

2.0 RELEASE CONTROLS

LIMITATION

L2.0.1 The Limitation and Action requirements shall be applicable during the conditions specified for each limitation.

L2.0.2 Adherence to the requirements of the Limitation and/or associated Action within the specified time interval shall constitute compliance with the Limitation. In the event the Limitation is restored prior to the expiration of the specified time interval, completion of the action statement is not required.

BASES

BL2.0.1 This limitation establishes the general requirements applicable to Limitations. Limitations are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a Limitation is not met, the licensee shall follow any remedial Action permitted by the Limitation until the condition can be met. This limitation establishes the applicability statement within each individual limitation as the requirement for when (i.e., in which specified conditions) conformance to the Limitation is required for safe operation of the facility. The Action requirements establish those remedial measures that must be taken within specified time limits when the requirements of a Limitation are not met. The Action requirements specify the remedial measures that permit continued operation of the facility which is not further restricted by the time limits of the Action requirements. In this case, conformance to the Action requirements provides an acceptable level of safety for unlimited continued operations as long as the Action requirements continue to be met. The specified time limits of the Action requirements are applicable from the point in time it is identified that a Limitation is not met. The time limits of the Action requirements are also applicable when a system or component is removed from service for surveillance testing or investigation of operational problems. Individual limitations may include a specified time limit for completion of a Surveillance Limitation when equipment is removed from service. In this case, the allowable outage time limits of the Action requirements are applicable when this limit expires if the surveillance has not been completed.

BL2.0.2 This limitation establishes the general requirements applicable to Limitations. Limitations are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limitation is not met, the licensee shall follow any remedial Action permitted by the Limitation until the condition can be met. This limitation establishes that noncompliance with a limitation exists when the requirements of the Limitation are not met and the associated Action requirements have not been implemented within the specified time interval. The purpose of this limitation is to clarify that (1) implementation of the Action requirements constitutes compliance with a limitation and (2) completion of the remedial measures of the Action requirements is not required when compliance with a Limitation is restored within the time interval specified in the associated Action requirements.

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SURVEILLANCE LIMITATION

S2.0.1 Surveillance Limitations shall be applicable during the conditions specified for individual Limitations unless otherwise stated in an individual Surveillance Limitation.

S2.0.2 Each Surveillance Limitation shall be performed within the specified surveillance interval with a maximum allowable extension not to exceed 25% of the specified surveillance interval.

BASES

BS2.0.1 This surveillance limitation establishes the general requirements applicable to Surveillance Limitations. Surveillance Limitations are requirements relating to test, calibration, or inspection to ensure that the necessary quality of systems and components is maintained and that the limitations will be met. This surveillance limitation establishes the requirement that surveillances must be performed during the conditions for which the requirements of the Limitation apply unless otherwise stated in an individual Surveillance Limitation. The purpose of this surveillance limitation is to ensure that the surveillances are performed to verify the operational status of systems and components and that parameters are within specified limits to ensure safe operation of the facility when the plant is in a specified condition for which the associated Limitations are applicable. Surveillance Limitations do not have to be performed when the facility is in a condition for which the requirements of the associated Limitation do not apply unless otherwise specified.

BS2.0.2 This surveillance limitation establishes the general requirements applicable to Surveillance Limitations. Surveillance Limitations are requirements relating to test, calibration, or inspection to ensure that the necessary quality of systems and components is maintained and that the limitations will be met. This surveillance limitation establishes the limit for which the specified time interval for Surveillance Limitations may be extended. It permits an allowable extension of the normal surveillance interval to facilitate surveillance scheduling and consideration of plant operating conditions that may not be suitable for conducting the surveillance (e.g., transient conditions or other ongoing surveillance or maintenance activities). It also provides flexibility to accommodate the length of a fuel cycle for surveillances that are performed at a refueling frequency and are specified with an 18-month surveillance interval. It is not intended that this provision be used repeatedly as a convenience to extend surveillance intervals beyond that specified for surveillances. This surveillance limitation is based upon engineering judgement and the recognition that the most probable result of any particular surveillance being performed is the verification of conformance with the Surveillance Limitations. This provision is sufficient to ensure that the reliability ensured through surveillance activities is not significantly degraded beyond that obtained from the specified surveillance intervals.

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2.1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

LIMITATION

L2.1.1 The radioactive liquid effluent monitoring instrumentation shown in Table 2.1-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 1, Limitation L2.3.1.A are not exceeded.

APPLICABILITY: During releases via this pathway.

OBJECTIVE: To provide instrumentation for radioactive liquid releases.

ACTIONS:

1. 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.
2. With less than the minimum number of channels operable, take the action shown in Table 2.1-1. 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.

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Table 2.1-1

Radioactive Liquid Effluent Monitoring Instrumentation

<u>Instrument</u>	<u>Minimum Operable Channels</u>	<u>Applicability</u>	<u>Action</u>
1. Liquid radwaste effluent monitor (automatic termination)	1	During releases via this pathway (DRVTP)	1
2. Liquid radwaste effluent flow monitor	1	DRVTP	2

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Table 2.1-1 (Continued)

Table Notation

ACTION 1

With the number of channels operable less than required, effluent releases may be resumed provided that prior to initiating a release :

- a. At least two independent samples of the tank's contents are analyzed in accordance with Appendix 1, Limitation S2.3.1.A.1 & S2.3.1.A.2;
- b. At least two technically qualified members of the facility staff independently verify that the computer input data is correct and;
- c. At least 2 members of the facility staff independently verify the discharge valve lineup.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 2

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.

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RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

SURVEILLANCE LIMITATION

S2.1.1 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 2.1-2.

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 L2.1.1.

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Table 2.1-2

Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Limitation

<u>Instrument</u>	<u>Channel Check</u>	<u>Source Check</u>	<u>Channel Calibration</u>	<u>Channel Test</u>
Liquid radwaste effluent line				
Radiation monitor (automatic termination)	D*	P**	R	Q
Flow monitor	D*	N/A	R	N/A

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
- D Daily
- Q Quarterly
- R Every 18 months
- N/A Not Applicable

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RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

BASES

BL2.1.1 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.

BS2.1.1 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:

- A. Power to the detector is lost.
- B. The instrument indicates a downscale failure.
- C. 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.

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2.2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

LIMITATION

L2.2.1 The radioactive gaseous effluent monitoring instrumentation shown in Table 2.2-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 1, Limitation L2.4.1.A are not exceeded.

APPLICABILITY: As shown in Table 2.2-1.

OBJECTIVE: To provide instrumentation for radioactive gaseous releases.

ACTIONS: .

1. With a channel alarm/trip setpoint less conservative than required, declare the channel inoperable.
2. With less than the minimum number of channels operable, take the action shown in Table 2.2-1. 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.

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Table 2.2-1

Radioactive Gas Effluent Monitoring Instrumentation

<u>Instrument</u>	<u>Minimum Channels Operable</u>	<u>Applicability</u>	<u>Parameter</u>	<u>Action</u>
1. Waste Gas Holdup System				
Noble gas activity monitor (provides alarm and automatic termination of release)	1	During releases via this pathway (DRVTP)	Radioactivity	1
Effluent flow monitor	1	DRVTP	System flow	2
2. Auxiliary Building Ventilation System				
a) Noble gas activity monitor	1	DRVTP	Radioactivity	3
b) Iodine sampler	1	DRVTP	Verify presence of cartridge	4
c) Particulate sampler	1	DRVTP	Verify presence of filter	4
d) Effluent flow monitor	1	DRVTP	System flow	2
e) Sampler flow monitor	1	DRVTP	Sample flow	2

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Table 2.2-1 (Continued)

Radioactive Gaseous Effluent Monitoring Instrumentation

<u>Instrument</u>	<u>Minimum Channels Operable</u>	<u>Applicability</u>	<u>Parameter</u>	<u>Action</u>
3. Spent Fuel Pool Area Ventilation System				
a) Noble gas activity monitor	1	DRVTP	Radioactivity	3
b) Iodine sampler	1	DRVTP	Verify presence of cartridge	4
c) Particulate sampler	1	DRVTP	Verify presence of filter	4
d) Effluent flow monitor	1	DRVTP	System flow	2
e) Sampler flow monitor	1	DRVTP	sample flow	2
4. Reactor Building Purge and Ventilation System				
a) Noble gas activity monitor	1	DRVTP	Radioactivity	3, 5
b) Iodine sampler	1	DRVTP	Verify presence of cartridge	4
c) Particulate sampler	1	DRVTP	Verify presence of filter	4
d) Effluent flow monitor	1	DRVTP	System flow	2
e) Sampler flow monitor	1	DRVTP	Sample flow	2

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Table 2.2-1 (Continued)

Radioactive Gaseous Effluent Monitoring Instrumentation

<u>Instrument</u>	<u>Minimum Channels Operable</u>	<u>Applicability</u>	<u>Parameter</u>	<u>Action</u>
5. Emergency Penetration Room Ventilation System				
a) Noble gas activity monitor	1	DRVTP	Radioactivity	3
b) Iodine sampler	1	DRVTP	Verify presence of cartridge	4
c) Particulate sampler	1	DRVTP	Verify presence of filter	4
d) Effluent flow monitor	1	DRVTP	System flow	2
e) Sampler flow monitor	1	DRVTP	Sample flow	2

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Table 2.2-1 (Continued)

Table Notation

- ACTION 1 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:
- a. At least two independent samples of the tank's contents are analyzed, and
 - b. At least two technically qualified members of the facility staff independently verify the computer input data, and
 - c. At least 2 members of the facility staff independently verify the correct discharge valve lineup.
- Otherwise, suspend release of radioactive effluents via this pathway.
- ACTION 2 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.
- ACTION 3 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. During the performance of required source checks of radioactive gaseous effluent monitoring instrumentation for plant ventilation systems, these requirements need not be implemented if the instrument is restored to an operable condition within four hours.
- ACTION 4 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 2.4-1. A time period of up to four hours is allowed to continue releases via the affected pathway without auxiliary sampling equipment in operation. If at the conclusion of the four-hour period normal instrumentation is not restored or auxiliary sampling equipment is not in operation, then releases via the pathway shall be immediately suspended. The allowable four-hour time period is applicable if the instrumentation is discovered to be inoperable for any reason and whenever it is necessary to render the instrumentation inoperable in order to perform the weekly surveillance (i.e., filter changeout) required by ODCM Appendix 1 Table 2.4-1.
- ACTION 5 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:
- a. At least two independent samples of the reactor building atmosphere are analyzed, and
 - b. At least two technically qualified members of the facility staff independently verify the computer input data.

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RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

SURVEILLANCE LIMITATION

S2.2.1 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 2.2-2.

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 L2.2.1.

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Table 2.2-2

Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Limitations

<u>Instrument</u>	<u>Channel Check</u>	<u>Source** Check</u>	<u>Channel Calibration</u>	<u>Channel Functional Test</u>
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 2.2-2 (Continued)

Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Limitations

<u>Instrument</u>	<u>Channel Check</u>	<u>Source** Check</u>	<u>Channel Calibration</u>	<u>Channel Functional Test</u>
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

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Table 2.2-2 (Continued)
Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Limitations

<u>Instrument</u>	<u>Channel Check</u>	<u>Source** Check</u>	<u>Channel Calibration</u>	<u>Channel Functional Test</u>
5. Emergency Penetration Room 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

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Table 2.2-2 (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
D Daily
W Weekly
M Monthly
Q Quarterly
R Once per 18 Months
N/A Not applicable

(1) Verify presence of cartridge or filter only.

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RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

BASES

BL2.2.1 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.

BS2.2.1 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.

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2.3 RADIOACTIVE LIQUID EFFLUENTS

2.3.1 Concentration

LIMITATION

L2.3.1.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} $\mu\text{Ci/ml}$.

APPLICABILITY: At all times

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

ACTION:

1. 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, Section 3.4 Limitations.

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RELEASE CONTROLS

RADIOACTIVE LIQUID EFFLUENTS

SURVEILLANCE LIMITATION

S2.3.1.A.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analyses program of Table 2.3-1.

S2.3.1.A.2 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 L2.3.1.A.

APPLICABILITY: At all times

OBJECTIVE: To ensure that the limits of Appendix 1, Limitation L2.3.1.A are met.

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Table 2.3-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSES PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analyses Frequency	Type of Activity Analyses	Lower Limit of Detection (LLD) ($\mu\text{Ci/ml}$) (a)
A. Batch Waste Release (d)	P Each Batch	P Each Batch	γ isotopic (g)	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}	
B. Continuous Waste Release (e)	Continuous (f) (h)	D (f)	γ isotopic (g)	5×10^{-7} (b)
			I-131	1×10^{-6}
	M Grab Sample	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	Continuous (f) (h)	M Composite (c)	H-3	1×10^{-5}
			Gross Alpha	1×10^{-7}
	Continuous (f) (h)	Q Composite (c)	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}

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Table 2.3-1 (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):

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

where

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

S_b is the standard deviation of the background counting rate or of the counting rate of a blank sample (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

Δt 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 Δt 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.

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TABLE 2.3-1 (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. A continuous release is the discharge of liquid waste of a non-discrete volume, e.g. from a volume of a system that has an input flow during the continuous release.
- f. If continuous samples cannot be obtained, then grab samples shall be collected and analyzed at least 1/24 hrs when the specific activity of the secondary coolant is ≤ 0.01 $\mu\text{Ci/ml}$ IDE (I-131) or at least 1/12 hrs when the specific activity of the secondary coolant is > 0.01 $\mu\text{Ci/ml}$ IDE (I-131). Grab sample frequency may be increased due to plant conditions.
- g. 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.
- h. To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be collected continuously in proportion to the rate of flow of the effluent stream. Prior to analysis, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

P Prior to Release
D Daily
M Monthly
Q Quarterly

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BASES

BL2.3.1.A 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 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.

BS2.3.1.A 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.

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RADIOACTIVE LIQUID EFFLUENTS

2.3.2 Dose

LIMITATION

- L2.3.2.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

APPLICABILITY: At all times

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

- ACTION:**
1. 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, Section 3.4 Limitations.

BASES

BL2.3.2.A Limitation L2.3.2 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".

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RELEASE CONTROLS

RADIOACTIVE LIQUID EFFLUENTS

2.3.3 Waste Treatment

LIMITATION

L2.3.3.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. The provisions of this limitation do not apply to the laundry tanks due to their incompatibility with the radwaste system.

APPLICABILITY: At all times

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

ACTION:

1. 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, Section 3.4 Limitations.

BASES

BL2.3.3.A 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.

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RELEASE CONTROLS

2.4 RADIOACTIVE GASEOUS EFFLUENTS

2.4.1 Dose Rate

LIMITATION

L2.4.1.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.

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.

ACTION:

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

SURVEILLANCE LIMITATIONS

S2.4.1.A.1 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 L2.4.1.A.

S2.4.1.A.2 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 2.4-1.

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.

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TABLE 2.4-1

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSES PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analyses Frequency	Type of Activity Analyses	Lower Limit of Detection (LLD) ($\mu\text{Ci/ml}$) (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.)	Continuous (e)	W (f) Charcoal Sample	I-131	1×10^{-12}
(Spent Fuel Pool Area Ventilation)	Continuous (e)	W (f) Particulate Sample	Principal Gamma Emitters (b) (I-131, Others)	1×10^{-11}
(Rx Bldg. Ventilation)	Continuous (e)	M Particulate Sample	Gross Alpha	1×10^{-11}
(Emergency Penetration Room Ventilation)	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.)

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TABLE 2.4-1 (Continued)

TABLE NOTATION

- a. See definition in Table 2.3-1, 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 L2.4.1.A, L2.4.2.A, and L2.4.3.A.
- 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.

P Prior to Release
W Weekly
M Monthly
Q Quarterly

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

Dose Rate

BASES

BL2.4.1.A 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.

BS2.4.1.A.1/2 This limitation provides for sampling and analyses to ensure that Appendix 1, Limitation L2.4.1.A is met.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

2.4.2 Dose - Noble Gases

LIMITATIONS

- L2.4.2.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 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and
 2. During any calendar year, less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

APPLICABILITY: At all times

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

ACTION:

1. 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, Section 3.4 Limitations.

BASES

BL2.4.2.A Limitation L2.4.2.A 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.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

2.4.3 Dose - Iodine-131, Tritium, and Radionuclides in Particulate Form

LIMITATIONS

L2.4.3.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.

APPLICABILITY: At all times

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

ACTION:

1. 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, Section 3.4 Limitations.

BASES

BL2.4.3.A Limitation L2.4.3.A 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.

This limitation provides 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".

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

2.4.4 Gaseous Radwaste Treatment

LIMITATIONS

L2.4.4.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.

L2.4.4.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.

APPLICABILITY: At all times

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

ACTION:

1. 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, Section 3.4 Limitations.

BASES

BL2.4.4.A/B 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 L2.4.2.A and L2.4.3.A.

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RELEASE CONTROLS

2.5 RADIOACTIVE EFFLUENTS

2.5.1 Total Dose

LIMITATIONS

L2.5.1.A The calculated doses from the release of radioactive materials in liquid or gaseous effluents shall not exceed twice the limits of Appendix 1, Limitation L2.3.2.A, L2.4.2.A, or L2.4.3.A.

APPLICABILITY: At all times

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

ACTION: .

1. With the calculated doses exceeding the above limits, prepare and submit a Special Report pursuant to 10 CFR Part 20.405C.
2. 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.

SURVEILLANCE LIMITATION

S2.5.1.A 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.

APPLICABILITY: At all times

OBJECTIVE: To ensure that the requirements of 10 CFR 50, Appendix I, Section III.A are met.

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RELEASE CONTROLS

RADIOACTIVE EFFLUENTS

Total Dose

BASES

BL2.5.1.A 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, Section 2.3 & 2.4 Limitations. 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.

BS2.5.1.A These calculations provide the dose values to be compared to the limits of Appendix 1, Limitations L2.3.2.A, L2.3.3.A, L2.4.2.A, L2.4.3.A, L2.4.4.A, and L2.5.1.A.

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RELEASE CONTROLS

2.6 RADIOLOGICAL ENVIRONMENTAL MONITORING

2.6.1 Radiological Environmental Monitoring Program Description

LIMITATION

L2.6.1.A The radiological environmental monitoring samples shall be collected pursuant to Table 2.6-1 and shall be analyzed pursuant to the requirements of Tables 2.6-1 and 2.6-2. The sample locations shall be listed in Table 4-1.

APPLICABILITY: Applies at all times.

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

ACTION:

1. With the radiological environmental monitoring program not being conducted as specified in Table 2.6-1, 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.

2. 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 2.6-1 exceeding the limits of Table 2.6-3 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 2.6-3 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 L2.3.2.A and L2.4.2.A. When more than one of the radionuclides in Table 2.6-3 are detected in the sampling medium, this Special Report shall be submitted if:

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

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RADIOLOGICAL ENVIRONMENTAL MONITORING

Radiological Environmental Monitoring Program Description

SURVEILLANCE LIMITATIONS (Continued)

When radionuclides other than those in Table 2.6-3 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 L2.3.2.A and L2.4.2.A. 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. With milk or fresh leafy vegetable samples unavailable from any of the sample locations required by Table 2.6-1, 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).

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TABLE 2.6-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location(a)</u>	<u>Sample and Collection Frequency(a)</u>	<u>Type and Frequency of Analyses</u>
1. AIRBORNE			
a. Radioiodine and Particulates	4 Locations 2 Samples close to Site Boundary, in (or near) different sectors with the highest calculated annual average groundlevel D/Q. 1 Sample from the vicinity of a community having the highest calculated annual average groundlevel D/Q. 1 Sample from a control location 15-30 km. (10-20 miles) distance (c).	Continuous operation of sampler with sample collection as required by dust loading but at least once per 14 days.	Radioiodine canister. Analyze at least once per 14 days for I-131. Particulate sampler: Analyze for gross beta radioactivity following filter change (b)

TABLE 2.6-1 (Continued)

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location(a)</u>	<u>Sample and Collection Frequency(a)</u>	<u>Type and Frequency of Analyses</u>
2. DIRECT RADIATION(d)	24 Locations	Once per 92 days	Gamma dose. Once per 92 days.
-	16 inner ring stations with two or more dosimeters in each meteorological sector in the general area of the Site Boundary		
-	8 stations with two or more dosimeters in special interest areas such as population centers, nearby residences, schools, and in 1 - 2 areas to serve as control locations.		

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TABLE 2.6-1 (Continued)

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location (a)</u>	<u>Sample and Collection Frequency (a)</u>	<u>Type and Frequency of Analyses</u>
3. WATERBORNE			
a. Surface Water	1 Indicator location (influenced by plant discharge) 1 Control location (uninfluenced by plant discharge)	Once per 92 days.	Gamma isotopic ^(e) and Tritium analyses once 92 days.
b. Drinking Water	1 Indicator location (influenced by plant discharge) 1 Control location (uninfluenced by plant discharge)	Once per 92 days.	I-131, gross beta, gamma isotopic ^(e) and tritium analyses once per 92 days.
c. Sediment from Shoreline	1 Indicator location (influenced by plant discharge) 1 Control location (uninfluenced by plant discharge)	Once per 365 days	Gamma isotopic ^(e) analysis once per 365 days.

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TABLE 2.6-1 (Continued)

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location(a)</u>	<u>Sample and Collection Frequency(a)</u>	<u>Type and Frequency of Analyses</u>
4. INGESTION			
a. Milk	1 Indicator sample location within 8 km. distant if commercially available. 1 Control sample location at a distant of >8 km. when an indicator exists.	Once per 92 days.	Gamma isotopic(e) and I-131 analyses once per 92 days.
b. Fish	1 Sample of commercially and/or recreationally important species in vicinity of plant discharge. 1 Sample of same species in area not influenced by plant discharge.	Once per 365 days.	Gamma isotopic(e) on edible portions once per 365 days.
c. Food Products	1 Sample of broadleaf (edible or non-edible) near the Site Boundary from one of the highest anticipated annual average groundlevel D/Q sectors, if milk sampling is not performed. 1 Sample location of broadleaf vegetation (edible or non-edible) from a control location 15 - 30 km. distant, if milk sampling is not performed.	Three per 365 days.	Gamma isotopic(e) and I-131 analyses three times per 365 days.

TABLE 2.6-1 (Continued)

TABLE NOTATION

- a The ODCM shall include, in a table and figures, specific parameters of distance and direction from the centerline of one reactor, and additional description where pertinent, for each sample location in Table 2.6-1. Refer to NUREG-0133, "Preparation of Radiological Technical Specifications for Nuclear Power Plants," October 1978, and to Radiological Assessment Branch Technical Position, Revision 1, November 1979. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunctions, every effort shall be made to complete corrective action before the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report.
- It is recognized that, at times, it may not be possible or practical to continue to obtain samples of the media of choice at the most desirable location or time. In these instances, suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program. In the next Annual Radioactive Effluent Release Report, identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining replacement samples, and also include in the report a revised figure(s) and table(s) for the ODCM reflecting the new location(s).
- b Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than ten times the yearly mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.
- c The purpose of this sample is to obtain background information.
- d One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purpose of this table, a thermoluminescent dosimeter may be considered to be one phosphor and two or more phosphors in a packet considered as two or more dosimeters. Film badges should not be used for measuring direct radiation.
- e Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

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Table 2.6-2

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 x 10 ⁻² (c)				
H-3	2000 (d)					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-95	30					
Nb-95	15					
I-131	1 (e)	7 x 10 ⁻² (f)		1	60	
Cs-134	15	5 x 10 ⁻² (g)	130	15	60	150
Cs-137	18	6 x 10 ⁻² (g)	150	18	80	180
Ba-140	60			60		
La-140	15			15		

(a) See definition of LLD in table notation of Table 2.3-1.

(b) LLD for drinking water.

(c) Applicable to airborne particulate only.

(d) LLD for drinking water. If no drinking water pathway exists, a value of 3000 may be used.

(e) LLD for drinking water. If no drinking water pathway exists, a gamma isotopic LLD value of 15 pCi/l may be used.

(f) Applicable to airborne gas only.

(g) Applicable to airborne particulate only during gamma isotopic analysis.

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TABLE 2.6-3

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	2 x 10 ⁴ (a)				
Mn-54	1 x 10 ³		3 x 10 ⁴		
Fe-59	4 x 10 ²		1 x 10 ⁴		
Co-58	1 x 10 ³		3 x 10 ⁴		
Co-60	3 x 10 ²		1 x 10 ⁴		
Zn-65	3 x 10 ²		2 x 10 ⁴		
Zr-Nb-95	4 x 10 ² (b)				
I-131	2	0.9		3	1 x 10 ²
Cs-134	30	10	1 x 10 ³	60	1 x 10 ³
Cs-137	50	20	2 x 10 ³	70	2 x 10 ³
Ba-La-140	2 x 10 ² (b)			3 x 10 ² (b)	

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

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RADIOLOGICAL ENVIRONMENTAL MONITORING

Radiological Environmental Monitoring Program Description

SURVEILLANCE LIMITATIONS

S2.6.1.A The results of analyses performed on the radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Operating Report.

APPLICABILITY: Applies at all times.

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

BASES

BL2.6.1.A & BS2.6.1.A 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 2.6-2 are state of the art for routine environmental measurements in industrial laboratories.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

2.6.2 Land Use Census

LIMITATION

L2.6.2.A 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.

APPLICABILITY: Applies at all times

OBJECTIVES: This limitation will identify changes in use of the unrestricted areas.

ACTION:

1. 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 S2.5.1.A and Appendix 2, Limitation S2.4.3.A submit location description in the Radioactive Effluent Release Report per Appendix 1, Section 3.2 Limitations.
2. 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 L2.6.1.A, identify the new location in the Radioactive Effluent Release Report per Appendix 1, Section 3.2 Limitations. 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.

*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.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

Land Use Census

SURVEILLANCE LIMITATION

S2.6.2.A The land use census shall be conducted at least once per 24 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.

APPLICABILITY: Applies at all times

OBJECTIVES: This limitation will identify changes in use of the unrestricted areas.

BASES

BL2.6.2.A & BS2.6.2.A 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.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

2.6.3 Interlaboratory Comparison Program

LIMITATION

L2.6.3.A Analyses shall be performed on radioactive materials supplied as part of Interlaboratory Comparison Program which has been approved by NRC.

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.

ACTION:

1. 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 LIMITATION

S2.6.3.A 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, Section 3.3 Limitations.

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.

BASES

BL2.6.3.A & BS2.6.3.A 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.

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3.0 ADMINISTRATIVE CONTROLS

3.1 PROGRAMS

LIMITATION

L3.1.1 The following program shall be established, implemented, and maintained:

ITS

A. Radioactive Effluent Controls Program

(Refer to Unit 1 Technical Specification 6.8.5 [ITS 5.5.4 ITS])

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.

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ADMINISTRATIVE CONTROLS

3.2 RADIOACTIVE EFFLUENT RELEASE REPORT**

LIMITATIONS

ITS

L3.2.1 The Radioactive Effluent Release Report shall be in accordance with Unit 1 Technical Specification 6.12.2.6 [ITS 5.6.3 ITS] 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.

A. 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.

B. 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.

ITS

C. 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 [ITS 5.5.1.c ITS] for potential reporting requirements.)

D. 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.

**A single submittal may be made for ANO.

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ADMINISTRATIVE CONTROLS

3.2 RADIOACTIVE EFFLUENT RELEASE REPORT**

LIMITATIONS (Continued)

- E. 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.***

***This information may be included in the periodic SAR update in lieu of inclusion in this report.

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ADMINISTRATIVE CONTROLS

3.3 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

LIMITATIONS

ITS

- L3.3.1 The Annual Radiological Environmental Operating Report shall be in accordance with Unit 1 Technical Specification 6.12.2.5 [ITS 5.6.2 ITS] requirements. 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.
- A. 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.
 - 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 1, Section 2.6.2 limitations, and the results of the Interlaboratory Comparison Program participation required by Appendix 1, Section 2.6.3 limitations.

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

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ADMINISTRATIVE CONTROLS

3.4 SPECIAL REPORTS

LIMITATIONS

L3.4.1 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.

- A. Radioactive Effluents; Appendix 1, Section 2.3, 2.4, 2.5 Limitations and ANO Procedure OP-1000.141.

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.

- B. Radiological Environmental Monitoring Sample Analysis; Appendix 1, Section 2.6.1 Limitations.

- C. 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.

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LIMITATION

L4.1 The Main Steam Line Radiation Monitoring Instrumentation shall be operable with a minimum measurement range from 10^{-1} to 10^4 mR/hr, whenever the reactor is above the cold shutdown condition.

APPLICABILITY: Unit 1 Main Steam Line Radiation Monitors

OBJECTIVE: To delineate the condition of the Unit 1 main steam line radiation monitors to assure reactor safety.

ACTION:

- 1.. With the less than minimum number of channels operable, take action shown in Table 4.1-1, Note 1.

SURVEILLANCE LIMITATION

S4.1 The Main Steam Line Radiation Monitors shall be demonstrated operable by performance of the channel check, channel test, and channel calibration at the frequency shown in Table 4.1-2.

APPLICABILITY: Applies to the Main Steam Line Radiation Monitors.

OBJECTIVE: To provide surveillance limitations for the instruments listed Appendix 1, Limitation L4.1.

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[ITS Table 4.1-1 ITS]

Instrumentation Limiting Conditions for Operation

<u>Functional Unit</u>	<u>No. of Channels</u>	<u>No. of Channels for system trip</u>	<u>Min. operable channels</u>	<u>Min. degree of redundancy</u>	<u>Operator action if conditions of column 3 or 4 cannot be met</u>
1. Main Steam Line	1/steam line	N/A	1/steam line	0	Note 1

Notes: 1. With the number of OPERABLE Channels less than required by the Minimum Channels OPERABLE requirements, initiate the preplanned alternate method of monitoring the appropriate parameter(s), within 72 hours, and restore the inoperable Channel(s) to OPERABLE status within 7 days of the event.

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[ITS Table 4.1-2 ITS]
Instrument Surveillance Requirements

Channel Description Check Test Calibrate

1. Main Steam Line Radiation Monitors S M R

S - Each Shift

M - Monthly

R - Once every 18 months

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APPENDIX 2

RADIOACTIVE EFFLUENT CONTROLS UNIT 2

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1.0 DEFINITIONS

OPERABLE - OPERABILITY

1.1 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

1.2 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

1.3 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

1.4 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

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

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DEFINITIONS

LIQUID RADWASTE TREATMENT SYSTEM

1.6 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

1.7 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

1.8 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

1.9 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

1.10 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

1.11 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.

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DEFINITIONS

UNRESTRICTED AREA

1.12 An unrestricted area shall be any area at or beyond the exclusion area boundary.

FREQUENCY NOTATION

1.13 The frequency notation specified for the performance of Surveillance Limitations shall correspond to the following intervals:

P		Completed prior to each release
S	Shift	At least once per 12 hours
D	Daily	At least once per 24 hours
W	Weekly	At least once per 7 days
M	Monthly	At least once per 31 days
Q	Quarterly	At least once per 92 days
SA	Semiannual	At least once per 184 days
R	Refueling	At least once per 18 months
N/A		Not Applicable

BATCH RELEASE

1.14 A "Batch" release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analysis, each batch shall be isolated and then thoroughly mixed to assure representative sampling.

CONTINUOUS RELEASE

1.15 A "Continuous" release is the discharge of liquid waste of a non-discrete volume, e.g. from a volume of a system that has an input flow during the continuous release.

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2.0 RELEASE CONTROLS

LIMITATION

L2.0.1 The Limitation and Action requirements shall be applicable during the conditions specified for each limitation.

L2.0.2 Adherence to the requirements of the Limitation and/or associated Action within the specified time interval shall constitute compliance with the Limitation. In the event the Limitation is restored prior to the expiration of the specified time interval, completion of the action statement is not required.

BASES

BL2.0.1 This limitation establishes the general requirements applicable to Limitations. Limitations are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a Limitation is not met, the licensee shall follow any remedial Action permitted by the Limitation until the condition can be met. This limitation establishes the applicability statement within each individual limitation as the requirement for when (i.e., in which specified conditions) conformance to the Limitation is required for safe operation of the facility. The Action requirements establish those remedial measures that must be taken within specified time limits when the requirements of a Limitation are not met. The Action requirements specify the remedial measures that permit continued operation of the facility which is not further restricted by the time limits of the Action requirements. In this case, conformance to the Action requirements provides an acceptable level of safety for unlimited continued operations as long as the Action requirements continue to be met. The specified time limits of the Action requirements are applicable from the point in time it is identified that a Limitation is not met. The time limits of the Action requirements are also applicable when a system or component is removed from service for surveillance testing or investigation of operational problems. Individual limitations may include a specified time limit for completion of a Surveillance Limitation when equipment is removed from service. In this case, the allowable outage time limits of the Action requirements are applicable when this limit expires if the surveillance has not been completed.

BL2.0.2 This limitation establishes the general requirements applicable to Limitations. Limitations are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limitation is not met, the licensee shall follow any remedial Action permitted by the Limitation until the condition can be met. This limitation establishes that noncompliance with a limitation exists when the requirements of the Limitation are not met and the associated Action requirements have not been implemented within the specified time interval. The purpose of this limitation is to clarify that (1) implementation of the Action requirements constitutes compliance with a limitation and (2) completion of the remedial measures of the Action requirements is not required when compliance with a Limitation is restored within the time interval specified in the associated Action requirements.

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SURVEILLANCE LIMITATION

S2.0.1 Surveillance Limitations shall be applicable during the conditions specified for individual Limitations unless otherwise stated in an individual Surveillance Limitation.

S2.0.2 Each Surveillance Limitation shall be performed within the specified surveillance interval with a maximum allowable extension not to exceed 25% of the specified surveillance interval.

BASES

BS2.0.1 This surveillance limitation establishes the general requirements applicable to Surveillance Limitations. Surveillance Limitations are requirements relating to test, calibration, or inspection to ensure that the necessary quality of systems and components is maintained and that the limitations will be met. This surveillance limitation establishes the requirement that surveillances must be performed during the conditions for which the requirements of the Limitation apply unless otherwise stated in an individual Surveillance Limitation. The purpose of this surveillance limitation is to ensure that the surveillances are performed to verify the operational status of systems and components and that parameters are within specified limits to ensure safe operation of the facility when the plant is in a specified condition for which the associated Limitations are applicable. Surveillance Limitations do not have to be performed when the facility is in a condition for which the requirements of the associated Limitation do not apply unless otherwise specified.

BS2.0.2 This surveillance limitation establishes the general requirements applicable to Surveillance Limitations. Surveillance Limitations are requirements relating to test, calibration, or inspection to ensure that the necessary quality of systems and components is maintained and that the limitations will be met. This surveillance limitation establishes the limit for which the specified time interval for Surveillance Limitations may be extended. It permits an allowable extension of the normal surveillance interval to facilitate surveillance scheduling and consideration of plant operating conditions that may not be suitable for conducting the surveillance (e.g., transient conditions or other ongoing surveillance or maintenance activities). It also provides flexibility to accommodate the length of a fuel cycle for surveillances that are performed at a refueling frequency and are specified with an 18-month surveillance interval. It is not intended that this provision be used repeatedly as a convenience to extend surveillance intervals beyond that specified for surveillances. This surveillance limitation is based upon engineering judgement and the recognition that the most probable result of any particular surveillance being performed is the verification of conformance with the Surveillance Limitations. This provision is sufficient to ensure that the reliability ensured through surveillance activities is not significantly degraded beyond that obtained from the specified surveillance intervals.

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RELEASE CONTROLS

2.1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

LIMITATION

L2.1.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table 2.1-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 2, Limitation L2.3.1.A are not exceeded.

APPLICABILITY: During releases via this pathway.

ACTION:

1. 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.
2. With less than the minimum number of monitoring instrumentation channels operable, take the action shown in Table 2.1-1.
3. 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.

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TABLE 2.1-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ACTION</u>
1. Gross Radioactivity Monitor(s) (provides alarm and automatic termination of release)			
a. Liquid Radwaste Effluent Line	1	During Releases Via This Pathway (DRVTP)	1
2. Flow Monitor(s)			
a. Liquid Radwaste Effluent Line	1	DRVTP	2

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TABLE 2.1-1 (Continued)

TABLE NOTATION

ACTION 1 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:

- a. At least two independent samples are analyzed; and
- b. At least two technically qualified members of the Facility Staff independently verify the release rate computer input data; and
- c. 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 2 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.

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RELEASE CONTROLS

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

SURVEILLANCE LIMITATIONS

S2.1.1 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 2.1-2.

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TABLE 2.1-2

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>
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.

- P Prior to release
- D Daily
- Q Quarterly
- R Every 18 months
- N/A Not Applicable

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RELEASE CONTROLS

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

BASES

BL2.1.1 & BS2.1.1 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:

- A. Power to the detector is lost.
- B. The instrument indicates a downscale failure (local alarm only on 2RE-4423).

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.

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RELEASE CONTROLS

2.2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

LIMITATION

L2.2.1 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 2.2-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of Appendix 2, Limitation L2.4.1.A are not exceeded.

APPLICABILITY: During releases via this pathway.

ACTION:

1. 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.
 - a. Waste Gas Holdup System Noble Gas Activity Monitor (during periods of gaseous releases.)
 - b. Containment Purge and Ventilation System Noble Gas Activity Monitor (during periods of containment building purge.)
2. With less than the minimum number of monitoring instrumentation channels operable, take the action shown in Table 2.2-1.
3. 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.

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TABLE 2.2-1

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>PARAMETER</u>	<u>ACTION</u>
1. Waste Gas Holdup System				
a. Noble Gas Activity Monitor (provides alarm and automatic termination of release)	1	During Releases Via This Pathway (DRVTP)	Radioactivity	1
b. Effluent System Flow Monitor	1	DRVTP	System Flow	2
2. Containment Purge and Ventilation System				
a. Noble Gas Activity Monitor	1	DRVTP	Radioactivity	3, 5
b. Iodine Sampler Cartridge	1	DRVTP	Verify Presence of Cartridge	4
c. Particulate Sampler Filter	1	DRVTP	Verify Presence of Filter	4
d. Effluent System Flow Monitor	1	DRVTP	System Flow	2
e. Sampler Flow Monitor	1	DRVTP	Sampler Flow	2

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TABLE 2.2-1 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>PARAMETER</u>	<u>ACTION</u>
3. Spent Fuel Area Ventilation System				
a. Noble Gas Activity Monitor	1	DRVTP	Radioactivity	3
b. Iodine Sampler Cartridge	1	DRVTP	Verify Presence of Cartridge	4
c. Particulate Sampler Filter	1	DRVTP	Verify Presence of Filter	4
d. Effluent System Flow Monitor	1	DRVTP	System Flow	2
e. Sampler Flow Monitor	1	DRVTP	Sampler Flow	2
4. Auxiliary Building Area Ventilation System				
a. Noble Gas Activity Monitor	1	DRVTP	Radioactivity	3
b. Iodine Sampler Cartridge	1	DRVTP	Verify Presence of Cartridge	4
c. Particulate Sampler Filter	1	DRVTP	Verify Presence of Filter	4
d. Effluent System Flow Monitor	1	DRVTP	System Flow	2
e. Sampler Flow Monitor	1	DRVTP	Sampler Flow	2

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TABLE 2.2-1 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>PARAMETER</u>	<u>ACTION</u>
5. Auxiliary Building Extension Ventilation System				
a. Noble Gas Activity Monitor	1	DRVTP	Radioactivity	3
b. Iodine Sample Cartridge	1	DRVTP	Verify Presence of Cartridge	4
c. Particulate Sampler Filter	1	DRVTP	Verify Presence of Filter	4
d. Effluent System Flow Monitor	1	DRVTP	System Flow	2
e. Sampler Flow Monitor	1	DRVTP	Sampler Flow	2
6. Radwaste Storage Building HVAC Exhaust System				
a. Noble Gas Activity Monitor	1	DRVTP	Radioactivity	6
b. Iodine Sample Cartridge	1	DRVTP	Verify Presence of Cartridge	7
c. Particulate Sampler Filter	1	DRVTP	Verify Presence of Filter	7
d. Effluent System Flow Monitor	1	DRVTP	System Flow	8
e. Sampler Flow Monitor	1	DRVTP	Sampler Flow	8

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TABLE 2.2-1 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>PARAMETER</u>	<u>ACTION</u>
7. Emergency Penetration Room Ventilation System				
a. Noble Gas Activity Monitor	1	DRVTP	Radioactivity	3
b. Iodine Sample Cartridge	1	DRVTP	Verify Presence of Cartridge	4
c. Particulate Sampler Filter	1	DRVTP	Verify Presence of Filter	4
d. Effluent System Flow Monitor	1	DRVTP	System Flow	2
e. Sampler Flow Monitor	1	DRVTP	Sampler Flow	2

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TABLE 2.2-1 (Continued)

TABLE NOTATION

- ACTION 1** 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:
- a. At least two independent samples of the tank's contents are analyzed; and
 - b. At least two technically qualified members of the Facility Staff independently verify the computer input data; and
 - c. 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 2** 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 3** 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. During the performance of required source checks of radioactive gaseous effluent monitoring instrumentation for plant ventilation systems, these requirements need not be implemented if the instrument is restored to an operable condition within four hours.
- ACTION 4** 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 2.4-1. A time period of up to four hours is allowed to continue releases via the affected pathway without auxiliary sampling equipment in operation. If at the conclusion of the four-hour period normal instrumentation is not restored or auxiliary sampling equipment is not in operation, then releases via the pathway shall be immediately suspended. The allowable four-hour time period is applicable if the instrumentation is discovered to be inoperable for any reason and whenever it is necessary to render the instrumentation inoperable in order to perform the weekly surveillance (i.e., filter changeout) required by ODCM Appendix 2 Table 2.4-1.

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TABLE 2.2-1 (Continued)

TABLE NOTATION

- ACTION 5 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.
- ACTION 6 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 7 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 2.4-1. Otherwise, suspend all compaction activities within the Radwaste Storage Building.
- ACTION 8 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.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

SURVEILLANCE LIMITATION

S2.2.1 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 2.2-2.

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TABLE 2.2-2

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>
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

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TABLE 2.2-2 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>
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

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TABLE 2.2-2 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>
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

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TABLE 2.2-2 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE LIMITATIONS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>
7. Emergency Penetration Room 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

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TABLE 2.2-2 (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.

P Prior to release
D Daily
W Weekly
M Monthly
Q Quarterly
R Every 18 months
N/A Not Applicable

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

BASES

BL2.2.1 & BS2.2.1 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:

- A. The instrument indicates measured levels above the alarm/trip setpoint.
- B. Power to the detector is lost.
- C. 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.

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RELEASE CONTROLS

2.3 RADIOACTIVE LIQUID EFFLUENTS

2.3.1 Concentration

LIMITATION

L2.3.1.A 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} $\mu\text{Ci/ml}$.

APPLICABILITY: At all times.

ACTION:

1. 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 L3.4.1.A within 30 days.

SURVEILLANCE LIMITATIONS

S2.3.1.A.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analyses program of Table 2.3-1.

S2.3.1.A.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 L2.3.1.A.

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TABLE 2.3-1

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 (g)	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}	
B. Continuous Waste Release (e)	Continuous (f)	D (f)	γ isotopic (g)	5×10^{-7} (b)
			I-131	1×10^{-6}
	M Grab Sample	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	Continuous (f) (h)	M Composite (c)	H-3	1×10^{-5}
			Gross Alpha	1×10^{-7}
	Continuous (f) (h)	Q Composite (c)	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}

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Table 2.3-1 (Continued)

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):

$$4.66 s_b$$

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

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)

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.

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Table 2.3-1 (Continued)

TABLE NOTATION (Continued)

- 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. A continuous release is the discharge of liquid waste of a non-discrete volume, e.g. from a volume of a system that has an input flow during the continuous release.
- f. If continuous samples cannot be obtained, then grab samples shall be collected and analyzed at least 1/24 hrs when the specific activity of the secondary coolant is ≤ 0.01 $\mu\text{Ci/ml IDE (I-131)}$ or at least 1/12 hrs when the specific activity of the secondary coolant is > 0.01 $\mu\text{Ci/ml IDE (I-131)}$. Grab sample frequency may be increased due to plant conditions.
- g. 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.
- h. To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be collected continuously in proportion to the rate of flow of the effluent stream. Prior to analysis, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

P Prior to release
 D Daily
 M Monthly
 Q Quarterly

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RELEASE CONTROLS

RADIOACTIVE LIQUID EFFLUENTS

Concentration

BASES

BL2.3.1.A & BS2.3.1.A 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.

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RELEASE CONTROLS

RADIOACTIVE LIQUID EFFLUENTS

2.3.2 Dose

LIMITATION

L2.3.2.A 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:

1. 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
2. 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:

1. 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 L3.4.1.A within 30 days.

SURVEILLANCE LIMITATIONS

S2.3.2.A Cumulative dose contributions from liquid effluents shall be determined in accordance with this manual at least once per 31 days.

BASES

BL2.3.2.A & BS2.3.2.A 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.

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RELEASE CONTROLS

RADIOACTIVE LIQUID EFFLUENTS

2.3.3 Liquid Radwaste Treatment

LIMITATION

L2.3.3.A 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:

1. 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 L3.4.1.A within 30 days.

SURVEILLANCE LIMITATIONS

S2.3.3.A Doses due to liquid releases shall be projected at least once per 31 days in accordance with this manual.

BASES

BL2.3.3.A & BS2.3.3.A 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.

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RELEASE CONTROLS

2.4 RADIOACTIVE GASEOUS EFFLUENTS

2.4.1 Dose Rate

LIMITATION

L2.4.1.A 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:

1. 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.
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 containment purging the dose rate may be averaged over a one hour interval.

APPLICABILITY: At all times.

ACTION:

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

SURVEILLANCE LIMITATIONS

S2.4.1.A.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.

S2.4.1.A.2 The dose rate due to iodine-131, tritium, and all radionuclides in particulate form with half-lives 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 2.4-1.

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TABLE 2.4-1

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 (Auxiliary Bldg. Ext.)	M (c) (d) Grab Sample	M	Principal Gamma Emitters(b) H-3	1×10^{-4} (g) 1×10^{-6}
(Spent Fuel Pool Area Ventilation)	Continuous (e)	W(f) Charcoal Sample	I-131	1×10^{-12}
(Containment 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}
(Emergency Penetration Room Ventilation)	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.)

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TABLE 2.4-1 (Continued)

TABLE NOTATION

- a. The Lower Limit of Detection (LLD) is defined in Table Notation (a.) of Table 2.3-1 of Appendix 2, Limitation L2.3.1.A.
- 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 L2.4.1.A, L2.4.2.A, and L2.4.3.A.
- 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.

P Prior to release
 W Weekly
 M Monthly
 Q Quarterly

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

Dose Rate

BASES

BL2.4.1.A & BS2.4.1.A 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.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

2.4.2 Dose - Noble Gases

LIMITATION

L2.4.2.A The dose due to noble gases released in gaseous effluents from ANO-2 to unrestricted areas (See Figure 4-2) shall be:

1. During any calendar quarter, less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and
2. During any calendar year, less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

APPLICABILITY: At all times.

ACTION:

1. 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 L3.4.1.A within 30 days.

SURVEILLANCE LIMITATIONS

S2.4.2.A 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.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

Dose - Noble Gases

BASES

BL2.4.2.A & BS2.4.2.A 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 limitation 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.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

2.4.3 Dose - Iodine-131, Tritium, And Radionuclides In Particulate Form

LIMITATION

L2.4.3.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-2 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.

APPLICABILITY: At all times.

ACTION:

1. 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 I3.4.1.A within 30 days.

SURVEILLANCE LIMITATIONS

S2.4.3.A 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.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

Dose - Iodine-131, Tritium, And Radionuclides In Particulate Form

BASES

BL2.4.3.A & BS2.4.3.A 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.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

2.4.4 Gaseous Radwaste Treatment

LIMITATION

L2.4.4.A 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.

L2.4.4.B 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:

1. With gaseous waste being discharged without treatment and in excess of the L2.4.4.A limits, in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation L3.4.1.A within 30 days.
2. With gaseous waste being discharged without treatment and in excess of the L2.4.4.B limits, in lieu of any other report, submit a Special Report pursuant to Appendix 2, Limitation L3.4.1.A within 30 days.

SURVEILLANCE LIMITATIONS

S2.4.4.A/B Doses due to gaseous releases from the site shall be projected at least once per 31 days in accordance with this manual.

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RELEASE CONTROLS

RADIOACTIVE GASEOUS EFFLUENTS

Gaseous Radwaste Treatment

BASES

BL2.4.4.A/B & BS2.4.4.A/B 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.

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RELEASE CONTROLS

2.5 RADIOACTIVE EFFLUENTS

2.5.1 Total Dose

LIMITATION

L2.5.1.A The calculated doses from the release of radioactive materials in liquid or gaseous effluents shall not exceed twice the limits of Appendix 2, Limitations L2.3.2.A.1, L2.3.2.A.2, L2.4.2.A.1, L2.4.A.2, L2.4.3.A.1, or L2.4.3.A.2.

APPLICABILITY : At all times.

ACTION:

1. With the calculated doses exceeding the above limits, prepare and submit a Special Report pursuant to 10 CFR Part 20.405c.
2. 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

S2.5.1.A Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Appendix 2, Limitations S2.3.2.A, S2.4.2.A, and S2.4.3.A, and in accordance with this manual.

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RELEASE CONTROLS

RADIOACTIVE EFFLUENTS

Total Dose

BASES

BL2.5.1.A & BS2.5.1.A 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, Section 2.3 and 2.4 Limitations. 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.

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RELEASE CONTROLS

2.6 RADIOLOGICAL ENVIRONMENTAL MONITORING

2.6.1 Monitoring Program

LIMITATION

L2.6.1.A The radiological environmental monitoring samples shall be collected pursuant to Table 2.6-1 and shall be analyzed pursuant to the requirements of Table 2.6-1 and 2.6-2. The sample locations shall be shown in Table 4-1 in this manual.

APPLICABILITY: At all times.

ACTION:

1. With the radiological environmental monitoring program not being conducted as specified in Table 2.6-1, 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.
2. 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 2.6-1 exceeding the limits of Table 2.6-3 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 2.6-3 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 L2.3.2.A, L2.4.2.A, and L2.4.3.A. When more than one of the radionuclides in Table 2.6-3 are detected in the sampling medium, this Special Report shall be submitted if:

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

When radionuclides other than those in Table 2.6-3 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 L2.3.2.A, L2.4.2.A, and L2.4.3.A. 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.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

Monitoring Program

LIMITATION (Continued)

3. With milk or fresh leafy vegetable samples unavailable from any of the sample locations required by Table 2.6-1, 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).

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TABLE 2.6-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location (a)</u>	<u>Sample and Collection Frequency (a)</u>	<u>Type and Frequency of Analyses</u>
1. AIRBORNE			
a. Radioiodine and Particulates	<p>4 Locations</p> <p>2 Samples close to Site Boundary, in (or near) different sectors with the highest calculated annual average groundlevel D/Q.</p> <p>1 Sample from the vicinity of a community having the highest calculated annual average groundlevel D/Q.</p> <p>1 Sample from a control location 15-30 km. (10-20 miles) distance (c).</p>	<p>Continuous operation of sampler with sample collection as required by dust loading but at least once per 14 days.</p>	<p>Radioiodine canister. Analyze at least once per 14 days for I-131.</p> <p>Particulate sampler: Analyze for gross beta radioactivity following filter change (b)</p>

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TABLE 2.6-1 (Continued)

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location(a)</u>	<u>Sample and Collection Frequency(a)</u>	<u>Type and Frequency of Analyses</u>
2. DIRECT RADIATION(d)	24 Locations - 16 inner ring stations with two or more dosimeters in each meteorological sector in the general area of the Site Boundary - 8 stations with two or more dosimeters in special interest areas such as population centers, nearby residences, schools, and in 1 - 2 areas to serve as control locations.	Once per 92 days	Gamma dose. Once per 92 days.

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TABLE 2.6-1 (Continued)

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location(a)</u>	<u>Sample and Collection Frequency(a)</u>	<u>Type and Frequency of Analyses</u>
3. WATERBORNE			
a. Surface Water	1	Indicator location (influenced by plant discharge)	Gamma isotopic(e) and Tritium analyses once 92 days.
	1	Control location (uninfluenced by plant discharge)	
b. Drinking Water	1	Indicator location (influenced by plant discharge)	I-131, gross beta, gamma isotopic(e) and tritium analyses once per 92 days.
	1	Control location (uninfluenced by plant discharge)	
c. Sediment from Shoreline	1	Indicator location (influenced by plant discharge)	Gamma isotopic(e) analysis once per 365 days.
	1	Control location (uninfluenced by plant discharge)	

TABLE 2.6-1 (Continued)

<u>Exposure Pathway and/or Sample</u>	<u>Number of Sample Location(a)</u>	<u>Sample and Collection Frequency(a)</u>	<u>Type and Frequency of Analyses</u>
4. INGESTION			
a. Milk	1 Indicator sample location within 8 km. distant if commercially available. 1 Control sample location at a distant of >8 km. when an indicator exists.	Once per 92 days.	Gamma isotopic(e) and I-131 analyses once per 92 days.
b. Fish	1 Sample of commercially and/or recreationally important species in vicinity of plant discharge. 1 Sample of same species in area not influenced by plant discharge.	Once per 365 days.	Gamma isotopic(e) on edible portions once per 365 days.
c. Food Products	1 Sample of broadleaf (edible or non-edible) near the Site Boundary from one of the highest anticipated annual average groundlevel D/Q sectors, if milk sampling is not performed. 1 Sample location of broadleaf vegetation (edible or non-edible) from a control location 15 - 30 km. distant, if milk sampling is not performed.	Three per 365 days.	Gamma isotopic(e) and I-131 analyses three times per 365 days.

TABLE 2.6-1 (Continued)

TABLE NOTATION

- a The ODCM shall include, in a table and figures, specific parameters of distance and direction from the centerline of one reactor, and additional description where pertinent, for each sample location in Table 2.6-1. Refer to NUREG-0133, "Preparation of Radiological Technical Specifications for Nuclear Power Plants," October 1978, and to Radiological Assessment Branch Technical Position, Revision 1, November 1979. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunctions, every effort shall be made to complete corrective action before the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report.
- It is recognized that, at times, it may not be possible or practical to continue to obtain samples of the media of choice at the most desirable location or time. In these instances, suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program. In the next Annual Radioactive Effluent Release Report, identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining replacement samples, and also include in the report a revised figure(s) and table(s) for the ODCM reflecting the new location(s).
- b Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air or water is greater than ten times the yearly mean of control samples for any medium, gamma isotopic analysis should be performed on the individual samples.
- c The purpose of this sample is to obtain background information.
- d One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purpose of this table, a thermoluminescent dosimeter may be considered to be one phosphor and two or more phosphors in a packet considered as two or more dosimeters. Film badges should not be used for measuring direct radiation.
- e Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

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TABLE 2.6-2
MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD^(a))

<u>Analysees</u>	<u>Water</u> <u>(pCi/l)</u>	<u>Airborne Particulate</u> <u>or Gas</u> <u>(pCi/m³)</u>	<u>Fish</u> <u>(pCi/kg, wet)</u>	<u>Milk</u> <u>(pCi/l)</u>	<u>Food Products</u> <u>(pCi/kg, wet)</u>	<u>Sediment</u> <u>(pCi/kg, dry)</u>
Gross Beta	4 (b)	1 x 10 ⁻² (c)				
H-3	2000 (d)					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-95	30					
Nb-95	15					
I-131	1 (e)	7 x 10 ⁻² (f)		1	60	150
Cs-134	15	5 x 10 ⁻² (g)	130	15	60	
Cs-137	18	6 x 10 ⁻² (g)	150	18	80	180
Ba-140	60			60		
La-140	15			15		

(a) See definition of LLD in table notation of Table 2.3-1.

(b) LLD for drinking water.

(c) Applicable to airborne particulate only.

(d) LLD for drinking water. If no drinking water pathway exists, a value of 3000 may be used.

(e) LLD for drinking water. If no drinking water pathway exists, gamma isotopic LLD value of 15 pCi/l may be used.

(f) Applicable to airborne gas only.

(g) Applicable to airborne particulate only during gamma isotopic analysis.

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TABLE 2.6-3

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

<u>Analyses</u>	<u>Water (pCi/l)</u>	<u>Airborne Particulate or gases (pCi/m³)</u>	<u>Fish (pCi/kg, wet)</u>	<u>Milk (pCi/l)</u>	<u>Food Products (pCi/kg, wet)</u>
H-3	2 x 10 ⁴ (a)				
Mn-54	1 x 10 ³		3 x 10 ⁴		
Fe-59	4 x 10 ²		1 x 10 ⁴		
Co-58	1 x 10 ³		3 x 10 ⁴		
Co-60	3 x 10 ³		1 x 10 ⁴		
Zn-65	3 x 10 ²		2 x 10 ⁴		
Zr-Nb-95	4 x 10 ² (b)				
I-131	2	0.9		3	1 x 10 ²
Cs-134	30	10	1 x 10 ³	60	1 x 10 ³
Cs-137	50	20	2 x 10 ³	70	2 x 10 ³
Ba-La-140	2 x 10 ² (b)			3 x 10 ² (b)	

(a) For drinking water samples.

(b) Total for parent and daughter.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

Monitoring Program

SURVEILLANCE LIMITATIONS

S2.6.1.A The results of analyses performed on the radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Operating Report.

BASES

BL2.6.1.A & BS2.6.1.A 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 2.6-2 are state of the art for routine environmental measurements in industrial laboratories.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

2.6.2 Land Use Census

LIMITATION

L2.6.2.A 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:

1. 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 S2.4.3.A, submit location description in the Radioactive Effluent Release Report per Appendix 2, Section 3.2 Limitations.
2. 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 L2.6.1.A, identify the new location in the Radioactive Effluent Release Report per Appendix 2, Section 3.2 Limitations. 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

S2.6.2.A The land use census shall be conducted at least once per 24 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.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

Land Use Census

BASES

BL2.6.2.A & BS2.6.2.A 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.

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RELEASE CONTROLS

RADIOLOGICAL ENVIRONMENTAL MONITORING

2.6.3 Interlaboratory Comparison Program

LIMITATION

L2.6.3.A 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:

1. 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

S2.6.3.A The results of analyses performed as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report.

BASES

BL2.6.3.A & BS2.6.3.A 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.

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3.0 ADMINISTRATIVE CONTROLS

3.1 PROGRAMS

LIMITATION

L3.1.1 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.

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ADMINISTRATIVE CONTROLS

3.2 RADIOACTIVE EFFLUENT RELEASE REPORT*

LIMITATION

L3.2.1 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.

A. 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.

B. 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.)

C. 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.

*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.

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ADMINISTRATIVE CONTROLS

RADIOACTIVE EFFLUENT RELEASE REPORT*

LIMITATION (Continued)

- D. 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.
- E. 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.

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ADMINISTRATIVE CONTROLS

3.3 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

LIMITATION

L3.3.1 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 by 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, Section 2.6.2 Limitations; and the results of the Interlaboratory Comparison Program participation required by Appendix 2, Section 2.6.3 Limitations.

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

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ADMINISTRATIVE CONTROLS

3.4 SPECIAL REPORTS

LIMITATION

L3.4.1 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.

- A. Radioactive Effluents; Appendix 2, Limitations L2.3.1.A, L2.3.2.A, L2.3.3.A, L2.4.2.A, L2.4.3.A, L2.4.4.A, L2.4.4.B, and L2.5.1.A.

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).

- B. Radiological Environmental Monitoring Sample Analysis; Appendix 2, Limitation L2.6.1.A.

- C. 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.

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