^V + (1 - f_p) * CF_i^{V^1} + f_p * (1 - f_s) * CF_i^{V^1}]\} * D(r,\theta) * Q_i$$

where:

NOTE
All parameters used in this pathway are for beef cattle.

$C_i^f(r,\theta)$ = concentration of nuclide "i" in animal flesh at the receptor location (r,θ) in ρCi/liter;

{ } = the expression in brackets represents the concentration factor (Note that the concentration factor for meat involves two different vegetation concentration factors);

F_f = average fraction of the animal's daily intake of radionuclide "i" which appears in each kilogram of flesh (in days/kg);

Q_f = amount of feed consumed by the animal per day in kg/day (wet weight);

λ_i = decay constant of nuclide "i" in hr^{-1};

t_s = average time from slaughter of the animal to consumption by humans (20 days);

f_p = fraction of the year that animals graze on pasture;

f_s = fraction of daily feed that is pasture grass when the animal grazes on pasture;

CF_i^V = vegetation concentration factor of nuclide "i" on pasture grass with the holdup time t_h = 0 days in ρCi/kg. (Refer to the explanation of the vegetation concentration factor calculation);

$CF_i^{V'}$ = vegetation concentration factor of nuclide "i" in stored feeds with the holdup time t_h = 90 days, in ρCi/kg. (Refer to the explanation of the vegetation concentration factor calculation);

$D(r,\theta)$ = relative deposition DOQ(r,θ) of the radionuclides, except carbon-14 and tritium. For carbon-14 and tritium, the decayed and depleted dispersion factor D2DPX/Q(r,θ) for radioiodines and particulates (in sec/m³) is used;

Q_i = is the release of nuclide "i" (in curies).

3.5 <u>Gaseous Effluent Projected Dose Calculation</u>

3.5.1 The quarterly projected dose is based upon the methodology of Sections 3.3 and 3.4, and is expressed as follows:

$$D_{QP} = \left[\frac{D_{QC} + D_{RP}}{T} \right] * 92$$

where:

D_{QP} = Quarterly projected dose (mrem);

D_{QC} = cumulative dose for the quarter (mrem);

D_{RP} = dose for current release (mrem);

T = current days into quarter; and

92 = number of days per quarter.

3.6 Dose to the Public Inside the Site Boundary

3.6.1 Liquid Releases

Dose to the public inside the site boundary due to liquid releases will be due to ingestion of fish caught from the discharge canal and exposure to sediment along the discharge canal bank while fishing.

3.6.1.a Dose Due to Ingestion of Fish

Dose due to ingestion of fish is calculated using the methodology given in Section 2.2, Liquid Dose Calculation.

3.6.1.b Dose Due to Exposure to Shoreline Sediments

Dose from external exposure to shoreline sediments is calculated from equation A-7 of Regulatory Guide 1.109, Rev. 1, 10/77.

$$R_{apj} = 110{,}000 \, \frac{U_{ap} * M_p * W}{F} * \Sigma_i \left[Q_i * T_i * D_{aipj} * [\exp(-\lambda_i t_p)] * [1 - \exp(-\lambda_i t_b)] \right]$$

where:

R_{apj} = is the total annual dose to organ "j" of individuals of age group "a" from all of the nuclides "i" in pathway in mrem/yr;

U_{ap} = is the usage factor that specifies exposure time for the maximum individual of age group "a" in hours from Table E-5 of Regulatory Guide 1.109. 67 hours for shoreline recreation for a teen was chosen. Adult is the controlling age group for ingestion but the maximum usage factor (teen) was used rather than the adult factor to ensure a conservative dose estimate;

M_p = is the mixing ratio (reciprocal of dilution factor);

W = is the shoreline width factor from Table A-2 of Regulatory Guide 1.109. The discharge canal value of 0.1 was chosen;

F = is the flow rate of the liquid effluent in ft^3/sec. This was determined by:

$$F(ft^3/sec) = \text{waste volume (gal/yr)} * \left[\frac{.134\ ft^3}{1\ gal}\right] * \left[\frac{1\ yr}{8760\ hr}\right] * \left[\frac{1\ hr}{3600\ sec}\right]$$

Q_i = is the release of nuclide "i" in Ci/yr;

T_i = is the radioactive half-life of nuclide "i", in days, from Radioactive Decay Data Tables, Technical Information Center, U. S. Dept. of Energy, 1981;

D_{aipj} = is the dose factor specific to age group "a", nuclide "i", and organ "j" from Table E-6 of Regulatory Guide 1.109;

λ_i = is the radioactive decay constant of nuclide "i" in hr^{-1};

t_p = is the average transit time for nuclides to reach the point of exposure. A value of 0 hours was chosen due to the proximity of the discharge canal to the plant; and

t_b = is the period of time for which sediment is exposed to the contaminated water in hours. The mid-point of plant operating life, 15 years was chosen per Regulatory Guide 1.109.

3.6.2 Airborne Release

3.6.2.a Dose Due to Noble Gases

Dose to fisherman at the discharge canal can be calculated by the ratio of dispersion factor for the discharge canal (1.6E-4 sec/m³ from Table 2-45 SAR, Unit 1, 100 meters downwind in a southerly direction) and the usage factor of 67 hours of shoreline recreation to the values used in Section 3.3 of this manual.

$$\text{Dose at discharge canal} = D^T(\theta) * \left[\frac{1.6E\text{-}4}{2.8E\text{-}6}\right] * \left[\frac{67\ hr}{8670\ hr}\right]$$

where $D^T(\theta)$ is the noble gas dose calculated by Section 3.3.

3.6.2.b Dose Due to Iodine, Tritium and Particulates from Gaseous Effluents

Section 3.4 calculates total dose for iodine, tritium and particulates as the sum of:

$$D^{TOT} = D^G + D^I + D^V + D^L + D^M + D^F$$

where:

D^G = ground plane deposition;

D^I = inhalation;

D^V = consumption of vegetation;

D^L = consumption of fresh leafy vegetables;

D^m = consumption of milk; and

D^F = consumption of meat and poultry;

The only contributions relevant to fishing activities at the discharge canal are ground plane deposition and inhalation. As D^G and D^I are not independently available, a conservative estimate can be obtained by using the same correction factor developed for noble gas dose to the total dose calculated in Section 3.4 for iodine, tritium and particulates. Depletion of the plume as it travels downwind can be ignored since the fraction remaining in the plume at 100 meters (discharge canal) and 1046 meters (site boundary) are both greater than 90% according to Figure 3 of Regulatory Guide 1.111.

The only activity inside the plant site by members of the public that might contribute a significant dose is fishing along the banks of the discharge canal. Travel alorg public roads would involve short exposure time and tours of the facility are conducted according to radiological control procedures enforced at the plant to control exposure. Fishing is the only uncontrolled activity.

4.0 ENVIRONMENTAL SAMPLING STATIONS - RADIOLOGICAL

Environmental samples will be collected as specified in the Appendix 1 and Appendix 2 Limitations. The approximate locations of selected sample sites are shown on Figure 4-1 for illustrative purposes.

Table 4-1 lists the approximate distances and directions of the sample stations from the plant.

FIGURES

Original has a fold out map.

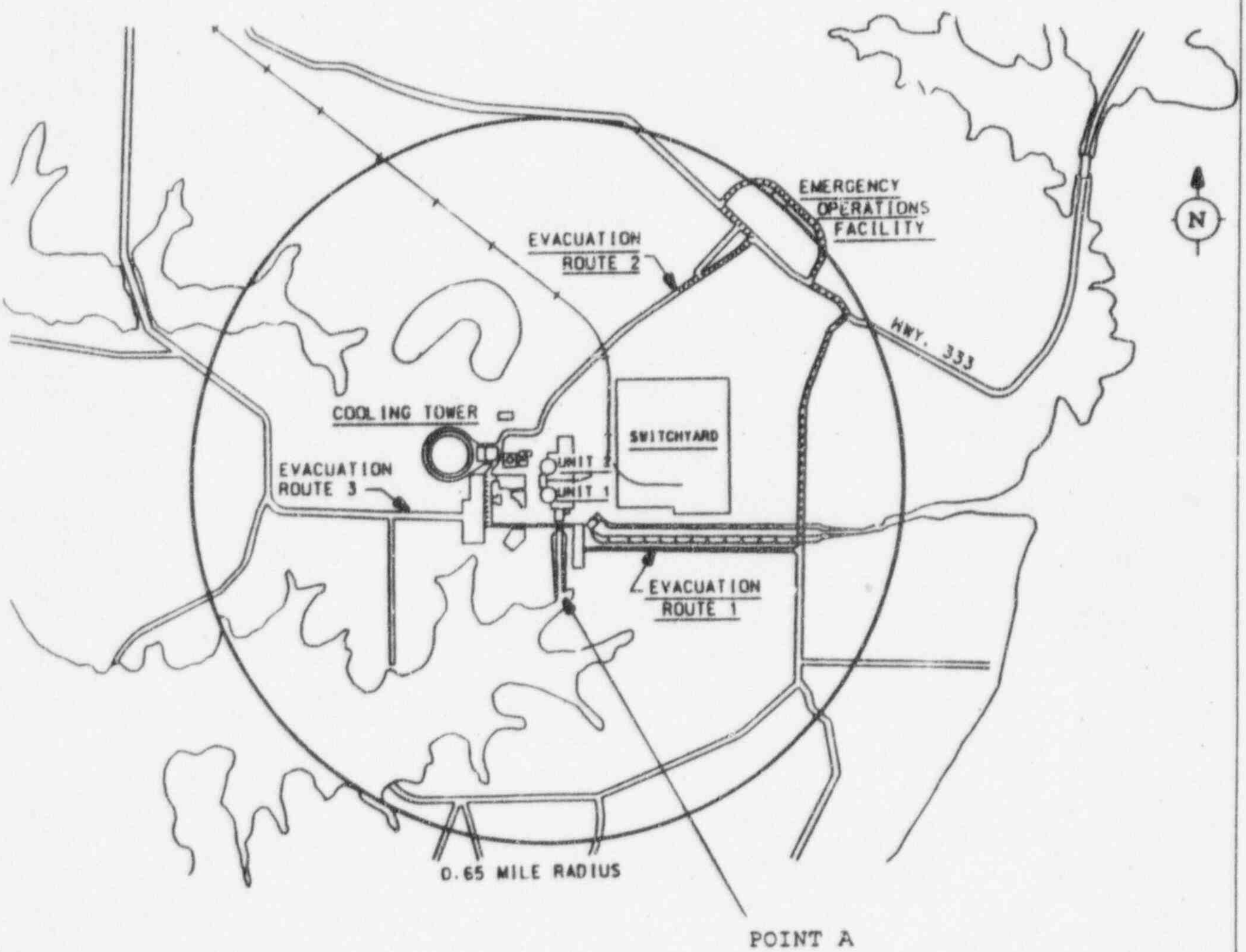
FIGURE 4-1

RADIOLOGICAL SAMPLE STATIONS

FIGURE 4-2

MAXIMUM AREA BOUNDARY FOR RADIOACTIVE RELEASE CALCULATION
(EXCLUSION AREAS)

GASES - 1046 METER RADIUS
LIQUIDS - END OF DISCHARGE CANAL (POINT A)



TABLES

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 1
Approximate Direction and Distance from Plant: 88° - 0.6 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:

The sample station is near the meteorology tower approximately 0.6 miles east of ANO.

Sample Station Number: 2
Approximate Direction and Distance from Plant: 235° - 0.4 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:

IF traveling from ANO,
THEN go approximately 0.2 miles west toward Gate 4. Turn left and go approximately 0.1 miles. Turn right and go approximately 0.1 miles. The sample station is on the right at the former AP&L lodge location.

IF traveling south on Flatwood Road,
THEN go approximately 0.25 miles from sample station 109. Veer left at fork in road and go approximately 0.2 miles. Turn right and go approximately 0.1 miles. Turn right and go approximately 0.1 miles. The sample station is on the right at the former AP&L lodge location.

Sample Station Number: 3
Approximate Direction and Distance from Plant: 0° - 0.6 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
4) Ground water (alternate)
Sample Station Location:

IF traveling west on Highway 333,
THEN go approximately 0.35 miles from Gate 2 at ANO. Turn left onto gravel road and go approximately 0.05 miles. The sample station is on the left.

IF traveling east on Highway 333,
THEN go approximately 0.9 miles from junction of Highway 333 and Flatwood Road. Turn right onto gravel road and go approximately 0.05 miles. The sample station is on the left.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 4
Approximate Direction and Distance from Plant: 180° - 0.7 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:

Go approximately 0.25 miles south from bridge over intake canal. Turn right onto gravel road. Proceed approximately 0.1 miles west of May Cemetery entrance. The sample station is on the left approximately 50 feet south of the road.

Sample Station Number: 5
Approximate Direction and Distance from Plant: 298° - 8.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:

While traveling on Highway 64, turn onto Cherry Street in Knoxville, AR and go approximately 0.7 miles. Turn left onto Highway 64 South and go approximately 0.2 miles. The sample station is on the right.

Sample Station Number: 6
Approximate Direction and Distance from Plant: 111° - 7.0 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:

Go to the AP&L local office which is located off Highway 7T in Russellville, AR (305 South Knoxville Avenue). The sample station is in the southeast corner of the back lot.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 7
Approximate Direction and Distance from Plant: 209° - 19.3 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:

Turn west at junction of Highway 7 and Highway 27 in Dardanelle, AR. Proceed to junction of Highway 27 and Highway 10 in Danville, AR. Turn right onto Highway 10 and proceed a short distance to the AP&L supply yard, which is on the right adjacent to an AP&L substation. The sample station is in the southwest corner of the supply yard.

Sample Station Number: 8
Approximate Direction and Distance from Plant: 180° - 0.1 miles
Sample Types: 1) Surface water (composite)
2) Shoreline sediment
3) Fish
Sample Station Location: Plant discharge canal

Sample Station Number: 10
Approximate Direction and Distance from Plant: 95° - 0.9 miles (shoreline sediment and fish)
plant intake structure (surface water)
Sample Types: 1) Surface water (composite)
2) Shoreline sediment
3) Fish
Sample Station Location:

Surface water (composite) is collected at plant intake structure. Shoreline sediment and fish are collected at plant inlet canal.

Sample Station Number: 13
Approximate Direction and Distance from Plant: 271° - 0.5 miles
Sample Types: 1) Broad leaf vegetation
Sample Station Location:

IF traveling south on Flatwood Road,
THEN go approximately 0.2 miles from sample station 109. The sample station is on the left.

IF traveling west from ANO toward Gate 4,
THEN go approximately 0.4 miles from ANO. Turn right onto Flatwood Road. Go a short distance. The sample station is on the right.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 14
Approximate Direction and Distance from Plant: 70° - 5.3
Sample Types: 1) Drinking water
Sample Station Location:

From junction of Highway 7 and Water Works Road, go approximately 0.8 miles west on Water Works Road. The sample station is on the left at the intake to the Russellville city water system from the Illinois Bayou.

Sample Station Number: 16
Approximate Direction and Distance from Plant: 290° - 5.9 miles
Sample Types: 1) Shoreline sediment
Sample Station Location:

From junction of Highway 64 and Highway 359 (Flat Rock-Piney Bay Recreational Area turnoff), go approximately 0.7 miles west on Highway 64. The sample station is at the Piney Creek area on Lake Dardanelle.

Sample Station Number: 19
Approximate Direction and Distance from Plant: 95° - 5.1 miles
Sample Types: 1) Milk
Sample Station Location:

Turn from Highway 7 onto Harrell Drive in Russellville, AR and go approximately 0.1 miles. Turn right and go approximately 0.25 miles. The sample station is on the left at the Arkansas Tech Dairy.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 32 Approximate Direction and Distance from Plant: 132° - 0.9 miles Sample Types: 1) Ground water Sample Station Location: From bridge over intake canal, go south approximately 0.25 miles. Turn left and go approximately 0.25 miles. Turn left on Bunker Hill Lane and go approximately 0.05 miles. The sample station is on the right at Clifton Stewart's residence.
Sample Station Number: 33 Approximate Direction and Distance from Plant: 94° - 3.8 miles Sample Types: 1) Ground water Sample Station Location: From junction of Highway 64 and Highway 326 (Dike Road), go approximately 0.3 miles east on Dike Road. The sample station is on the left at the Ouita Lake Recreation Area on the Illinois Bayou.
Sample Station Number: 36 Approximate Direction and Distance from Plant: 140° - 0.05 miles Sample Types: 1) Pond water 2) Pond sediment Sample Station Location: The sample station is at the Wastewater Holding Pond on the ANO site east of the discharge canal.
Sample Station Number: 37 Approximate Direction and Distance from Plant: 0° - 7.5 miles Sample Types: 1) Milk Sample Station Location: IF traveling north on Highway 333, THEN go approximately 3.5 miles from junction of Highway 333 and Mill Creek Road on Highway 333. Turn left and go approximately 0.1 miles. The sample station is on the left at the Lawrence Steuber Dairy. IF traveling from junction of Highway 7 and Highway 333, THEN go approximately 6.0 miles west on Highway 333. Turn right and go approximately 0.1 miles. The sample station is on the left at the Lawrence Steuber Dairy.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 38
Approximate Direction and Distance from Plant: 314° - 2.4 miles
Sample Types: Food products (alternate)
Sample Station Location:

From west junction of Highway 64 and Highway 333 in London, AR, go approximately 0.4 miles west on Highway 64. Turn right at Hornet Estate and go approximately 0.1 miles. Turn left and go approximately 0.1 miles. The sample station is on the left at Ronnie Jones' residence.

Sample Station Number: 40
Approximate Direction and Distance from Plant: 119° - 2.2 miles
Sample Types: 1) Foods products
Sample Station Location:

From junction on Highway 64 and Highway 326 (Marina Road), go approximately 2.0 miles on Marina Road. The sample station is on the left at Horace Hollis' residence just prior to curve.

Sample Station Number: 45
Approximate Direction and Distance from Plant: 90° - 0.9 miles
Sample Types: 1) Broad leaf vegetation
Sample Station Location:

The sample station is located near mouth of intake canal.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 46
Approximate Direction and Distance from Plant: 295° - 4.1 miles
Sample Types: 1) Food products
Sample Station Location:

From west junction of Highway 64 and Highway 333 in London, AR, go west on Highway 64 approximately 2.4 miles. Turn right onto Scottie Lane and go approximately 0.1 miles. The sample location is on the right at Dewey Gregory's residence.

Sample Station Number: 48
Approximate Direction and Distance from Plant: 316° - 2.2 miles
Sample Types: 1) Food Products
Sample Station Location:

R.J. Cochran residence, Hwy 64 London West, directly north (across from London Volunteer Fire Dept).

Sample Station Number: 49
Approximate Direction and Distance from Plant: 338° - 9.0 miles
Sample Types: 1) Milk
Sample Station Location:

IF traveling from London,
THEN take Hwy. 333 N. to Augsburg community. Turn left (west) at the Augsburg Church. Travel west on County Road 81 for 3.2 miles. Rylee Dairy on right (north) side of County Road 81.

Sample Station Number: 50
Approximate Direction and Distance from Plant: 47° - 10.8 miles
Sample Types: 1) Milk
Sample Station Location:

Take State Highway 7 north to Dover. Turn right (east) on State Highway 27. Go approximately 1.6 miles. Dairy is located on left (north) side of State Highway 27.

Sample Station Number: 108
Approximate Direction and Distance from Plant: 301° - 0.9 miles
Sample Types: 1) Direct radiation
2) Food Products
Sample Station Location:

IF traveling from Highway 333,
THEN turn south onto Flatwood Road and go approximately 0.4 miles. The sample station is on the right.

IF traveling north on Flatwood Road,
THEN go approximately 0.4 miles from sample station 109. The sample station is on the left.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 109
Approximate Direction and Distance from Plant: 285° - 0.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling south on Flatwood Road,
THEN go approximately 0.4 miles from sample station 108. Sample station 109 is on a utility pole on the left across from the junction of Flatwood Road and Round Mountain Road.

IF traveling west from ANO toward Gate 4,
THEN go approximately 0.4 miles and turn right onto Flatwood Road. Go approximately 0.2 miles. The sample station is on a utility pole on the right across from the junction of Flatwood Road and Round Mountain Road.

Sample Station Number: 110
Approximate Direction and Distance from Plant: 138° - 0.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

From bridge over intake canal, go south approximately 0.25 miles. Turn left and go approximately 0.25 miles. Turn right on Bunker Hill Lane. The sample station is on the first utility pole on the left.

Sample Station Number: 111
Approximate Direction and Distance from Plant: 121° - 2.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:

From junction of Highway 64 and Highway 326 (Marina Road), go approximately 2.1 miles on Marina Road. The sample station is on a utility pole on the left just prior to curve.

Sample Station Number: 112
Approximate Direction and Distance from Plant: 74° - 2.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Go to the junction of Highway 64 and the I-40 exit which is approximately 1.3 miles east of sample station 113. The sample station is on a utility pole on the northeast corner of the junction.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 113
Approximate Direction and Distance from Plant: 52° - 1.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Go to the east junction of Highway 333 and Highway 64. The sample station is on a utility pole on the southwest corner of the junction.

Sample Station Number: 114
Approximate Direction and Distance from Plant: 31° - 1.3 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling west on Highway 64,
THEN go approximately 0.6 miles west of the east junction of Highway 64 and Highway 333. The sample station is on a utility pole on the right.

IF traveling east on Highway 64,
THEN go approximately 1.1 miles from sample station 115. The sample station is on a utility pole on the left.

Sample Station Number: 115
Approximate Direction and Distance from Plant: 344° - 1.4 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling west on Highway 64,
THEN go approximately 1.1 miles west of sample station 114. The sample station is on a utility pole on the right.

IF traveling east on Highway 64,
THEN go approximately 0.8 miles from the west junction of Highway 64 and Highway 333 in London, AR. The sample station is on a utility pole on the left.

Sample Station Number: 116
Approximate Direction and Distance from Plant: 320° - 1.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Go one block south of the west junction of Highway 333 and Highway 64 in London, AR. The sample station is on a utility pole north of the railroad tracks.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 117
Approximate Direction and Distance from Plant: 305° - 17.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling west on I-40,
THEN take Exit 58 at Clarksville, AR. Turn right onto Rogers Street. At junction of Rogers Street and Highway 64, turn left and proceed west to first stop light. Turn left onto Cravens Street. The sample station is on a utility pole on the right between the county courthouse and the post office.

IF traveling west on Highway 64,
THEN go to first stop light past junction of Rogers Street and Highway 64. Turn left onto Cravens Street. The sample station is on a utility pole on the right between the county courthouse and the post office.

Sample Station Number: 118
Approximate Direction and Distance from Plant: 294° - [illegible].6 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling east on Highway 64,
THEN go approximately 0.3 miles from bridge which goes across Piney. The sample station is on a utility pole on the left.

IF traveling west on Highway 64,
THEN go approximately 0.4 miles past Flat Rock-Piney Bay Recreational Area turnoff. The sample station is on a utility pole on the right.

Sample Station Number: 119
Approximate Direction and Distance from Plant: 309° - 4.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Turn west from Highway 333 onto Will Baker Road, which intersects Highway 333 approximately 1.4 miles north of the I-40 Overpass near London, AR. Go approximately 2.0 miles. The sample station is on a utility pole on the left just prior to pavement ending.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 120
Approximate Direction and Distance from Plant: 336° - 4.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling from I-40 Overpass in London, AR,
THEN go north on Highway 333 approximately 2.4 miles. The sample station is on a utility pole on the right near Martin Chapel.

IF traveling from junction of Mill Creek Road and Highway 333,
THEN go approximately 1.0 mile south on Highway 333. The sample station is on a utility pole on the left near Martin Chapel.

Sample Station Number: 121
Approximate Direction and Distance from Plant: 349° - 4.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling from I-40 Overpass in London, AR,
THEN go north on Highway 333 approximately 3.4 miles to Mill Creek Road. Turn right onto Mill Creek Road and go approximately 0.7 miles. The sample station is on a utility pole on the right.

IF traveling northwest on Mill Creek Road,
THEN go approximately 0.4 miles past East Point Baptist Church and Cemetery. The sample station is on a utility pole on the left.

Sample Station Number: 122
Approximate Direction and Distance from Plant: 18° - 3.3 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling north from junction of Highway 64 and Mill Creek Road,
THEN go approximately 2.5 miles. The sample station is on a utility pole on the right.

IF traveling southeast on Mill Creek Road,
THEN go approximately 1.9 miles from East Point Baptist Church. The sample station is on a utility pole on the left.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 123
Approximate Direction and Distance from Plant: 46° - 3.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Turn north from Pleasant View Road onto Ball Hill Road and go approximately 0.8 miles. The sample station is on a utility pole on the left.

Sample Station Number: 124
Approximate Direction and Distance from Plant: 60° - 3.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling from junction of Highway 64 and Mill Creek Road, THEN go north on Mill Creek Road approximately 0.7 miles. Turn right onto Pleasant View Road and go approximately 1.3 miles. The sample station is on the right on a utility pole which is across from a siren and below a transmission line.

IF traveling west from junction of Highway 7 and Pleasant View Road, THEN go approximately 3.1 miles. The sample station is on the left on a utility pole which is across from a siren and below a transmission line.

Sample Station Number: 125
Approximate Direction and Distance from Plant: 46° - 9.1 miles
Sample Types: 1) Direct radiation
Sample Station Location:

While traveling north on Highway 7, turn left onto Water Street in Dover, AR. Go one block and turn left onto South Elizabeth Street. Go one block and turn right onto College Street. The sample station is on a utility pole at the southeast corner of the red brick school building, which is located on top of hill.

Sample Station Number: 126
Approximate Direction and Distance from Plant: 81° - 5.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:

The sample station is located on the west side of Highway 7 directly across from Shiloh Road, which is approximately 1.3 miles north of the junction of Highway 7 and Dike Road.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 127 Approximate Direction and Distance from Plant: 102° - 5.6 miles Sample Types: 1) Direct radiation Sample Station Location: The sample station is located on the Arkansas Tech Campus on West O Street on a security light pole in front of Bryan Hall, which is the first building on the left when traveling from North Arkansas on West O Street.
Sample Station Number: 128 Approximate Direction and Distance from Plant: 113° - 8.6 miles Sample Types: 1) Direct radiation Sample Station Location: The sample station is on a utility pole inside the security fence near the Russellville Airport Office. The airport is located off of East 16th Street and is well marked by airport signs.
Sample Station Number: 129 Approximate Direction and Distance from Plant: 118° - 7.3 miles Sample Types: 1) Direct radiation Sample Station Location: The sample station is on a utility pole north of the Russellville High School sign, which is in front of high school on east side of Highway 7T.
Sample Station Number: 130 Approximate Direction and Distance from Plant: 245° - 4.6 miles Sample Types: 1) Direct radiation Sample Station Location: At junction of Highway 7 and Highway 22 in Dardanelle, AR, take Highway 22 toward Delaware, AR. Go approximately 0.4 miles west of Delaware Recreation Area turnoff. The sample station is on a utility pole on the right in Delaware, AR near Shirley's Beauty Salon.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 131
Approximate Direction and Distance from Plant: 244° - 2.4 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Turn north from Highway 22 onto Highway 393 at Delaware Recreation Area turnoff and go approximately 2.9 miles. The sample station is located past the boat ramp on an oak tree near crosstie steps in northeast quadrant of circle drive.

Sample Station Number: 132
Approximate Direction and Distance from Plant: 267° - 5.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Turn north from Highway 22 onto Highway 393 at Delaware Recreation Area turnoff and go approximately 0.9 miles. Turn left onto dirt road and go approximately 2.3 miles. The sample station is on a utility pole on the right.

Sample Station Number: 133
Approximate Direction and Distance from Plant: 233° - 3.7 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling west on Highway 22,
THEN go approximately 2.0 miles from sample station 134. The sample station is on the south side of the Highway 22 causeway attached to the first NO PARKING ANY TIME sign west of the bridge.

IF traveling east on Highway 22 from Delaware, AR,
THEN go approximately 0.8 miles from Delaware Recreation Area turnoff. The sample station is on the south side of the Highway 22 causeway attached to the first NO PARKING ANY TIME sign west of the bridge.

Sample Station Number: 134
Approximate Direction and Distance from Plant: 200° - 2.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling west on Highway 22,
THEN go approximately 0.8 miles from sample station 135. The sample station is on a utility pole on the right at Mockingbird Lane.

IF traveling east on Highway 22,
THEN go approximately 2.0 miles from sample station 133. The sample station is on a utility pole on the left at Mockingham Lane.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 135
Approximate Direction and Distance from Plant: 188° - 3.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling northwest on Highway 22,
THEN go approximately 1.7 miles from sample station 136. The sample station is on a utility pole on the right.

IF traveling east on Highway 22,
THEN go approximately 0.8 miles from sample station 134. The sample station is on a utility pole on the left.

Sample Station Number: 136
Approximate Direction and Distance from Plant: 168° - 4.3 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling west on Highway 22,
THEN go approximately 3.7 miles from junction of Highway 22 and Highway 7. The sample station is on the right on the first utility pole west of the Little Hays Creek Bridge.

IF traveling east on Highway 22,
THEN go approximately 1.7 miles from sample station 135. The sample station is on the left on the first utility pole west of the Little Hays Creek Bridge.

Sample Station Number: 137
Approximate Direction and Distance from Plant: 150° - 8.4 miles
Sample Types: 1) Direct radiation
Sample Station Location:

At junction of Highway 7 and Highway 28 in Dardanelle, AR, go approximately 0.2 miles on Highway 28. The sample station is on a speed limit sign on the right in front of the Morris R. Moore Arkansas National Guard Armory.

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 138
Approximate Direction and Distance from Plant: 193° - 5.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

At junction of Highway 22 and Highway 155 (Mt. Nebo Road) in Dardanelle, AR, turn west and go to top of mountain. Veer right at stop sign and proceed toward Sunset Point. The sample station is down a dirt road on the right which is approximately 0.1 miles southeast of Sunset Point. The sample station is on the left side of the dirt road on a utility pole near a TV tower.

Sample Station Number: 139
Approximate Direction and Distance from Plant: 178° - 19.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Take Highway 7 South through Dardanelle, AR to Ola, AR. Turn left at junction of Highway 7 and Highway 10 West in Ola, AR and go approximately ½ block. The sample station is on a utility pole on the left in front of the U. S. Post Office.

Sample Station Number: 140
Approximate Direction and Distance from Plant: 151° - 21.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

Proceed through Ola, AR and take Highway 10 East to Casa, AR, which is in Perry County. Turn right at the Perry-Casa High School. The sample station is on a utility pole at the southwest corner of the school.

Sample Station Number: 141
Approximate Direction and Distance from Plant: 125° - 3.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:

While traveling southwest on Highway 326 (Marina Road), go approximately 2.4 miles from sample station 111. The sample station is on the right on a utility pole, which is approximately 50 yards east of a transmission line. (The sample station is approximately 0.35 miles west of the junction of Hilltop Drive and Marina Road.)

TABLE 4-1
Environmental Sampling Stations - Radiological

Sample Station Number: 142
Approximate Direction and Distance from Plant: 129° - 5.1 miles
Sample Types: 1) Direct radiation
Sample Station Location:

The sample station is on a utility pole at the junction of Skyline Drive and Nordin Lane in Russellville, AR, near a peach orchard.

Sample Station Number: 143
Approximate Direction and Distance from Plant: 106° - 17.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:

IF traveling east on Highway 64 to Atkins, AR,
THEN turn left at junction of Highway 64 and North Church Street. Proceed north. The sample station is on a utility pole on the left in front of Atkins High School near stop sign at corner of North Church Street and Northeast 3rd Street.

IF traveling east on Interstate 40,
THEN take Exit 94 at Atkins, AR. Turn left onto North Church Street and proceed south. The sample station is on a utility pole on the right in front of Atkins High School near stop sign at corner of North Church Street and Northeast 3rd Street.

Sample Station Number: 144
Approximate Direction and Distance from Plant: 313° - 12.7 miles
Sample Types: 1) Direct radiation
Sample Station Location:

While traveling on Highway 64, turn south onto Cumberland Street in Lamar, AR, and go approximately 0.7 miles. Veer left at stop sign. The sample station is on a utility pole across the one way fire lane in front of Lamar Elementary School.

APPENDICES

APPENDIX 1

LIMITATIONS - UNIT 1

1.3 OPERABLE - OPERABILITY

As defined in Unit 1 Technical Specifications, a system, subsystem, train, component or device shall be operable or have operability when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s).

1.5.2 CHANNEL TEST

As defined in Unit 1 Technical Specifications, a channel test is the injection of an internal or external test signal into the channel to verify its proper response, including alarm and/or trip initiating action, where applicable.

1.5.3 INSTRUMENT CHANNEL CHECK

As defined in Unit 1 Technical Specifications, an instrument channel check is a verification of acceptable instrument performance by observation of its behavior and/or state; this verification includes comparison of output and/or state of independent channels measuring the same variable.

1.5.4 INSTRUMENT CHANNEL CALIBRATION

As defined in Unit 1 Technical Specifications, an instrument channel calibration is a test, and adjustment (if necessary), to establish that the channel output responds with acceptable range and accuracy to known values of the parameter which the channel measures or an accurate simulation of these values. Calibration shall encompass the entire channel, including equipment actuation, alarm or trip and shall be deemed to include the channel test.

1.10.2 SOURCE CHECK

As defined in Unit 1 Technical Specifications, a source check shall be the qualitative assessment of channel response when the channel sensor is exposed to a radioactive source.

1.10.4 LIQUID RADWASTE TREATMENT SYSTEM

As defined in Unit 1 Technical Specifications, a liquid radwaste treatment system is a system designed and used for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the environment.

1.10.5 GASEOUS RADWASTE TREATMENT SYSTEM

As defined in Unit 1 Technical Specifications, a gaseous radwaste treatment system is any system designed and installed to reduce radioactive gaseous effluents by collecting gases from radioactive systems and providing for decay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

1.10.6 VENTILATION EXHAUST TREATMENT SYSTEM

As defined in Unit 1 Technical Specifications, a ventilation exhaust treatment system is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment (such a system is not considered to have any effect on noble gas effluents). Engineered Safety Feature (ESF) atmospheric cleanup systems are not considered to be ventilation exhaust treatment systems.

1.10.7 PURGE - PURGING

As defined in Unit 1 Technical Specifications, purge or purging is the controlled process of discharging air or gas from a confinement to reduce the airborne radioactivity concentration in such a manner that replacement air or gas is required to purify the confinement.

1.10.8 MEMBER(S) OF THE PUBLIC

As defined in Unit 1 Technical Specifications, member(s) of the public shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from the category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

1.10.9 EXCLUSION AREA

As defined in Unit 1 Technical Specifications, the exclusion area is that area surrounding ANO within a minimum radius of 0.65 miles of the reactor buildings and controlled to the extent necessary by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

1.10.10 UNRESTRICTED AREA

As defined in Unit 1 Technical Specifications, an unrestricted area shall be any area beyond the exclusion area boundary.

3.5.6 Radioactive Liquid Effluent Instrumentation

Applicability: During releases via this pathway.

Objective: To provide instrumentation for radioactiv liquid releases.

Limitation:

3.5.6.1 The radioactive liquid effluent monitoring instrumentation shown in Table 3.5.6-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 1, Limitation 3.25.1.1 are not exceeded.

3.5.6.2 With alarm/trip setpoints less conservative than required by the above limitation, immediately suspend the release of radioactive liquid effluents monitored by the affected channel, until the setpoint is changed to an acceptably conservative value.

3.5.6.3 With less than the minimum number of channels operable, take the action shown in Table 3.5.6-1. Return the instruments to operable status within 30 days or, in lieu of any other report, explain in the next Radioactive Effluent Release Report why the inoperability was not corrected.

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 the methods in this manual to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.

Table 3.5.6-1

Radioactive Liquid Monitoring Instrumentation

Instrument	Minimum Operable Channels	Applicability	Action
1. Liquid radwaste effluent monitor (automatic termination)	1	During releases via this pathway	A
2. Liquid radwaste effluent flow monitor	1	During releases via this pathway	B

Table 3.5.6-1 (Continued)

Table Notation

Action	Description
A.	With the number of channels operable less than required, effluent releases may be resumed provided that prior to initiating a release : 1. At least two independent samples of the tank's contents are analyzed in accordance with Appendix 1, Limitation 4.29.1.1; 2. At least two technically qualified members of the facility staff independently verify that the computer input data is correct and; 3. At least 2 members of the facility staff independently verify the discharge valve lineup. Otherwise, suspend release of radioactive effluents via this pathway.
B.	With the number of channels operable less than required, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump curves may be used to estimate flow.

3.5.7 Radioactive Gaseous Effluent Instrumentation

Applicability: As shown in Table 3.5.7-1.

Objective: To provide instrumentation for radioactive gaseous releases.

Limitation:

3.5.7.1 The radioactive gaseous effluent monitoring instrumentation shown in Table 3.5.7-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 1, Limitation 3.25.2.1 are not exceeded.

3.5.7.2 With a channel alarm/trip setpoint less conservative than required, declare the channel inoperable.

3.5.7.3 With less than the minimum number of channels operable, take the action shown in Table 3.5.7-1. Return the instruments to operable status within 30 days or, in lieu of any other report, explain in the next Radioactive Effluent Release Report why the inoperability was not corrected.

Bases:

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 methods in this manual to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.105.

Table 3.5.7-1

Radioactive Gas Effluent Monitoring Instrumentation

Instrument	Minimum Channels Operable	Applicability	Paramete_	Action
1. Waste Gas Holdup System				
Noble gas activity monitor (provides alarm and automatic termination of release)	1	During releases via this pathway (DRVTP)	Radioactivity	A
Effluent flow monitor	1	DRVTP	System flow	B
2. Auxiliary Building Ventilation System				
a) Noble gas activity monitor	1	DRVTP	Radioactivity	C
b) Iodine sampler	1	DRVTP		D
c) Particulate sampler	1	DRVTP		D
d) Effluent flow monitor	1	DRVTP	System flow	B
e) Sampler flow monitor	1	DRVTP	Sample flow	B

Table 3.5.7-1 (Continued)

Radioactive Gaseous Effluent Monitoring Instrumentation

Instrument	Minimum Channels Operable	Applicability	Parameter	Action
3. Spent Fuel Pool Area Ventilation System		When the system is in operation		
a) Noble gas activity monitor	1		Radioactivity	C
b) Iodine sampler	1			D
c) Particulate sampler	1			D
d) Effluent flow monitor	1		System flow	B
e) Sampler flow monitor	1		Sample flow	B
4. Reactor Building Purge and Ventilation System		When the system is in the operation		
a) Noble gas activity monitor	1		Radioactivity	C, E
b) Iodine sampler	1			D
c) Particulate sampler	1			D
d) Effluent flow monitor	1		System flow	B
e) Sampler flow monitor	1		Sample flow	B

Table 3.5.7-1 (Continued)

Table Notation

Action	Description
A.	With the number of channels operable less than required, the contents of the tank may be released to the environment provided that prior to initiating the release: 1. At least two independent samples of the tank's contents are analyzed, and 2. At least two technically qualified members of the facility staff independently verify the computer input data, and 3. At least 2 members of the facility staff independently verify the correct discharge valve lineup. Otherwise, suspend release of radioactive effluents via this pathway.
B.	With the number of channels operable less than required, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours.
C.	With the number of channels operable less than required, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours.
D.	With the number of channels operable less than required, effluent releases via the affected pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in Table 4.29-3.
E.	When purging the reactor building, immediately suspend purging if less than the required number of monitoring channels are operable. Purging may be resumed provided that prior to initiating the purge: 1. At least two independent samples of the reactor building atmosphere are analyzed, and 2. At least two technically qualified members of the facility staff independently verify the computer input data.

3.25 RADIOACTIVE EFFLUENTS

3.25.1 Radioactive Liquid Effluents

3.25.1.1 Concentration

Applicability: At all times

Objective: To ensure that the limits of 10 CFR 20 are met.

Limitations:

3.25.1.1 A. The concentration of radioactive material released to the discharge canal 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 total concentration released shall be limited to 2×10^{-4} µCi/ml.

B. With the concentration of radioactive material released exceeding the above limits, immediately initiate action to restore concentration to within limits and provide notification to the Commission within 24 hours. In lieu of any other report, prepare and submit a Special Report within 30 days pursuant to Appendix 1, Limitation 6.12.5.

Bases:

This limitation 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. This limit provides additional assurance that the levels of radioactive materials in bo[illegible]f water outside the site will not result in exposures [illegible]ater th[illegible] Section II.A design objectives of Appendix I, 10 CFR Part [illegible]o a mer[illegible] the public. The concentration limit for noble gas[illegible] is based [illegible] the assumption that Xe-133 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.

Radioactive Liquid Effluents

3.25.1.2 Dose

Applicability: At all times

Objective: To ensure that the dose limits of 10 CFR 50, Appendix I, Section IV.A, are met.

Limitations:

3.25.1.2 A. The dose commitment to a member of the public from radioactive material in liquid effluents released from ANO-1 to the discharge canal shall be:

1) During any calendar quarter less than or equal to 1.5 mrem to the total body and less than or equal to 5 mrem to any organ, and

2) During any calendar year less than or equal to 3 mrem to the total body and less than or equal to 10 mrem to any organ.

B. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days, pursuant to Appendix 1, Limitation 6.12.5.

Bases:

Limitation 3.25.1.2 provides assurance that releases of liquid effluents will result in concentrations far below the limits of 10 CFR 20. The limitation provides the required operating flexibility and at the same time assures that the release of radioactive material in liquid effluents will be kept "as low as reasonably achievable".

Radioactive Liquid Effluents

3.25.1.3 Waste Treatment

Applicability: At all times

Objective: To assure that the amount of radioactive material in liquid effluents will be "as low as reasonably achievable."

Limitations:

3.25.1.3 A. The appropriate parts of the liquid radwaste treatment system shall be used to reduce the radioactive materials in liquid waste prior to their discharge when it is projected that the cumulative dose during a calendar quarter due to liquid effluent releases would exceed 0.18 mrem to the total body or 0.625 mrem to any organ.

B. The provisions of this limitation do not apply to the laundry tanks due to their incompatibility with the radwaste system.

C. With radioactive liquid waste being discharged without treatment and in excess of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days per Appendix 1, Limitation 6.12.5.

Bases:

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." The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the guide set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents. The values of 0.18 mrem and 0.625 mrem are approximately 25% of the yearly design objectives on a quarterly basis. The yearly design objectives are given in 10 CFR 50, Appendix I, Section II.

3.25.2 Radioactive Gaseous Effluents

3.25.2.1 Dose Rate

Applicability: At all times

Objective: To ensure that the dose rate in unrestricted areas from gaseous effluents will be within the limits of 10 CFR 20.

Limitations:

3.25.2.1 A. The dose rate in unrestricted areas (see Figure 4-2) due to radioactive materials released in gaseous effluents from the site shall be:

1) For noble gases: Less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin.

2) For iodine-131, for tritium and for all radionuclides in particulate form with half lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

During periods of reactor building purging the dose rate may be averaged over a one hour interval.

B. With the dose rate(s) exceeding the above limits, without delay restore the release rate to within the above limit(s).

Bases:

This limitation is provided to ensure that, at any time, the dose rate due to gaseous effluents from all units on the site will be within the limits of 10 CFR 20 for unrestricted areas.

This limitation applies to the release of gaseous effluents from all reactors at the site.

Radioactive Gaseous Effluents

3.25.2.2 Dose - Noble Gases

Applicability: At all times

Objective: To ensure that the design objective doses of 10 CFR 50, Appendix I, Section IV.A, are not exceeded.

Limitations:

3.25.2.2 A. The dose due to noble gases released in gaseous effluents from ANO-1 to unrestricted areas (see Figure 4-2) shall be:

1) During any calendar quarter, less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation, and

2) During any calendar year, less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.

B. With the calculated dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days, pursuant to Appendix 1, Limitation 6.12.5.

Bases:

Limitation 3.25.2.2 implements the design guides specified in 10 CFR 50, Appendix I, Section II, and the limiting condition for operation as set forth in Section IV.A of Appendix I.

The limitations provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A, Appendix I, to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable."

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, to annual average concentrations exceeding the limits specified in Appendix B, Table II 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.

Radioactive Gaseous Effluents

3.25.2.3 Dose - Iodine-131, Tritium, and Radionuclides in Particulate Form

Applicability: At all times

Objective: To ensure that the dose limits of 10 CFR 50, Appendix I, Section IV.A, are met.

Limitations:

3.25.2.3 A. The dose to a member of the public from iodine-131, from tritium, and from all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released from ANO-1 to unrestricted areas (see Figure 4-2) shall be:

1) During any calendar quarter, less than or equal to 7.5 mrems to any organ, and

2) During any calendar year, less than or equal to 15 mrems to any organ.

B. With the calculated dose from the release of iodine-131, tritium and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, in lieu of any other report, prepare and submit a Special Report to the Commission within 30 days, pursuant to Appendix 1, Limitation 6.12.5.

Bases:

Limitation 3.25.2.3 implements the design guides set forth in 10 CFR 50, Appendix I, Section II.C, and the limiting conditions for operation as set forth in Appendix I, Section IV.A.

The limitations provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as reasonably achievable".

Radioactive Gaseous Effluents

3.25.2.4 Gaseous Radwaste Treatment

Applicability: At all times

Objective: To assure that the amount of radioactive material in gaseous effluents is "as low as reasonably achievable."

Limitations:

3.25.2.4 A. Ventilation exhaust treatment systems shall be used to reduce radioactive materials in gaseous waste prior to discharge when the projected doses due to gaseous effluent releases from ANO-1 to unrestricted areas (see Figure 4-2) would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation over a calendar quarter; or when the projected doses due to iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days would exceed 1.0 mrem to any organ over a calendar quarter.

B. When degasifying the reactor coolant system, the gaseous radwaste treatment system shall be utilized to process the degassing effluent to reduce the concentration of radioactive materials prior to discharge when the projected doses due to gaseous effluent releases from ANO-1 to unrestricted areas (see Figure 4-2) would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation over a calendar quarter.

C. With gaseous waste being discharged without treatment and in excess of the above limits, in lieu of any other report, prepare and submit to the Commission within 30 days a Special Report, per Appendix 1, Limitation 6.12.5.

Bases:

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 reasonably achievable." The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the guide set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents. The values 0.625 mrad, 1.25 mrad, and 1.0 mrem are approximately 25% of the yearly design objectives on a quarterly basis. The yearly design objectives are given in Appendix 1, Limitations 3.25.2.2 and 3.25.2.3.

3.25.3 Total Dose

Applicability: At all times

Objective: To ensure that the limits of 40 CFR 190 are not exceeded.

Limitations:

3.25.3.1 The calculated doses from the release of radioactive materials in liquid or gaseous effluents shall not exceed twice the limits of Appendix 1, Limitation 3.25.1.2, 3.25.2.2, or 3.25.2.3.

3.25.3.2 With the calculated doses exceeding the above limits, prepare and submit a Special Report pursuant to 10 CFR Part 20.405C.

3.25.3.3 If the limits of 40 CFR 190 have been exceeded, obtain a variance from the Commission to permit further releases in excess of 40 CFR 190 limits. A variance is granted until staff action on the request is completed.

Bases:

This limitation is provided to meet the dose limits of 40 CFR 190 that have now been incorporated into 10 CFR Part 20. The limitation requires the preparation and submittal of a Special Report whenever the calculated doses from plant radioactive effluents exceed twice the design objective doses of Appendix I. For sites containing up to 4 reactors, it is highly unlikely that the resultant dose to a member of the public will exceed the dose limits of 40 CFR 190 if the individual reactors remain within the reporting requirement level. The Special Report will describe a course of action that should result in limiting the annual dose to a member of the public to within the 40 CFR 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the member of the public from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities within a radius of 8 km must be considered. If the dose to any member of the public is estimated to exceed the requirements of 40 CFR 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR 190, and does not apply in any way to the other requirements for dose limits in 10 CFR 20, as addressed in Appendix 1, Limitations 3.25.1 and 3.25.2. An individual is not considered to be a member of the public during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

4.29 RADIOACTIVE EFFLUENTS

4.29.1 Radioactive Liquid Effluents

4.29.1.1 Concentration

Applicability: At all times

Objective: To ensure that the limits of Appendix 1, Limitation 3.25.1.1 are met.

Limitations:

4.29.1.1 A. Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analyses program of Table 4.29-1.

B. The results of the radioactivity analyses shall be used in accordance with this manual to assure that the concentrations at point of release are maintained within the limits of Appendix 1, Limitation 3.25.1.1.

Bases:

This limitation 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. This limit provides additional assurance that the levels of radioactive materials in bodies of water outside the site will not result in exposures greater than the Section II.A design objectives of Appendix I, 10 CFR Part 50, to an individual. The concentration limit for noble gases is based upon the assumption that Xe-133 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 of Radiological Protection (ICRP) Publication 2.

Table 4.29-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSES PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analyses Frequency	Type of Activity Analyses	Lower Limit of Detection (LLD) (µCi/ml) [(a)]
A. Batch Waste Release [(d)]	P Each Batch	P Each Batch	γ isotopic [(e)]	5×10^{-7} [(b)]
			I-131	1×10^{-6}
	P One Batch/M	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	P Each Batch	M Composite [(c)]	H-3	1×10^{-5}
			Gross Alpha	1×10^{-7}
	P Each Batch	Q Composite [(c)]	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}

Table 4.29-1 (Continued)

TABLE NOTATION

a. The Lower Limit of Detection (LLD) is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radio-chemical separation):

$$LLD = \frac{4.66\ S_b}{E * V * 2.22 * Y * \exp(-\lambda \nabla t)}$$

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 (in 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 transformations per minute per picocurie

Y is the fracti[illegible] radiochemical yield (when applicable)

λ is the radioactive decay constant for the particular radionuclide

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

Typical values of E, V, Y and ∇t should be used in the calculation.

It should be recognized that the LLD is an a Priori (before the fact) limit representing the capability of measurement system and not an a Posteriori (after the fact) limit for a particular measurement.

TABLE 4.29-1 (Continued)

TABLE NOTATION

b. For certain mixtures of gamma emitters, it may not be possible to measure radionuclides in concentrations near their sensitivity limits when other nuclides are present in the sample in much greater concentrations. Under these circumstances, it will be more appropriate to calculate the concentration of such radionuclides using observed ratios with those radionuclides which are measurable.

c. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.

d. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling, each batch shall be isolated and mixed to ensure representative sampling.

e. The principal gamma emitters for which the LLD limitation 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 Radioactive Effluent Release Report.

D Daily
P Prior to Release
M Monthly
Q Quarterly
R Every 18 months

Radioactive Liquid Effluents

4.29.1.3 Liquid Radioactive Effluent Instrumentation

Applicability: Applies to the instrumentation in the liquid radwaste system that is used to limit the amount of radioactivity released to the environs.

Objective: To provide surveillance limitations for the instruments required in Appendix 1, Limitation 3.5.6.

Limitations:

4.29.1.3 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and channel test at the frequencies shown in Table 4.29-2.

Bases:

To ensure that the instrumentation for the liquid radwaste system is operable.

The channel test demonstrates that automatic isolation of this pathway and control room alarm annunciation occur if the instrument indicates measured levels above the trip setpoint. The channel test also demonstrates that alarm annunciation occurs if any of the following conditions exist:

1. Power to the detector is lost.
2. The instrument indicates a downscale failure.
3. Instrument controls are not set in the operate mode.

The initial channel calibration is performed using one or more of the reference standards certified by the National Institute of Standards and Technology or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards permit calibrating the system over its intended range of energy and measurement range. For subsequent channel calibration, sources that have been related to the initial calibration are used.

Table 4.29-2

Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Limitation

Instrument	Channel Check	Source Check	Channel Calibration	Channel Test
Liquid radwaste effluent line				
Radiation monitor (automatic termination)	D*	P**	R	Q
Flow monitor	D*	NA	R	NA

Notation

*During releases via this pathway

**A check source is not required if the background activity is greater than the activity of the check source.

D Daily
P Prior to release
M Monthly
Q Quarterly
R Every 18 months

4.29.2 Radioactive Gaseous Effluents

4.29.2.1 Dose Rate

Applicability: At all times

Objective: To ensure that the dose rate, at any time, in unrestricted areas from gaseous effluents will be within the dose limits of 10 CFR 20.

Limitations:

4.29.2.1 A. The dose rate, due to noble gases in gaseous effluents shall be determined in accordance with this manual to be within the limits of Appendix 1, Limitation 3.25.2.1.

B. The dose rate in unrestricted areas, due to iodine-131, tritium, and all radionuclides in particulate form with half-lives greater than 8 days released in gaseous effluents, shall be determined in accordance with this manual to be within the required limits by using the results of the sampling and analyses program, specified in Table 4.29-3.

Bases:

This limitation provides for sampling and analyses to ensure that Appendix 1, Limitation 3.25.2.1 is met.

TABLE 4.29-3

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSES PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analyses Frequency	Type of Activity Analyses	Lower Limit of Detection (LLD) (μCi/ml) (a)
A. Waste Gas Storage Tank	P Each Tank Grab Sample	P Each Tank	Principal Gamma Emitters (b)	1×10^{-4} (g)
B. Reactor Bldg. Purge	P Each Purge Grab Sample	P Each Purge	Principal Gamma Emitters (b) H-3	1×10^{-4} (g) 1×10^{-6}
C. Unit Vents	M (c) (d) Grab Sample	M	Principal Gamma Emitters (b) H-3	1×10^{-4} (g) 1×10^{-6}
(Auxiliary Bldg.) (Spent Fuel Pool Area Ventilation) (Rx Bldg. Ventilation)	Continuous (e)	W (f) Charcoal Sample	I-131	1×10^{-12}
	Continuous (e)	W (f) Particulate Sample	Principal Gamma Emitters (b) (I-131, Others)	1×10^{-11}
	Continuous (e)	M Particulate Sample	Gross Alpha	1×10^{-11}
	Continuous (e)	Q Composite Particulate Sample	Sr-89, Sr-90	1×10^{-11}
	Continuous (e)	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	1×10^{-6} (Xe-133 equiv.)

TABLE 4.29-3 (Continued)

TABLE NOTATION

a. See definition in Table 4.29-1, Table Notation.

b. The principal gamma emitters for which the LLD limitation will apply are exclusively the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. 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 for that nuclide. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the Radioactive Effluent Release Report.

c. Tritium grab samples shall be taken from the Reactor Building ventilation exhaust at least once per 24 hours when the refueling canal is flooded.

d. Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel area, whenever spent fuel is in the spent fuel pool.

e. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Appendix 1, Limitation 3.25.2.1, 3.25.2.2, and 3.25.2.3.

f. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from the sampler).

g. 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 LLD. Under these circumstances, the LLD may be increased inversely proportional to the magnitude of the gamma yield (i.e., $(1 \times 10^{-4}/I)$, 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 1.

D Daily
P Prior to Release
W Weekly
M Monthly
Q Quarterly
R Every 18 months

Radioactive Gaseous Effluents

4.29.2.3 Radioactive Gaseous Effluent Monitoring Instrumentation

Applicability: Applies to the instrumentation in the gaseous radwaste system that is used to limit the amount of activity released to the environs.

Objective: To provide surveillance limitations for the instruments listed in Appendix 1, Limitation 3.5.7.

Limitations:

4.29.2.3 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and channel test at the frequencies shown in Table 4.29-4.

Bases:

To ensure that the instrumentation for the gaseous radwaste system is operable.

The channel test demonstrates that control room alarm annunciation occurs if any of the following conditions exist:

1. The instrument indicates measured levels above the alarm/trip setpoint.
2. Power to the detector is lost.
3. The instrument indicates a downscale failure.
4. Instrument controls are not set in the operate mode.

For the waste gas holdup system noble gas activity monitor, the channel test also demonstrates that automatic isolation of the release pathway occurs if the instrument indicates above the trip setpoint.

The initial channel calibration is performed using one or more of the reference standards certified by the National Institute of Standards and Technology or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards permit calibrating the system over its intended range of energy and measurement range. For subsequent channel calibration, sources that have been related to the initial calibration are used.

Table 4.29-4

Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Limitations

Instrument	Channel Check	Source** Check	Channel Calibration	Channel Functional Test
1. Waste Gas Holdup System				
a. Noble Gas Activity Monitor (provides automatic termination of release)	D*	P	R	Q
b. Effluent Flow Monitor	D*	N/A	R	N/A
2. Auxiliary Building Ventilation System				
a. Noble Gas Activity Monitor	D*	M	R	Q
b. Effluent Flow Monitor	D*	N/A	R	N/A
c. Sampler Flow Monitor	D*	N/A	R	N/A
d. Iodine Sampler Cartridge	W*(1)	N/A	N/A	N/A
e. Particulate Sampler Filter	W*(1)	N/A	N/A	N/A

Table 4.29-4 (Continued)

Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Limitations

Instrument	Channel Check	Source** Check	Channel Calibration	Channel Functional Test
3. Spent Fuel Pool Area Ventilation System				
a. Noble Gas Activity Monitor	D*	M	R	Q
b. Effluent Flow Monitor	D*	N/A	R	N/A
c. Sampler Flow Monitor	D*	N/A	R	N/A
d. Iodine Sampler Filter	W*(1)	N/A	N/A	N/A
e. Particulate Sampler Filter	W*(1)	N/A	N/A	N/A
4. Reactor Building Purge System				
a. Noble Gas Activity Monitor	D*	M	R	P
b. Effluent Flow Monitor	D*	N/A	R	N/A
c. Sampler Flow Monitor	D*	N/A	R	N/A
d. Iodine Sampler Filter	W*(1)	N/A	N/A	N/A
e. Particulate Sampler Filter	W*(1)	N/A	N/A	N/A

Table 4.29-4 (Continued)

Table Notation

*Durinq releases via this pathway.

**A check source is not required if the background activity is greater than the activity of the check source.

P Prior to release

W Weekly

D Daily

M Monthly

Q Quarterly

R Once per 18 Months

NA Not applicable

(1) Verify presence of cartridge or filter only.

4.29.3 Dose Calculations for Radioactive Effluents

Applicability: At all times

Objective: To ensure that the requirements of 10 CFR 50, Appendix I, Section III.A are met.

Limitations:

4.29.3 Cumulative dose contributions and dose projections for liquid effluents and for gaseous effluents shall be determined in accordance with this manual at least once per 31 days.

Bases:

These calculations provide the dose values to be compared to the limits of Appendix 1, Limitations 3.25.1.2, 3.25.1.3, 3.25.2.2, 3.25.2.3, 3.25.2.4 and 3.25.3.

4.30 RADIOLOGICAL ENVIRONMENTAL MONITORING

4.30.1 Radiological Environmental Monitoring Program Description

Applicability: Applies at all times.

Objective: To provide information on the radiological effects of station operation on the environment.

Limitations:

4.30.1.1 The radiological environmental monitoring samples shall be collected pursuant to Table 4.30-1 and shall be analyzed pursuant to the requirements of Tables 4.30-1 and 4.30-2. The sample locations shall be listed in Table 1-1.

4.30.1.2

a. With the radiological environmental monitoring program not being conducted as specified in Table 4.30-1, prepare and submit to the Commission in the Annual Radiological Environmental Operating Report a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. (Deviations are permitted from the required sampling schedule if specimens are not obtainable due to hazardous conditions, seasonal unavailability, or to malfunction of sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period.)

b. With the level of radioactivity as the result of plant effluents in an environmental sampling medium at one or more of the locations specified in Table 4.30-1 exceeding the limits of Table 4.30-3 when averaged over any calendar quarter, prepare and submit to the Commission, within 30 days from the end of the affected quarter, a Special Report which includes an evaluation of any release conditions, environmental factors or other aspects which caused the limits of Table 4.30-3 to be exceeded, and defines the actions taken to reduce radioactive effluents so that the potential annual dose to a member of the public is less than the calendar year limits of Appendix 1, Limitations 3.25.1.2 and 3.25.2.2. When more than one of the radionuclides in Table 4.30-3 are detected in the sampling medium, this Special Report shall be submitted if:

$$\frac{\text{Concentration (1)}}{\text{reporting level (1)}} + \frac{\text{Concentration (2)}}{\text{reporting level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those in Table 4.30-3 are detected and are the result of plant effluents, this Special Report shall be submitted if the potential annual dose to a member of the public is equal to or greater than the calendar year limits of Appendix 1, Limitations 3.25.1.2 and 3.25.2.2. This Special 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.

c. With milk or fresh leafy vegetable samples unavailable from any of the sample locations required by Table 4.30-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the causes of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Radioactive Effluent Release Report and also include in the report a revised Table 4-1 reflecting the new location(s).

4.30.1.3 The results of analyses performed on the radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Operating Report.

Bases:

The radiological monitoring program required by this limitation 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 effluents 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 the environmental exposure pathways. The initially specified monitoring 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 4.30-2 are state of the art for routine environmental measurements in industrial laboratories. The LLD's for drinking water meet the requirements of 40 CFR 141.

TABLE 4.30-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Sample Locations*	Sampling and Collection Frequency	Type of Frequency of Analyses
1. AIRBORNE			
a. Radioiodine and Particulates	5 Locations	Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days	Radioiodine canister. Analyze at least once per 7 days for I-131. Particulate sampler. Analyze for gross beta radioactivity > 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is > 10 times the mean of control sample. Perform gamma isotopic analysis on composite (by location) sample at least once every 92 days.
2. DIRECT RADIATION	40 Locations 2 dosimeter per location	At least once per 92 days	Gamma dose. At least once per 92 days

*Sample locations are shown in Figure 4-1.

TABLE 4.30-1 (Continued)

Exposure Pathway and/or Sample	Number of Sample Locations*	Sampling and Collection Frequency	Type of Emergency of Analyses
3. WATERBORNE			
a. Surface	2 Locations	Composite** sample collected over a period ≤ 31 days.	Gamma isotopic analysis of each sample by location. Tritium analysis of composite sample at least once every 92 days.
b. Ground	2 Locations	At least once per 92 days.	Gamma isotopic and tritium analyses of each sample.
c. Drinking	1 Location	Monthly grab sample.	I-131 analysis of each sample; and Gross beta and gamma isotopic analyses of each sample. Tritium analysis of composite sample at lease once every 92 da,-.
d. Sediment from Shoreline	2 Locations	At least once per 184 days.	Gamma isotopic analysis of each sample

*Sample locations are shown in Figure 4-1.
**Composite samples shall be collected by an aliquot at intervals not exceeding 24 hours.

TABLE 4.30-1 (Continued)

Exposure Pathway and/or Sample	Number of Sample Locations*	Sampling and Collection Frequency	Type of Emergency of Analyses
4. INGESTION			
a. Milk	4 Locations	At least once per 31 days when animals are on pasture.	Gamma isotopic and I-131 analyses of each sample.
b. Fish	2 Locations	One sample in season, or at least once per 184 days if not seasonal. One sample of each of the following species: 1. Catfish 2. Crappie or Bass	Gamma isotopic analysis on edible portions.
c. Food Products**	3 Locations	At time of harvest. One sample of each of the following classes of food products: 1. Fruits 2. Flowering Vegetable 3. Tubular Vegetable	Gamma isotopic analysis on edible portions.
	1 Location	At time of harvest. One sample of broad leaf vegetation.	I-131 analysis.

*Sample locations are shown in Figure 4-1.
**If these food products are available.

Table 4.30-2

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

Analyses	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]	1×10^{-2}				
H-3	(1000[b])					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1*[b]	7×10^{-2}		1	60[c]	
Cs-134, 137	15(10[b]),18	1×10^{-2}	130,150	15, 18	60, 80	150,180
Ba-La-140	15			15		

*For Monthly grab samples.

(a) See definition of LLD in table notation of Table 4.29-1.
(b) LLD for drinking water.
(c) LLD for leafy vegetables.

TABLE 4.30-3

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analyses	Water (pCi/l)	Airborne Particulate or Gases (pCi/m³)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)
H-3	3×10^4 (a)				
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 (b)				
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 (b)			3×10^2 (b)	

(a) For drinking water samples.
(b) Total for parent and daughter.

Radiological Environmental Monitoring

4.30.2 Land Use Census

Applicability: Applies at all times

Objectives: This limitation will identify changes in use of the unrestricted areas.

Limitations:

4.30.2.1 A land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence, and the nearest garden* of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles from the ANO-1 reactor building.

4.30.2.2 The land use census shall be conducted at least once per 12 months between the dates of June 1 and October 1, by door-to-door survey, aerial survey, or by consulting local agricultural authorities.

4.30.2.3 a. With a land use census identifying a location(s) which yields a calculated dose commitment due to I-131, tritium, and radionuclides in particulate form greater than the values currently being calculated in Appendix 1, Limitation 4.29.3 and Appendix 2, Limitation 4.11.2.3 submit location description in the Radioactive Effluent Release Report per Appendix 1, Limitation 6.12.2.6.

b. With a land use census identifying a location(s) which yields a calculated dose commitment (via the same exposure pathway) greater than at a location from which samples are currently being obtained in accordance with Appendix 1, Limitation 4.30.1.1, identify the new location in the Radioactive Effluent Release Report per Appendix 1, Limitation 6.12.2.6. The new location shall be added to the radiological environmental monitoring program within 30 days, if possible. The sampling location having the lowest calculated 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.

4.30.2.4 The results of the land use census shall be included in the Annual Radiological Environmental Operating Report.

*Broad leaf vegetation sampling may be performed at the site boundary in the direction sector with the highest D/Q in lieu of the garden census.

Bases:

This limitation is provided to ensure 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. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathway via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were used, 1) that 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of 2 kg/square meter.

Radiological Environmental Monitoring

4.30.3 Interlaboratory Comparison Program

Applicability: Applies to the off-site radiochemistry laboratory.

Objective: To provide independent checks on the accuracy of the measurements of radioactive material in environmental samples.

Limitations:

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

4.30.3.2 With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report.

4.30.3.3 The results of analyses performed as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Appendix 1, Limitation 6.12.2.5.

Bases:

The requirement for participation in an Interlaboratory Comparison Program is provided to ensure 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.

6.8.4 The following program shall be established, implemented, and maintained:

a. Radioactive Effluent Controls Program

(Refer to Unit 1 Technical Specification 6.8.4.a.)

b. Radiological Environmental Monitoring Program

A program shall be provided to monitor the radiation and radionuclides in the environs of the plant. The program shall provide (1) representative , measurements of radioactivity in the highest potential exposure pathways, and (2) verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. The program shall (1) be contained in this manual, (2) conform to the guidance of Appendix I to 10 CFR Part 50, and (3) include the following:

1) Monitoring, sampling, analysis, and reporting of radiation and radionuclides in the environment in accordance with the methodology and parameters in this manual,

2) A Land Use Census to ensure that changes in the use of areas at and beyond the site boundary are identified and that modifications to the monitoring program are made if required by the results of this census,

3) Participation in an Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

6.12.2.5 Annual Radiological Environmental Operating Report *

(a) The Annual Radiological Environmental Operating Report shall be in accordance with Unit 1 Technical Specification 6.12.2.5 requirements. The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted prior to May 15 of each year.

(b) The Annual Radiological Environmental Operating Report shall include summaries, interpretations, and analyses of trends of the results of the radiological environmental monitoring program for the reporting period. If harmful effects or evidence of irreversible damage 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 Report shall include summarized and tabulated results of all radiological environmental samples and of all environmental radiation measurements required by this manual taken during the reporting 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. If the missing data becomes available, it shall be submitted as soon as possible in a supplementary report.

The Annual Radiological Environmental Operating Report shall also include the following: a summary description of the radiological environmental monitoring program, a map of all sampling locations keyed to a table giving distances and directions from the reactor buildings; the results of the Land Use Census required by Appendix 1, Limitation 4.30.2, and the results of the Interlaboratory Comparison Program participation required by Appendix 1, Limitation 4.30.3.

*A single submittal may be made for ANO. The submittal should combine those sections that are common to both units.

6.12.2.6 Radioactive Effluent Release Report**

(a) The Radioactive Effluent Release Report shall be in accordance with Unit 1 Technical Specification 6.12.2.6 requirements. The Radioactive Effluent Release Report covering the operation of the unit during the calendar year shall be submitted annually. The report must be submitted as specified in 10 CFR 50.4, and the time between submission of reports must be no longer than 12 months.

(b) The Radioactive Effluent Release Report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste release from the unit. The data will be summarized following the format of Regulatory Guide 1.21, Rev. 1.

(c) The Radioactive Effluent Release Report shall include the following information for all unplanned releases to unrestricted areas of radioactive material in gaseous and liquid effluents:

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.

(d) The Radioactive Effluent Release Report shall contain a description of any changes to the ODCM and PCP made during the period of the report. (Refer to Unit 1 Technical Specification 6.14.c for potential reporting requirements.)

(e) The Radioactive Effluent Release Report shall contain:

1. A summary of the hourly meteorological data collected over the previous calendar year. In lieu of including this summary in the report, the data may be retained by the Licensee for NRC review and noted as such in the report.

2. A summary of radiation doses due to radiological effluents during the previous calendar year calculated in accordance with the methodology specified in this manual.

3. The radiation dose to members of the public due to their activities inside the site boundary. This calculated dose shall include only those dose contributions directly attributed to operation of the unit and shall be compared to the limits specified in 40 CFR 190.

(f) The Radioactive Effluent Release Report shall include a description of licensee initiated major changes to the radioactive waste systems (liquid, gaseous and solid) during the previous calendar year.***

**A single submittal may be made for ANO.

***This information may be included in the periodic SAR update in lieu of inclusion in this report.

6.12.5 Special Reports

Special reports shall be submitted to the Administrator of the appropriate Regional Office 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 limitation.

c. Radioactive Effluents; Appendix 1, Limitations 3.25.1, 3.25.2, 3.25.3, and 3.25.4.

This report shall include the following:

1) Description of occurrence.

2) Identify the cause(s) for exceeding the limit(s)

3) Explain corrective action(s) taken to mitigate occurrence.

4) Define action(s) taken to prevent recurrence.

5) Summary of consequence(s) of occurrence.

6) Describe levels exceeding 40 CFR 190 in accordance with 10 CFR 20.405(c), as applicable.

f. Radiological Environmental Monitoring Sample Analysis; Appendix 1, Limitation 4.30.1.

g. An unplanned offsite release during any one hour period 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 be submitted within 30 days of the occurrence and 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.

APPENDIX 2

LIMITATIONS - UNIT 2

OPERABLE - OPERABILITY

1.6 As defined in Unit 2 Technical Specifications, a system, subsystem, train, component or device shall be operable or have operability when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s).

CHANNEL CALIBRATION

1.9 As defined in Unit 2 Technical Specifications, a channel calibration shall be the adjustment, as necessary, of the channel output such that it responds with the necessary range and accuracy to known values of the parameter which the channel monitors. The channel calibration shall encompass the entire channel including the sensor and alarm and/or trip functions, and shall include the channel functional test. The channel calibration may be performed by any series of sequential, overlapping or total channel steps such that the entire channel is calibrated.

CHANNEL CHECK

1.10 As defined in Unit 2 Technical Specifications, a channel check shall be the qualitative assessment of channel behavior during operation by observation. This determination shall include, where possible, comparison of the channel indication and/or status with other indications and/or status derived from independent instrument channels measuring the same parameter.

CHANNEL FUNCTIONAL TEST

1.11 As defined in Unit 2 Technical Specifications, a channel functional test shall be:

a. Analog channels - The injection of a simulated signal into the channel as close to the sensor as practicable to verify operability including alarm and/or trip functions.

b. Bistable channels - The injection of a simulated signal into the sensor to verify operability including alarm and/or trip functions.

c. Digital computer channels - The exercising of the digital computer hardware using diagnostic programs and the injection of simulated process data into the channel to verify operability.

SOURCE CHECK

1.28 As defined in Unit 2 Technical Specifications, a source check shall be the qualitative assessment of channel response when the channel sensor is exposed to the radioactive source.

LIQUID RADWASTE TREATMENT SYSTEM

1.30 As defined in Unit 2 Technical Specifications, a liquid radwaste treatment system is a system designed and installed to reduce radioactive liquid effluents from the unit. This is accomplished by providing for holdup, filtration, and/or demineralization of radioactive liquid effluents prior to their release to the environment.

GASEOUS RADWASTE TREATMENT SYSTEM

1.31 As defined in Unit 2 Technical Specifications, a gaseous radwaste treatment system is any system designed and installed to reduce radioactive gaseous effluents from the plant by collecting offgases from radioactive systems and providing for decay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

VENTILATION EXHAUST TREATMENT SYSTEM

1.32 As defined in Unit 2 Technical Specifications, a ventilation exhaust treatment system is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment. Such a system is not considered to have any effect on noble gas effluents. Atmospheric cleanup systems that are Engineered Safety Feature (ESF) actuated are not considered to be ventilation exhaust treatment systems.

MEMBER(S) OF THE PUBLIC

1.33 As defined in Unit 2 Technical Specifications, member(s) of the public shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

PURGE - PURGING

1.34 As defined in Unit 2 Technical Specifications, purge or purging is the controlled process of discharging air or gas from a confinement to reduce airborne radioactive concentrations in such a manner that replacement air or gas is required to purify the confinement.

EXCLUSION AREA

1.35 As defined in Unit 2 Technical Specifications, the exclusion area is that area surrounding ANO within a minimum radius of 0.65 miles of the reactor buildings and controlled to the extent necessary by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

UNRESTRICTED AREA

1.36 As defined in Unit 2 Technical Specifications, an unrest icted area shall be any area at or beyond the exclusion area boundary.

INSTRUMENTATION

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

LIMITATION

3.3.3.9 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.3-12 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 2, Limitation 3.11.2.1 are not exceeded.

APPLICABILITY: During releases via this pathway.

ACTION:

a. With the following gaseous effluent monitoring instrumentation channels alarm/trip setpoint less conservative than required by the above limitation, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel.

   1. Waste Gas Holdup System Noble Gas Activity Monitor (during periods of gaseous releases.)

   2. Containment Purge and Ventilation System Noble Gas Activity Monitor (during periods of containment building purge.)

b. With less than the minimum number of monitoring instrumentation channels operable, take the action shown in Table 3.3-12.

c. Return the instruments to operable status within 30 days or, in lieu of any other report, explain in the next Radioactive Effluent Release Report why the inoperability was not corrected.

SURVEILLANCE LIMITATIONS

4.3.3.9 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and channel functional test at the frequencies shown in Table 4.3-12.

TABLE 3.3-12

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

	INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	PARAMETER	ACTION
1.	Waste Gas Holdup System				
	a. Noble Gas Activity Monitor (provides alarm and automatic termination of release)	1	*	Radioactivity	25
	b. Effluent System Flow Monitor	1	*	System Flow	26
2.	Containment Purge and Ventilation System				
	a. Noble Gas Activity Monitor	1	*	Radioactivity	27, 29
	b. Iodine Sampler Cartridge	1	*	Verify Presence of Cartridge	28
	c. Particulate Sampler Filter	1	*	Verify Presence of Filter	28
	d. Effluent System Flow Monitor	1	*	System Flow	26
	e. Sampler Flow Monitor	1	*	Sampler Flow	26

TABLE 3.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	PARAMETER	ACTION
3. Spent Fuel Area Ventilation System				
a. Noble Gas Activity Monitor	1	*	Radioactivity	27
b. Iodine Sampler Cartridge	1	*	Verify Presence of Cartridge	28
c. Particulate Sampler Filter	1	*	Verify Presence of Filter	28
d. Effluent System Flow Monitor	1	*	System Flow	26
e. Sampler Flow Monitor	1	*	Sampler Flow	26
4. Auxiliary Building Area Ventilation System				
a. Noble Gas Activity Monitor	1	*	Radioactivity	27
b. Iodine Sampler Cartridge	1	*	Verify Presence of Cartridge	28
c. Particulate Sampler Filter	1	*	Verify Presence of Filter	28
d. Effluent System Flow Monitor	1	*	System Flow	26
e. Sampler Flow Monitor	1	*	Sampler Flow	26

TABLE 3.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	PARAMETER	ACTION
5. Auxiliary Building Extension Ventilation System				
a. Noble Gas Activity Monitor	1	*	Radioactivity	27
b. Iodine Sample Cartridge	1	*	Verify Presence of Cartridge	28
c. Particulate Sampler Filter	1	*	Verify Presence of Filter	28
d. Effluent System Flow Monitor	1	*	System Flow	26
e. Sampler Flow Monitor	1	*	Sampler Flow	26
6. Radwaste Storage Building HVAC Exhaust System				
a. Noble Gas Activity Monitor	1	*	Radioactivity	30
b. Iodine Sample Cartridge	1	*	Verify Presence of Cartridge	31
c. Particulate Sampler Filter	1	*	Verify Presence of Filter	31
d. Effluent System Flow Monitor	1	*	System Flow	32
e. Sampler Flow Monitor	1	*	Sampler Flow	32

TABLE 3.3-12 (Continued)

TABLE NOTATION

*During releases via this pathway.

ACTION 25 With the number of channels operable less than required by the Minimum Channels operable requirement, the contents of the tank may be released to the environment provided that prior to initiating the release:

1. At least two independent samples of the tank's contents are analyzed; and

2. At least two technically qualified members of the Facility Staff independently verify the computer input data; and

3. At least two technically qualified members of the Facility Staff independently verify the discharge valve lineup.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 26 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours.

ACTION 27 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours.

ACTION 28 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases via this pathway may continue provided samples are collected with auxiliary sampling equipment. Iodine sample cartridges and particulate sample filters shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing in accordance with Table 4.11-2.

ACTION 29 With the number of channels operable less than required by the Minimum Channels operable requirement, suspend all operations involving movement of fuel assemblies or CEAs within the pressure vessel.

TABLE 3.3-12 (Continued)

TABLE NOTATION

*During releases via this pathway.

ACTION 30 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours. Otherwise, suspend all compaction activities within the Radwaste Storage Building.

ACTION 31 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases via this pathway may continue provided samples are collected with auxiliary sampling equipment. Iodine sample cartridges and particulate sample filters shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing in accordance with Table 4.11-2. Otherwise, suspend all compaction activities within the Radwaste Storage Building.

ACTION 32 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours. Otherwise, suspend all compaction activities within the Radwaste Storage Building.

TABLE 4.3-12

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Waste Gas Holdup System				
a. Gas Activity Monitor (provides alarm and automatic termination of release)	D*	P**	R	Q
b. System Effluent Flow Monitor	D*	N/A	R	N/A
2. Containment Purge and Ventilation System				
a. Gas Activity Monitor	D*	P**	R	M (1), P
b. Iodine Sampler Cartridge	W*(2)	N/A	N/A	N/A
c. Particulate Sampler Filter	W*(2)	N/A	N/A	N/A
d. System Effluent Flow Monitor	D*	N/A	R	N/A
e. Sampler Flow Monitor	D*	N/A	R	N/A

TABLE 4.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
3. Spent Fuel Area Ventilation System				
a. Gas Activity Monitor	D*	M**	R	Q
b. Iodine Sampler Cartridge	W*(2)	N/A	N/A	N/A
c. Particulate Sampler Filter	W*(2)	N/A	N/A	N/A
d. System Effluent Flow Monitor	D*	N/A	R	N/A
e. Sampler Flow Monitor	D*	N/A	R	N/A
4. Auxiliary Building Area Ventilation System				
a. Gas Activity Monitor	D*	M**	R	Q
b. Iodine Sampler Cartridge	W*(2)	N/A	N/A	N/A
c. Particulate Sampler Filter	W*(2)	N/A	N/A	N/A
d. System Effluent Flow Monitor	D*	N/A	R	N/A
e. Sampler Flow Monitor	D*	N/A	R	N/A

TABLE 4.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
5. Auxiliary Building Extension Ventilation System				
a. Gas Activity Monitor	D*	M**	R	Q
b. Iodine Sampler Cartridge	W*(2)	N/A	N/A	N/A
c. Particulate Sampler Filter	W*(2)	N/A	N/A	N/A
d. System Effluent Flow Monitor	D*	N/A	R	N/A
e. Sampler Flow Monitor	D*	N/A	R	N/A
6. Radwaste Storage Building HVAC Exhaust System				
a. Gas Activity Monitor	D*	M**	R	Q
b. Iodine Sampler Cartridge	W*(2)	N/A	N/A	N/A
c. Particulate Sampler Filter	W*(2)	N/A	N/A	N/A
d. System Effluent Flow Monitor	D*	N/A	R	N/A
e. Sampler Flow Monitor	D*	N/A	R	N/A

TABLE 4.3-12 (Continued)

TABLE NOTATION

*During releases via this pathway.

**A source check is not required if the background activity is greater than the activity of the check source.

(1) During Containment Building ventilation operations.

(2) Verify presence of cartridge or filter only.

INSTRUMENTATION

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

LIMITATION

3.3.3.10 The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.3-13 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 2, Limitation 3.11.1.1 are not exceeded.

APPLICABILITY: During releases via this pathway.

ACTION:

a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above limitation, immediately suspend the release of radioactive liquid effluents monitored by the affected channel, until the set point is changed to an acceptable conservative value.

b. With less than the minimum number of monitoring instrumentation channels operable, take the action shown in Table 3.3-13.

c. Return the instruments to operable status within 30 days or, in lieu of any other report, explain in the next Radioactive Effluent Release Report why the inoperability was not corrected.

SURVEILLANCE LIMITATIONS

4.3.3.10 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and channel functional test at the frequencies shown in Table 4.3-13.

TABLE 3.3-13

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
1. Gross Radioactivity Monitor(s) (provides alarm and automatic termination of release)			
a. Liquid Radwaste Effluent Line	1	During release via this pathway	18
2. Flow Monitor(s)			
a. Liquid Radwaste Effluent Line	1	During releases via this pathway	19

TABLE 3.3-13 (Continued)

TABLE NOTATION

ACTION 18 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases may be resumed provided that prior to initiating a release:

1. At least two independent samples are analyzed; and

. At least two technically qualified members of the Facility Staff independently verify the release rate computer input data; and

3. At least two technically qualified members of the Facility Staff independently verify the discharge valve lineup.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 19 With the number of channels operable less than required by the Minimum Channels operable requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump curves may be used to estimate flow.

TABLE ..3-13

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Gross Radioactivity Monitor(s) (provides alarm and automatic isolation)				
a. Liquid Radwaste Effluents Line	D*	p**	R	Q
2. Flow Monitor(s)				
a. Liquid Radwaste Effluent Line	D*	N/A	R	N/A

* During releases via this pathway

** A source check is not required if the background activity is greater than the activity of the check source.

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1 LIQUID EFFLUENTS

LIMITATION

3.11.1.1 The concentration of radioactive material released from the site in liquid effluents to the discharge canal shall be limited to the concentrations 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 released shall be limited to 2×10^{-4} µCi/ml.

APPLICABILITY: At all times.

ACTION:

a. With the concentration of radioactive material released exceeding the above limits, immediately initiate actions to restore concentrations to within the above limits. Provide notification to the Commission within 24 hours and in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation 6.9.2.h within 30 days.

SURVEILLANCE LIMITATIONS

4.11.1.1.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analyses program of Table 4.11-1.

4.11.1.1.2 The results of the radioactivity analyses shall be used in accordance with the methods in this manual to assure that the concentrations at the point of release are maintained within the limits of Appendix 2, Limitation 3.11.1.1.

TABLE 4.11-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSES PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analyses Frequency	Type of Activity Analyses	Lower Limit of Detection (LLD) (uCi/ml) (a)
A. Batch Waste Release (d)	P Each Batch	P Each Batch	γ isotopic (e)	5×10^{-7} (b)
			I-131	1×10^{-6}
	P One Batch/M	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	P Each Batch	M Composite (c)	H-3	1×10^{-5}
			Gross Alpha	1×10^{-7}
	P Each Batch	Q Composite (c)	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}

TABLE NOTATION

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

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

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

Where:

LLD is the lower limit of detection as defined above (as picocurie 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)

Table 4.11-1 (Continued)

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

2.22 is the number of transformations per minute per picocurie.

Y is the fractional radiochemical yield (when applicable).

λ is the radioactive decay constant for the pa. -- radionuclide, and

Δt is the elapsed time between midpoint of sample collection and time of counting (for plant effluents, not environmental samples).

Typical values of E, V, Y, and Δt shall be used in the calculation.

It should be recognized that the LLD is an a priori (before the fact) limit representing the capability of a measurement system and not an a posteriori (after the fact) limit for a particular measurement.

b. For certain mixtures of gamma emitters, it may not be possible to measure radionuclides in concentrations near their sensitivity limits when other nuclides are present in the sample in much greater concentrations. Under these circumstances, it will be more appropriate to calculate the concentration of such radionuclides using observed ratios with those radionuclides which are measurable.

c. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.

d. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling, each batch shall be isolated and mixed to assure representative sampling.

e. The principal gamma emitters for which the LLD limitation 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 Radioactive Effluent Release Report.

RADIOACTIVE EFFLUENTS

DOSE

LIMITATION

3.11.1.2 The dose commitment to a member of the public from radioactive materials in liquid effluents released from ANO-2 to the discharge canal shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.

APPLICABILITY: At all times.

ACTION:

a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of any other report submit a Special Report pursuant to Appendix 2, Limitation 6.9.2.h within 30 days.

SURVEILLANCE LIMITATIONS

4.11.1.2 Dose Calculations. Cumulative dose contributions from liquid effluents shall be determined in accordance with this manual at least once per 31 days.

RADIOACTIVE EFFLUENTS

LIQUID RADWASTE TREATMENT

LIMITATION

3.11.1.3 The liquid radwaste treatment system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent, from ANO-2 to the discharge canal, would exceed 0.18 mrem to the total body or 0.625 mrem to any organ in any calendar quarter.

APPLICABILITY: At all times.

ACTION:

a. With radioactive liquid waste being discharged without treatment and in excess of the above limits, in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation 6.9.2.h within 30 days.

SURVEILLANCE LIMITATIONS

4.11.1.3.1 Doses due to liquid releases shall be projected at least once per 31 days in accordance with this manual.

RADIOACTIVE EFFLUENTS

3/4.11.2 GASEOUS EFFLUENTS

DOSE RATE

LIMITATION

3.11.2.1 The dose rate due to radioactive materials released in gaseous effluents from the site to unrestricted areas (see Figure 4-2) shall be limited to the following:

a. For noble gases: Less than or equal to the 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin.

b. For iodine-131, for tritium and for all radionuclides in particular form with half lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

During periods of containment purging the dose rate may be averaged over a one hour interval.

APPLICABILITY: At all times.

ACTION:

a. With the dose rate(s) exceeding the above limits, without delay restore the release rate to comply with the above limit(s).

SURVEILLANCE LIMITATIONS

4.11.2.1.1 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methods and procedures of this manual.

4.11.2.1.2 The dose rate due to iodine-131, tritium, and all radionuclides in particulate form with half-lifes greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with the methods and procedures of this manual by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 4.11-2.

TABLE 4.11-2

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSES PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analyses Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (uCi/ml) (a)
A. Waste Gas Storage Tank	P Each Tank Grab Sample	P Each Tank	Principal Gamma Emitters(b)	1×10^{-4} (g)
B. Containment Purge	P Each Purge Grab Sample	P Each Purge	Principal Gamma Emitters(b) H-3	1×10^{-4} (g) 1×10^{-6}
C. Unit Vents	M (c) (d) Grab Sample	M	Principal Gamma Emitters(b) H-3	1×10^{-4} (g) 1×10^{-6}
(Auxiliary Bldg. Ext.) (Spent Fuel Pool Area Ventilation)	Continuous(e)	W(f) Charcoal Sample	I-131	1×10^{-12}
(Cont. Bldg. Ventilation) (Radwaste Area Ventilation)	Continuous(e)	W(f) Particulate Sample	Principal Gamma Emitters(b) (I-131, Others)	1×10^{-11}
(Low-Level Radwaste Storage Building) (HVAC Exhaust Ventilation)	Continuous(e)	M Particulate Sample	Gross alpha	1×10^{-11}
	Continuous(e)	Q Composite Particulate Sample	Sr-89, Sr-90	1×10^{-11}
	Continuous(e)	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	1×10^{-6} (Xe-133 equiv.)

TABLE 4.11-2 (Continued)

TABLE NOTATION

a. The Lower Limit of Detection (LLD) is defined in Table Notation (a.) of Table 4.11-1 of Appendix 2, Limitation 3.11.1.1.

b. The principal gamma emitters for which the LLD limitation will apply are exclusively the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. 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 for that nuclide. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the Radioactive Effluent Release Report.

c. Tritium grab samples shall be taken from the Containment Building ventilation exhaust at least once per 24 hours when the refueling canal is flooded.

d. Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel area, whenever spent fuel is in the spent fuel pool.

e. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Appendix 2, Limitations 3.11.2.1, 3.11.2.2, and 3.11.2.3.

f. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from the sampler).

g. For certain radionuclides with low gamma yield or low energies, or for certain radionuclide mixtures, it may not be possible to measure radionuclides in concentrations near the LLD. Under these circumstances, the LLD may be increased inversely proportional to the magnitude of the gamma yield (i.e., $1 \times 10^{-4}/I$, 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 I.

RADIOACTIVE EFFLUENTS

DOSE - NOBLE GASES

LIMITATION

3.11.2.2 The dose due to noble gases released in gaseous effluents from ANO-2 to unrestricted areas (See Figure 4-2) shall be:

a During any calendar quarter, less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation, and

b. During any calendar year, less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.

APPLICABILITY: At all times.

ACTION:

a. With the calculated dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation 6.9.2.h within 30 days.

SURVEILLANCE LIMITATIONS

4.11.2.2 Dose Calculations. Cumulative dose contributions for noble gases for the current calendar quarter and current calendar year shall be determined in accordance with this manual at least once per 31 days.

RADIOACTIVE EFFLUENTS

DOSE - IODINE-131, TRITIUM, AND RADIONUCLIDES IN PARTICULATE FORM

LIMITATION

3.11.2.3 The dose to a member of the public from iodine-131, from tritium, and from all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released from ANO-2 to unrestricted areas (see Figure 4-2) shall be:

a. During any calendar quarter, less than or equal to 7.5 mrems to any organ, and

b. During any calendar year, less than or equal to 15 mrems to any organ.

APPLICABILITY: At all times.

ACTION:

a. With the calculated dose from the release of iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation 6.9.2.h within 30 days.

SURVEILLANCE LIMITATIONS

4.11.2.3 Dose Calculations. Cumulative dose contributions for the current calendar quarter and current calendar year for iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with this manual at least once per 31 days.

RADIOACTIVE EFFLUENTS

GASEOUS RADWASTE TREATMENT

LIMITATION

3.11.2.4 The ventilation exhaust treatment systems shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent doses from ANO-2 to unrestricted areas (see Figure 4-2) would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation in any calendar quarter; or when the projected doses due to iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days would exceed 1.0 mrem to any organ over a calendar quarter.

APPLICABILITY: At all times.

ACTION:

a. With gaseous waste being discharged without treatment and in excess of the above limits, in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation 6.9.2.h within 30 days.

SURVEILLANCE LIMITATIONS

4.11.2.4.1 Doses due to gaseous releases from the site shall be projected at least once per 31 days in accordance with this manual.

RADIOACTIVE EFFLUENTS

GASEOUS RADWASTE TREATMENT

LIMITATION

3.11.2.5 When degasifying the reactor coolant system, the gaseous radwaste treatment system shall be used to reduce radioactive material in gaseous waste prior to their discharge when the projected gaseous effluent doses for ANO-2 to unrestricted areas (see Figure 4-2) would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation in any calendar quarter.

APPLICABILITY: At all times.

ACTION:

a. With gaseous waste being discharged without treatment and in excess of the above limits, in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation 6.[illegible].2.h within 30 days.

SURVEILLANCE LIMITATIONS

4.11.2.5.1 Doses due to gaseous releases from the site shall be projected at least once per 31 days in accordance with this manual.

RADIOACTIVE EFFLUENTS

3/4.11.3 TOTAL DOSE

LIMITATION

3.11.3 The calculated doses from the release of radioactive materials in liquid or gaseous effluents shall not exceed twice the limits of Appendix 2, Limitations 3.11.1.2.a, 3.11.1.2.b, 3.11.2.2.a, 3.11.2.2.b, 3.11.2.3.a, or 3.11.2.3.b.

APPLICABILITY : At all times.

ACTION:

a. With the calculated doses exceeding the above limits, prepare and submit a Special Report pursuant to 10 CFR Part 20.405c.

b. If the limits of 40 CFR 190 have been exceeded, obtain a variance from the Commission to permit further releases in excess of 40 CFR 190 limits. A variance is granted until staff action on the request is complete.

SURVEILLANCE LIMITATIONS

4.11.3 Dose Calculations. Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Appendix 2, Limitations 4.11.1.2, 4.11.2.2, and 4.11.2.3, and in accordance with this manual.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

3/4.12.1 MONITORING PROGRAM

LIMITATION

3.12.1 The radiological environmental monitoring samples shall be collected pursuant to Table 3.12-1 and shall be analyzed pursuant to the requirements of Table 3.12-1 and 3.12-2. The sample locations shall be shown in Table 4-1 in this manual.

APPLICABILITY: At all times.

ACTION:

a. With the radiological environmental monitoring program not being conducted as specified in Table 3.12-1, prepare and submit to the Commission in the Annual Radiological Environmental Operating Report a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. (Deviations are permitted from the required sampling schedule if specimens are not obtainable due to hazardous conditions, seasonal unavailability, or to malfunction of sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period).

b. With the level of radioactivity as the result of plant effluents in an environmental sampling medium at one or more of the locations specified in Table 3.12-1 exceeding the limits of Table 3.12-3 when averaged over any calendar quarter, prepare and submit to the Commission, within 30 days from the end of the affected quarter, a Special Report which includes an evaluation of any release conditions, environmental factors or other aspects which caused the limits of Table 3.12-3 to be exceeded, and defines the actions taken to reduce radioactive effluents so that the potential annual dose to a member of the public is less than the calendar year limits of Appendix 2, Limitations 3.11.1.2, 3.11.2.2 and 3.11.2.3. When more than one of the radionuclides in Table 3.12-3 are detected in the sampling medium, this Special Report shall be submitted if:

$$\frac{\text{Concentration (1)}}{\text{reporting level (1)}} + \frac{\text{Concentration (2)}}{\text{reporting level (2)}} + \ldots\ldots \geq 1.0$$

When radionuclides other than those in Table 3.12-3 are detected and are the result of plant effluents, this Special Report shall be submitted if the potential annual dose to a member of the public is equal to or greater than the calendar year limits of Appendix 2, Limitations 3.11.1.2, 3.11.2.2 and 3.11.2.3. This Special 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.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

LIMITATION (Continued)

c. With milk or fresh leafy vegetable samples unavailable from any of the sample locations required by Table 3.12-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the causes of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Radioactive Effluent Release Report and also include in the report a revised Table 4-1 reflecting the new location(s).

SURVEILLANCE LIMITATIONS

4.12.1 The results of analyses performed on the radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Operating Report.

TABLE 3.12-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Sample Location*	Sample and Collection Frequency	Type and Frequency of Analyses
1. AIRBORNE			
a. Radioiodine and Particulates	5 locations	Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days.	Radioiodine canister. Analyze at least once per 7 days for I-131. Particulate sampler. Analyze for gross beta radioactivity ≥ 24 hours following filter change Perform gamma isotopic analysis on each sample when gross beta activity is > 10 times the mean of control sample. Perform gamma isotopic analysis on composite (by location) sample at least every 92 days.
2. DIRECT RADIATION	40 locations 2 dosimeter per location	At least once per 92 days	Gamma dose. At least once 92 days.

*Sample locations are shown in Figure 4-1.

TABLE 3.12-1 (Continued)

Exposure Pathway and/or Sample	Number of Sample Locations*	Sampling and Collection Frequency	Type and Frequency of Analyses
3. WATERBORNE			
a. Surface	2 Locations	Composite** sample collected over a period ≤ 31 days.	Gamma isotopic analysis of each sample by location. Tritium analysis of composite sample at least once every 92 days.
b. Ground	2 Locations	At least once per 92 days.	Gamma isotopic and tritium analyses of each sample.
c. Drinking	1 Location	Monthly grab sample	I-131 analysis of each sample; and Gross beta and gamma isotopic analyses of each gamma sample. Tritium analysis of composite sample at least once every 92 days.
d. Sediment from Shoreline	2 Locations	At least once per 184 days	Gamma isotopic analysis of each sample.

*Sample locations are shown in Figure 4-1.

**Composite samples shall be collected by an aliquot at intervals not exceeding 24 hours.

TABLE 3.12-1 (Continued)

Exposure Pathway and/or Sample	Number of Sample Locations*	Sampling and Collection Frequency	Type and Frequency of Analyses
4. INGESTION			
a. Milk	4 Locations	At least once per 31 days when animals are on pasture.	Gamma isotopic and I-131 analyses of each sample.
b. Fish	2 Locations	One sample in season, or at least once per 184 days if not seasonal. One sample of each of the following species: 1. Catfish 2. Crappie or Bass	Gamma isotopic analysis on edible portions.
c. Food Products**	3 Locations	At time of harvest. One sample of each of the following classes of food products: 1. Fruits 2. Flowering Vegetable 3. Tubular Vegetable	Gamma isotopic analysis on edible portions.
	1 Location	At time of harvest. One sample of broad leaf vegetation.	I-131 analysis.

*Sample locations are shown in Figure 4-1.
**If these food products are available.

TABLE 3.12-2

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

Analyses	Water (pCi/l)	Airborne Particulate or gas (pCi/m³)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
gross beta	4(b)	1×10^{-2}				
H-3	1000(b)					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1*(b)	7×10^{-2}		1	60[c]	
Cs-134, 137	15(10(b)), 18	1×10^{-2}	130, 150	15, 18	60, 80	150,180
Ba-La-140	15			15		

*For monthly grab samples

(a) See definition of LLD in table notation of Table 4.11-1
(b) LLD for drinking water.
(c) LLD for leafy vegetables.

TABLE 3.12-3

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analyses	Water (pCi/l)	Airborne Particulate or gases (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)
H-3	3×10^4 (a)				
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	3×10^3		1×10^4		
Zn-65	3×10^2		2×10^4		
Zr-Nb-95	4×10^2 (b)				
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 (b)			3×10^2 (b)	

(a) For drinking water samples.
(b) Total for parent and daughter.

RADIOLOGICAL ENVIRONMENTAL MONITORING

3/4.12.2 LAND USE CENSUS

LIMITATION

3.12.2 A land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence, and the nearest garden* of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles.

APPLICABILITY: At all times.

ACTION:

a. With a land use census identifying a location(s) which yields a calculated dose commitment due to I-131, tritium, and radionuclides in particulate form greater than the values currently being calculated in Appendix 2, Limitation 4.11.2.3, submit location description in the Radioactive Effluent Release Report per Appendix 2, Limitation 6.9.3.

b. With a land use census identifying a location(s) which yields a calculated dose commitment (via the sample exposure pathway) greater than at a location from which samples are currently being obtained in accordance with the Appendix 2, Limitation 3.12.1, identify the new location in the Radioactive Effluent Release Report per Appendix 2, Limitation 6.9.3. The new location shall be added to the radiological environmental monitoring program within 30 days, if possible. The sampling location having the lowest calculated 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.

SURVEILLANCE LIMITATIONS

4.12.2 The land use census shall be conducted at least once per 12 months between the dates of June 1 and October 1 by door-to-door survey, aerial survey, or by consulting local agricultural authorities. The results of the land use census shall be included in the Annual Radiological Environmental Operating Report.

*Broad Leaf vegetation sampling may be performed at the site boundary in the direction sector with the highest D/Q in lieu of the garden census.

RADIOLOGICAL ENVIRONMENTAL MONITORING

3/4.12.3 INTERLABORATORY COMPARISON PROGRAM

LIMITATION

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

APPLICABILITY: At all times.

ACTION:

a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report.

SURVEILLANCE LIMITATIONS

4.12.3 The results of analyses performed as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report.

3/4.3.3.9 RADIOACTIVE GASEOUS EFFLUENT INSTRUMENTATION

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 of gaseous effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with the procedures in this manual to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.

For the radioactive gaseous effluent instrumentation surveillance requirements, the channel functional test demonstrates that control room alarm annunciation occurs if any of the following conditions exist:

1. The instrument indicates measured levels above the alarm/trip setpoint.

2. Power to the detector is lost.

3. The instrument indicates a downscale failure.

For the containment purge and the waste gas holdup system noble gas activity monitors, the channel functional test also demonstrates the automatic isolation of the release pathway occurs if the instrument indicates above the trip setpoint.

The initial channel calibration is performed using one or more of the reference standards certified by the National Institute of Standards and Technology or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards permit calibrating the system over its intended range of energy and measurement range. For subsequent channel calibration, sources that have been related to the initial calibration are used.

3.4.3.3.10 RADIOACTIVE LIQUID EFFLUENT INSTRUMENTATION

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 of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with the procedures in this manual to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20.

For the radioactive liquid effluent instrumentation surveillance requirements, the channel test demonstrates that automatic isolation of this pathway and control room alarm annunciation occur if the instrument indicates measured levels above the trip setpoint. The channel test demonstrates that alarm annunciation occurs if any of the following conditions exist:

1. Power to the detector is lost.

2. The instrument indicates a downscale failure.

The initial channel calibration is performed using one or more of the reference standards certified by the National Institute of Standards and Technology or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards permit calibrating the system over its intended range of energy and measurement range. For subsequent channel calibration, sources that have been related to the initial calibration are used.

3/4.11 RADIOACTIVE EFFLUENTS

BASES

3/4.11.1 LIQUID EFFLUENTS

3/4.11.1.1 CONCENTRATION

This limitation is provided to ensure that the concentration of radioactive materials released in liquid waste effluents in unrestricted areas will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2. This limit provides additional assurance that the levels of radioactive materials in bodies of water in unrestricted areas will result in exposures within (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a member of the public, and (2) the limits of 10 CFR Part 20.106(e) to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-133 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.

3/4.11.1.2 DOSE

This limitation provides assurance that releases of liquid effluents will result in concentrations below the limits of 10 CFR 20. The limitation provides the required operating flexibility and at the same time assures that the release of radioactive material in liquid effluents will be kept "as low as is reasonably achievable." The equations specified in this manual for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation 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 1, October 1977, and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I", April 1977.

3/4.11.1.3 LIQUID RADWASTE TREATMENT

The requirement 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." The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

The values of 0.18 mrem and 0.625 mrem are approximately 25% of the yearly design objectives on a quarterly basis. The yearly design objectives are given in 10 CFR 50, Appendix I, Section II.

RADIOACTIVE EFFLUENTS

BASES

3/4.11.2 GASEOUS EFFLUENTS

3/4.11.2.1 DOSE RATE

This limitation is provided to ensure that the dose at any time in unrestricted areas from gaseous effluents from all units on the site will be within the limits of 10 CFR Part 20.105(b). This limitation applies to the release of gaseous effluents from all reactors at the site.

3/4.11.2.2 DOSE-NOBLE GASES

This limitation is provided to implement the requirements of Sections II.B, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.B of Appendix I. The action statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable." The Surveillance Limitations implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a member of the public through appropriate pathways is unlikely to be substantially underestimated. The dose calculations established in this manual for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation 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 1, 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," Revision 1, July 1977. The equations in this manual provided for determining the air doses at and beyond the site boundary are based upon the historical average atmospheric conditions.

RADIOACTIVE EFFLUENTS

BASES

3/4.11.2.3 DOSE - IODINE-131, TRITIUM, AND RADIONUCLIDES IN PARTICULATE FORM

This limitation is provided to implement the requirements of Sections II.C, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Conditions for Operation are the guides set forth in Section II.C of Appendix I. The action statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable". The calculational methods in this manual specified in the Surveillance Limitations implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a member of the public through appropriate pathways is unlikely to be substantially underestimated. The calculational methods in this manual for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation 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 1, 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," Revision 1, July 1977 These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate limitations for iodine-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent on the existing radionuclide pathways to man in the areas at or beyond the site boundary. The pathways that were examined in the development of these calculations were: 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.

3/4.11.2.4 and 5 GASEOUS RADWASTE TREATMENT

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 limitation implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents. This limitation applies to gaseous radwaste from ANO-2.

RADIOACTIVE EFFLUENTS

BASES

3/4.11.3 TOTAL DOSE

This limitation is provided to meet the dose limits of 40 CFR Part 190 that have now been incorporated into 10 CFR Part 20 by 46 FR 18525. The limitation requires the preparation and submittal of a Special Report whenever the calculated doses from plant radioactive effluents exceed twice the design objective doses of Appendix I. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a member of the public will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within the reporting requirement level. The Special Report will describe a course of action that should result in limiting the annual dose to a member of the public to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the member of the public from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any member of the public is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provision of 40 CFR Part 190.11 and 10 CFR Part 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limits in 10 CFR Part 20, as addressed in Appendix 2, Limitations 3.11.1 and 3.11.2. An individual is not considered a member of the public during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

BASES

3/4.12.1 MONITORING PROGRAM

The radiological monitoring program required by this limitation 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 effluents 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 the environmental exposure pathways. The initially specified monitoring 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 3.12-2 are state of the art for routine environmental measurements in industrial laboratories. The LLDs for drinking water meet the requirements of 40 CFR 141.

3/4.12.2 LAND USE CENSUS

This limitation is provided to ensure 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. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathway via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were used: 1) that 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/square meter.

3/4.12.3 INTERLABORATORY COMPARISON PROGRAM

The requirement for participation in an Interlaboratory Comparison Program is provided to ensure 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.

ADMINISTRATIVE CONTROLS

LIMITATION

6.8.4 The following program shall be established, implemented, and maintained:

a. Radioactive Effluent Controls Program

(Refer to Unit 2 Technical Specification 6.8.4.a.)

b. Radiological Environmental Monitoring Program

A program shall be provided to monitor the radiation and radionuclides in the environs of the plant. The program shall provide (1) representative , measurements of radioactivity in the highest potential exposure pathways, and (2) verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. The program shall (1) be contained in this manual, (2) conform to the guidance of Appendix I to 10 CFR Part 50, and (3) include the following:

1) Monitoring, sampling, analysis, and reporting of radiation and radionuclides in the environment in accordance with the methodology and parameters in this manual,

2) A Land Use Census to ensure that changes in the use of areas at and beyond the site boundary are identified and that modifications to the monitoring program are made if required by the results of this census,

3) Participation in an Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

SPECIAL REPORTS

6.9.2 Special reports shall be submitted to the Administrator of the Regional Office 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 limitation.

h. Radioactive Effluents; Appendix 2, Limitations 3.11.1.1, 3.11.1.2, 3.11.1.3, 3.11.2.2, 3.11.2.3, 3.11.2.4, 3.11.2.5, and 3.11.3.

This report shall include the following:

1) Description of occurrence.

2) Identify the cause(s) for exceeding the limit(s)

3) Explain corrective action(s) taken to mitigate occurrence.

4) Define action(s) taken to prevent recurrence.

5) Summary of consequence(s) of occurrence.

6) Describe levels exceeding 40 CFR 190 in accordance with 10 CFR 20.405(c).

l. Radiological Environmental Monitoring Sample Analysis; Appendix 2, Limitation 3.12.1.

m. Unplanned Offsite Release during one hour period 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. This report shall be submitted within 30 days of the occurrence of the event and shall include the following information:

1. Description of the occurrence.

2. Identify the cause(s) of exceeding the limit(s).

3. Explain corrective action(s) taken to mitigate occurrence.

4. Define action(s) taken to prevent recurrence.

5. Summary of the consequence(s) of occurrence.

ADMINISTRATIVE CONTROLS

LIMITATION

RADIOACTIVE EFFLUENT RELEASE REPORT*

6.9.3 The Radioactive Effluent Release Report shall be in accordance with Unit 2 Technical Specification 6.9.3. The Radioactive Effluent Release Report covering the operation of the unit during the calendar year shall be submitted annually. The report must be submitted as specified in 10 CFR 50.4, and the time between submission of reports must be no longer than 12 months.

6.9.3.1 The Radioactive Effluent Release Report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The data will be summarized following the format of Regulatory Guide 1.21, Revision 1.

6.9.3.2 Any changes in the ODCM and PCP shall be included in the Radioactive Effluent Release Report for the period in which the change(s) was made effective. (Refer to Unit 2 Technical Specification 6.14.c for potential reporting requirements.)

6.9.3.3 The Radioactive Effluent Release Report shall include the following information for all unplanned releases to unrestricted areas of radioactive materials in gaseous and liquid effluents:

1. Description of the occurrence.
2. Identify the cause(s) for exceeding the limit(s).
3. Explain corrective actions taken to mitigate occurrence.
4. Define action(s) taken to prevent recurrence.
5. Summary of consequence(s) of occurrence.

6.9.3.4 The Radioactive Effluent Release Report shall contain:

1. A summary of the hourly meteorological data collected over the previous calendar year. In lieu of including this summary in the report, the data may be retained by the licensee for NRC review and noted as such in the report.
2. A summary of radiation doses due to radiological effluent during the previous calendar year calculated in accordance with the methodology specified in this manual.
3. The radiation dose to members of the public due to their activities inside the site boundary. This calculated dose shall include only those dose contributions directly attributed to operation of the unit and shall be compared to the limits specified in 40 CFR 190.

*A single submittal may be made for ANO. The submittal should combine those sections that are common to both units. The submittal shall specify the releases of radioactive material from each unit.

ADMINISTRATIVE CONTROLS

LIMITATION

6.9.3.5 The Radioactive Effluent Release Report shall contain a description of licensee initiated major changes to the radioactive waste systems (liquid, gaseous and solid) during the previous calendar year.*

*This information may be included in the periodic SAR update in lieu of inclusion in this report.

ADMINISTRATIVE CONTROLS

LIMITATION

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

6.9.4 The Annual Radiological Environmental Operating Report shall be in accordance with Unit 2 Technical Specification 6.9.4. The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted prior to May 15 of year.

a. The Annual Radiological Environmental Operating Report shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental monitoring program for the reporting period. If harmful effects or evidence of irreversible damage are detected by the monitoring, the report shall provide an analysis of the problem and a planned course of action to alleviate the problem.

b. The Annual Radiological Environmental Operating Report shall include summarized and tabulated results of all radiological environmental samples and of all environmental radiation measurements required by this manual taken during the reporting 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. If the missing data becomes available, it shall be submitted as soon as possible in a supplementary report.

c. The Annual Radiological Environmental Operating Report shall also include the following: a summary description of the radiological environmental monitoring program, a map of all sampling locations keyed to a table giving distances and directions from the reactor buildings; the results of the Land Use Census required by Appendix 2, Limitation 3.12.2; and the results of the Interlaboratory Comparison Program participation required by Appendix 2, Limitation 3.12.3.

*A single submittal may be made for ANO. The submittal should combine those sections that are common to both units.