

## INSTRUMENTATION

### RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

#### LIMITING CONDITION FOR OPERATION

3.3.3.9 The radioactive liquid effluent monitoring instrumentation channels shown in table 3.3-12 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.11.1.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with the methodology and the parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

APPLICABILITY: During releases via these pathways.

#### ACTION:

- a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, without delay, suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable, or change the setpoint so it is acceptably conservative.
- b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE take the ACTION shown in table 3.3-12. Exert best effort to return the instruments to OPERABLE status within 30 days and, if unsuccessful, explain in ~~Semi~~ the next Annual Radioactive Effluent Release Report why the inoperability could not be corrected within 30 days.
- c. The provisions of Specifications 3.0.3, 3.0.4, and 6.9.1.13.b are not applicable.

#### SURVEILLANCE REQUIREMENTS

4.3.3.9 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 operations at the frequencies shown in table 4.3-8.

8510090134 850927  
PDR ADOCK 05000327  
P PDR

TABLE 3.3-12 (Continued)

TABLE NOTATION

- ACTION 30 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may continue provided that prior to initiating a release:
- At least two independent samples are analyzed in accordance with Specification 4.11.1.1.1, and
  - At least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge line valving;
- Otherwise, suspend release of radioactive effluents via this pathway.
- ACTION 31 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are analyzed for gross radioactivity gamma at a limit of detection of at least  $10^{-7}$  microcuries/gram:
- ~~At least once per 12 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microcuries/gram DOSE EQUIVALENT I-131.~~  
*greater*
  - At least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microcuries/gram DOSE EQUIVALENT I-131.
- ACTION 32 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided that, at least once per 12 hours, grab samples are collected and analyzed for gross radioactivity gamma at a limit of detection of at least  $10^{-7}$  microcuries/ml.
- ACTION 33 - 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.
- ACTION 34 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, liquid additions to this tank may continue provided the tank liquid level is estimated during all liquid additions to the tank.

## INSTRUMENTATION

### RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

#### LIMITING CONDITION FOR OPERATION

---

3.3.3.10 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.3-13 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.11.2.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with the methodology and parameters in the ODCM.

APPLICABILITY: As shown in Table 3.3-13

#### ACTION:

- a. With a radioactive gaseous effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above Specification, without delay suspend the release of radioactive gaseous effluents monitored by the affected channel, declare the channel inoperable, or change the setpoint so it is acceptably conservative.
- b. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.3-13. Exert best efforts to return the instrument to OPERABLE status with 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the operability could not be corrected within 30 days.
- c. The provisions of Specifications 3.0.3, 3.0.4, and 6.9.1.13.b are not applicable.

#### SURVEILLANCE REQUIREMENTS

---

4.3.3.10 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 4.3-9.



TABLE 3.3-13 (Continued)

TABLE NOTATION

\* At all times.

\*\* During waste gas disposal system operation.

\*\*\* During shield building exhaust system operation.

ACTION 40 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) 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 release rate calculations and discharge valve lineup;

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 41 - 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 42 - 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 noble gas gross activity within 24 hours.

ACTION 43 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, operation of these waste gas disposal system may continue ~~for up to 14 days~~ provided grab samples are taken and analyzed either (1) every 4 hours during degassing operations of the reactor coolant system, or (2) daily during other operations.

ACTION 44 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue provided that within 4 hours after the channel has been declared inoperable samples are continuously collected with auxiliary sampling equipment as required in Table 4.11-2.



TABLE 4.11-1 (Continued)

$2.22 \times 10^6$  is the number of disintegrations per minute per microcurie,  
Y is the fractional radiochemical yield (when applicable),

$\lambda$  is the radioactive decay constant for the particular radionuclide,  
and

$\Delta t$  from plant effluents is the elapsed time between midpoint of sample collection and time of counting (MIDPOINT)

It should be recognized that the LLD is defined as 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 particulate measurement.

- b. A composite sample is one 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.
- c. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.
- d. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed, by a method described in the ODCM, to assure representative sampling.
- e. A continuous release is the discharge of liquid wastes of a non-discrete volume; e.g., from a volume of system that has an input flow during the continuous release. *shall also be measured, with an LLD of  $5 \times 10^{-6}$ .*
- f. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, ~~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. ||
- g. Releases from these tanks are continuously composited during releases. With the composite sampler or the sampler flow monitor inoperable, the sampling frequency shall be changed to require representative batch samples from each tank to be released to be taken prior to release and manually composite for these analyses.
- h. Applicable only during periods of primary to secondary leakage or the release of radioactivity as detected by the effluent radiation monitor provided the radiation monitor setpoint is at a LLD of  $\leq 1 \times 10^{-6}$   $\mu\text{Ci/ml}$  and allowing for background radiation during periods when primary to secondary leakage is not occurring. ||

## RADIOACTIVE EFFLUENTS

### LIQUID WASTE TREATMENT

#### LIMITING CONDITION FOR OPERATION

---

3.11.1.3 The liquid radwaste treatment system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent to unrestricted areas (see Figure 5.1-1) would exceed 0.06 mrem to the total body\* or 0.2 mrem to any organ\* in a 31-day period.

APPLICABILITY: At all times.

ACTION:

- a. With radioactive liquid waste being discharged without treatment ~~for more than 31 days~~ and in excess of the above limits, in lieu of an LER, prepare and submit to the Commission within 30 days pursuant to Specification 6.9.2 a Special Report which includes the following information:
  1. Identification of the inoperable equipment or subsystems and the reason for inoperability,
  2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and
  3. Summary description of action(s) taken to prevent a recurrence.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

---

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

\*Per reactor unit

## RADIOACTIVE EFFLUENTS

### 3/4.11.2 GASEOUS EFFLUENTS

#### DOSE RATE

#### LIMITING CONDITION FOR OPERATION

---

3.11.2.1 The dose rate due to radioactive materials released in gaseous effluents to areas at or beyond the site boundary (unrestricted areas) (see Figure 5.1-1) shall be limited to the following:

- a. 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, and **Iodine 133**
- b. 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.

APPLICABILITY: At all times.

#### ACTION:

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

#### SURVEILLANCE REQUIREMENTS

---

4.11.2.1.1 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and parameters in the ODCM.

4.11.2.1.2 The dose rate due to **I-133** I-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 methodology and parameters of the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 4.11-2.



Table 4.11-2  
Radioactive Gaseous Waste Monitoring  
Sampling and Analysis Program

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) ( $\mu\text{Ci/ml}$ ) <sup>a</sup>
A. Waste Gas Storage Tank	P Each Tank Grab	P Each Tank	<del>Principal Gamma Emitter</del> <del>Noble Gases</del> <del>Principal Gamma Emitter</del> <del>Noble Gas</del> <sup>8</sup>	$1 \times 10^{-4}$
B. Containment	Pi Each Purge Grab Sample	Di Each Purge	H-3 Principal Gamma Emitter <del>Noble Gas</del> <sup>8</sup>	$1 \times 10^{-4}$ $1 \times 10^{-6}$
2. Vent	Dj Each Day Grab Sample	Dj Each Day	H-3 Principal Gamma Emitter	$1 \times 10^{-4}$ $1 \times 10^{-6}$
C. Noble Gases and Tritium	M Grab Sample	N	<del>Noble Gases</del> <sup>8</sup> H-3	$1 \times 10^{-4}$ $1 \times 10^{-6}$
1. Condenser Vacuum Exhaust <sup>h</sup>				
2. Auxiliary Building Exhaust <sup>b,e</sup>				
3. Service Building Exhaust				
4. Shield Building Exhaust <sup>b,c,h</sup>				
D. Iodine and Particulates	f Continuous Sampler	W <sup>d</sup> Charcoal Sample	I-131	$1 \times 10^{-12}$
1. Auxiliary Building Exhaust	f Continuous Sampler	W <sup>d</sup> Particulate Sample	Principal Gamma Emitter <sup>8</sup> (I-131, Others)	$1 \times 10^{-11}$
2. Shield Building Exhaust	f Continuous Sampler	M Composite Particulate Sample	Gross Alpha	$1 \times 10^{-11}$
	f Continuous Sampler	O Composite Particulate Sample	Sr-89, Sr-90	$1 \times 10^{-11}$
E. Noble Gases all Releases types as listed in C	f Continuous Monitor	Sample Noble Gas Monitor	Noble Gases Gross Beta or Gamma	$1 \times 10^{-6}$

TABLE 4.11-2 (Continued)

TABLE NOTATION

- a. The LLD is defined, for the purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count above system background that will be detected with 95% probability with only a 5% probability of falsely concluding that a blank observation represents a "real" signal.

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

$$LLD = \frac{4.66s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(\lambda \cdot \Delta t)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above in microcurie 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 disintegration,

V is the sample size in units of mass or volume,

$2.22 \times 10^6$  is the number of disintegrations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

$\lambda$  is the radioactive decay constant for the particular radionuclide, and

$\Delta t$  for plant effluents is the elapsed time between midpoint of sample collection and time of counting (midpoint).

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

- b. Sampling and analysis shall also be performed following shutdown, startup, or a thermal power change exceeding 15% of rated thermal power within 1 hour unless (1) analysis shows that the dose equivalent I-131 concentration in the primary coolant has not increased more than a factor of 3 and (2) the noble gas activity monitor shows that the effluent activity has not increased by more than a factor of 3. ~~and the noble gas monitor reading is at least 50% of the monitor setpoint.~~

WITHDRAW (TP d. only)

TABLE 4.1.1 (Continued)

TABLE NOTATION

- c. Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.
- d. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from sampler). Sampling shall also be performed at least once per 24 hours for at least 2 days following each shutdown from  $\geq 15\%$  RATED THERMAL POWER, startup of  $\geq 15\%$  RATED THERMAL POWER or THERMAL POWER change exceeding 15% of RATED THERMAL POWER in one hour and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLD's may be increased by a factor of 10.
- e. Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.
- f. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.11.2.1, 3.11.2.2 and 3.11.2.3.
- g. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for noble gases and Mn-54, Fe-59, I-131, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate principal gamma emitters. This list does not mean that only these nuclides are to be detected and reported. Other gamma peaks that are measureable and identifiable, together with the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.12.
- h. During releases via this exhaust system.
- i. Purging - Applicable in MODES 1, 2, 3, and 4, the upper and lower compartments of the containment shall be sampled prior to PURGING. Prior to breaking containment integrity in MODE 5 or 6, the upper and lower compartments of the containment shall be sampled. The incore instrument room purge sample shall be obtained at the shield building exhaust between 20 and 25 minutes following initiation of the incore instrument room purge.
- j. Venting - Applicable in Modes 1, 2, 3, and 4; the containment will be vented to the containment annulus and then to the auxiliary building via containment annulus fans. The lower containment compartment shall be sampled daily when venting is to occur to account for the radioactivity being discharged from the venting process.



## RADIOACTIVE EFFLUENTS

DOSE - I-131, TRITIUM, AND RADIONUCLIDES IN PARTICULATE FORM

I-133

### LIMITING CONDITION FOR OPERATION

I-133,

3.11.2.3 The dose to a MEMBER OF THE PUBLIC from I-131, Tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to areas at or beyond the site boundary (see Figure 5.1-1) shall be limited to the following from each reactor unit.

- a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ and,
- b. During any calendar year: Less than or equal to 15 mrem to any organ.

APPLICABILITY: At all times.

### ACTION:

I-133,

- a. With the calculated dose from the release of I-131, tritium, and all radionuclides in particulate form with half lives greater than 8 days, in gaseous effluents exceeding any of the above limits, in lieu of an LER, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

## SURVEILLANCE REQUIREMENTS

I-133,

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

TABLE 3.12-2

## REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

## Reporting Levels

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m <sup>3</sup> )	Fish (pCi/Kg, wet)	Milk (pCi/l)	Food Products (pCi/Kg, wet)
H-3	$2 \times 10^4$ <sup>(a)</sup>	NA	NA	NA	NA
Mn-54	$1 \times 10^3$	NA	$3 \times 10^4$	NA	NA
Fe-59	$4 \times 10^2$	NA	$1 \times 10^4$	NA	NA
Co-58	$1 \times 10^3$	NA	$3 \times 10^4$	NA	NA
Co-60	$3 \times 10^2$	NA	$1 \times 10^4$	NA	NA
Zn-65	$3 \times 10^2$	NA	$2 \times 10^4$	NA	NA
Zr-Nb-95	$4 \times 10^2$	NA	NA	NA	NA
I-131	$2$ <sup>(b)</sup>	0.9	NA	3	$1 \times 10^2$
Cs-134	30	10	$1 \times 10^3$	60	$1 \times 10^3$
Cs-137	50	20	$2 \times 10^3$	70	$2 \times 10^3$
Ba-La-140	$2 \times 10^2$	NA	NA	$3 \times 10^2$	NA

(a) For drinking water samples. This is 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

(b) If no drinking water pathway exists, a value of 20 pCi/l may be used.

TABLE 4.12-1

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)<sup>a, b</sup>

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m <sup>3</sup> )	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
gross beta	4	$1 \times 10^{-2}$	NA	NA	NA	NA
H-3	2000 *	NA	NA	NA	NA	NA
Mn-54	15	NA	130	NA	NA	NA
Fe-59	30	NA	260	NA	NA	NA
Co-58, 60	15	NA	130	NA	NA	NA
Zn-65	30	NA	260	NA	NA	NA
Zr-95	30	NA	NA	NA	NA	NA
Nb-95	15	NA	NA	NA	NA	NA
I-131	15 **	$7 \times 10^{-2}$	NA	1	60	NA
Cs-134	15	$5 \times 10^{-2}$	130	15	60	150
Cs-137	18	$6 \times 10^{-2}$	150	18	80	180
Ba-140	60	NA	NA	60	NA	NA
La-140	15	NA	NA	15	NA	NA

\* If no drinking water pathway exists, a value of 3000 pCi/l may be used.

\*\* If no drinking water pathway exists, a value of 15 pCi/l may be used.



TABLE 4.12-1 (Continued)

TABLE NOTATION

- ~~b. The LLD for analysis of drinking water and surface water samples shall be performed by gamma spectroscopy at approximately 15 pCi/l. If levels greater than 15 pCi/l are identified in surface water samples downstream from the plant, or in the event of an unanticipated release of I-131, drinking water samples will be analyzed at a LLD of 1.0 pCi/l for I-131.~~
- b. Other peaks which are measurable and identifiable, together with the radionuclides in Table 4.12-1, shall be identified and reported.

## RADIOLOGICAL ENVIRONMENTAL MONITORING

### 3/4.12.2 LAND USE CENSUS

#### LIMITING CONDITION FOR OPERATION

3.12.2 A Land Use Census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden\* of greater than 50 m<sup>2</sup> (500 ft<sup>2</sup>) producing fresh leafy vegetation.

APPLICABILITY: At all times.

#### ACTION:

- a. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment 20% greater than the values currently being calculated in Specification 4.11.2.3, identify the new location(s) in the next Semiannual Radioactive Effluent Release Report, pursuant to Specification 6.9.1.7.
- b. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with Specification 3.12.1, add the new location(s) within 30 days to the Radiological Environmental Monitoring Program given in the ODCM, if samples are available. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), 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. Pursuant to Specification 6.14, submit in the next Semiannual Radioactive Effluent Release Report documentation for a change in the ODCM including a revised figure(s) and table(s) for the ODCM reflecting the new location(s) with information supporting the change in sampling locations.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

4.12.2 The Land Use Census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, mail survey, telephone survey, aerial survey, or by consulting local agriculture authorities. The results of the Land Use Census shall be included in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.1.6.

\*Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 3.12-1.4c. shall be followed, including analysis of control samples.

SEQUOYAH-  
WATTS BAR - UNIT 1

3/4 12-10

## RADIOACTIVE EFFLUENTS

### BASES

---

This specification applies to the release of gaseous effluents from all reactors at the site. For units with shared radwaste treatment systems, the gaseous effluents from the shared system are proportioned among the units sharing that system.

#### 3/4.11.2.2 DOSE, NOBLE GASES

This specification is provided to implement the requirements of Sections II.B, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.B of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable". The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix 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 the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision I, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at the site boundary are based upon the historical average atmospheric conditions.

#### IODINE 133,

#### 3/4.11.2.3 DOSE - IODINE 131, TRITIUM, AND RADIONUCLIDES

This specification is provided to implement the requirements of Sections II.C, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation are the guides set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable". The ODCM calculational methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methods for calculating the doses due to the actual release rates of the subject materials are consistent with the methodologies provided in NUREG/CR-1004, "A Statistical Analysis of Selected Parameters for Predicting Food Chain Transport and Internal Dose of Radionuclides", October, 1979 and Regulatory Guide 1.109, "Calculation of



## RADIOACTIVE EFFLUENTS

### BASES

---

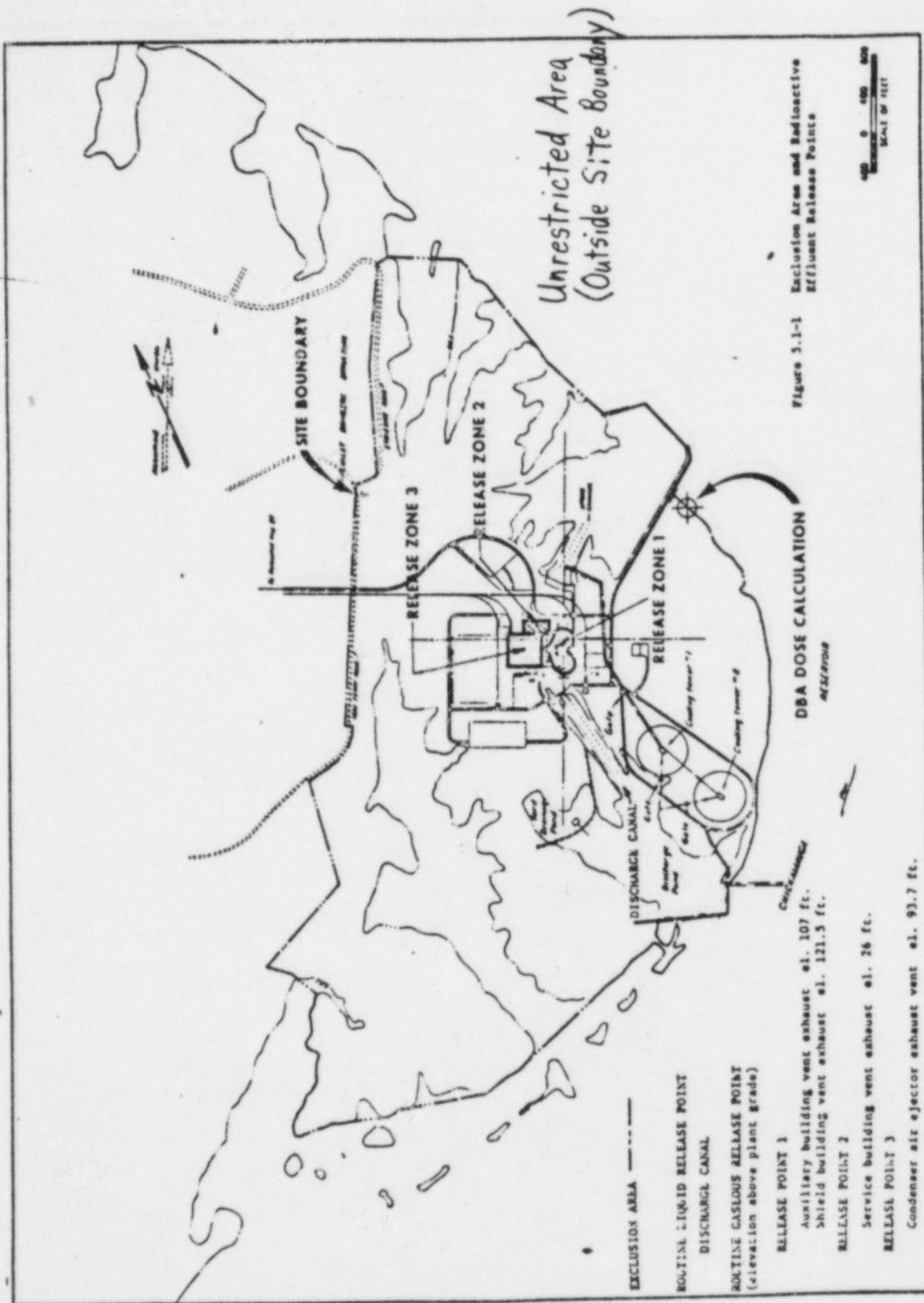
Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for I-131, ~~I-133~~ Tritium, and Radionuclides in particulate form with half-lives greater than 8 days are dependent on the existing radionuclide pathways to man, beyond the site boundary. The pathways which were examined in the development of these calculations were: (1) individual inhalation of airborne radionuclides, (2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, (3) deposition onto grassy areas where milk animals and meat producing animals graze with consumption of the milk and meat by man, and (4) deposition on the ground with subsequent exposure of man.

#### 3/4.11.2.4 GASEOUS RADWASTE TREATMENT

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

#### 3/4.11.2.5 EXPLOSIVE GAS MIXTURE

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



## ADMINISTRATIVE CONTROLS

The annual radiological environmental operating reports shall include summarized and tabulated results in the format of Regulatory Guide 4.8, December 1975 of all radiological environmental samples taken during the report period. In the event that some results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the radiological environmental monitoring program; a map of all sampling locations keyed to a table giving distances and directions from one reactor; and the results of licensee participation in the Interlaboratory Comparison Program, required by Specification 3.12.3.

### SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT<sup>1/</sup>

6.9.1.8 The semiannual radioactive effluent release report covering the operation of the unit during the previous 6 months of operation shall be submitted within 60 days after January 1 and July 1 of each year. The period of the first report shall begin with the date of initial criticality.

6.9.1.9 Semiannual radioactive effluent release reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof.

The annual radioactive effluent release report (Radiological Impact) to be submitted 60 days after January 1 of each year shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing of wind speed, wind direction, atmospheric stability, and precipitation (if measured) on magnetic tape, or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.\* This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to members of the public due to their activities inside the site boundary (Figure 5.1-1) during the report period. All assumptions used in making these assessments (i.e., specific activity, exposure time and location) shall be included in these reports. The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents (as determined by sampling frequency and measurement) shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the OFFSITE DOSE CALCULATION MANUAL (ODCM).

<sup>1/</sup> A single submittal may be made for a multiple unit station. The submittal should combine those sections that are common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.

\* In lieu of submission with the annual radioactive effluent release report, this summary of required meteorological data may be retained on site in a file that shall be provided to NRC upon request.



## ADMINISTRATIVE CONTROLS

- b. a determination that the change did not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes; and
- c. documentation of the fact that the change has been reviewed and found acceptable by the PORC.

2. Shall become effective upon review and acceptance by the PORC.

### 6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

6.14.1 The ODCM shall be approved by the Commission prior to implementation.

6.14.2 Licensee initiated changes to the ODCM:

- 1. Shall be submitted to the Commission in the next <sup>semi-</sup>annual radioactive effluent release report pursuant to specification 6.9.1.9. This submittal shall contain:
  - a. sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information. Information submitted should consist of a package of those pages of the ODCM to be changes with each page numbered and provided with an approval and date box, together with appropriate analyses or evaluations justifying the change(s);
  - b. a determination that the change will not reduce the accuracy or reliability of dose calculations or setpoint determinations; and
  - c. documentation of the fact that the change has been reviewed and found acceptable by the RARC.

2. Shall become effective upon review and acceptance by the RARC.

### 6.15 MAJOR CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS (Liquid, Gaseous and Solid)

6.15.1 Licensee initiated major changes to the radioactive waste systems (liquid, gaseous and solid): \*

- 1. Shall be reported to the Commission in the <sup>semi annual radioactive effluent release report</sup> ~~Monthly Operating Report~~ for the period in which the evaluation was reviewed by the PORC. The discussion of each change shall contain:
  - a. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59;

\* Submittal of information required by this section may be made as part of the annual FSAR update.

## INSTRUMENTATION

### RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

#### LIMITING CONDITION FOR OPERATION

---

3.3.3.9 The radioactive liquid effluent monitoring instrumentation channels shown in table 3.3-12 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.11.1.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with the methodology and the parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

APPLICABILITY: During releases via these pathways.

#### ACTION:

- a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, without delay, suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable, or change the setpoint so it is acceptably conservative.
- b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE take the ACTION shown in table 3.3-12. Exert best effort to return the instruments to OPERABLE status within 30 days and, if unsuccessful, explain in ~~the next~~ Annual Radioactive Effluent Release Report why the inoperability could not be corrected within 30 days.
- c. The provisions of Specifications 3.0.3, 3.0.4, and 6.9.1.13.b are not applicable.

#### SURVEILLANCE REQUIREMENTS

---

4.3.3.9 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 operations at the frequencies shown in table 4.3-8.

## INSTRUMENTATION

### RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

#### LIMITING CONDITION FOR OPERATION

---

3.3.3.10 The radioactive gaseous effluent monitoring instrumentation channels shown in table 3.3-13 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.11.2.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with the ODCM.

APPLICABILITY: As shown in table 3.3-13

#### ACTION:

- a. With a radioactive gaseous effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, without delay, suspend the release of radioactive gaseous effluent monitored by the affected channel or declare the channel inoperable, or change the setpoint so it is acceptably conservative.
- b. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in table 3.3-13. Exert best efforts to return the instrument to ~~OPERABLE~~ status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the operability could not be corrected within 30 days.
- c. The provisions of Specifications 3.0.3, 3.0.4, and 6.9.1.13.b are not applicable.

#### SURVEILLANCE REQUIREMENTS

---

4.3.3.10 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST at the frequencies shown in table 4.3-9.



TABLE 3.3-13 (Continued)

TABLE NOTATION

- \* At all times.
- \*\* During waste gas disposal system operation.
- \*\*\* During shield building exhaust system operation.

- ACTION 40 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) 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 release rate calculations and discharge valve lineup;
- Otherwise, suspend release of radioactive effluents via this pathway.
- ACTION 41 - 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 42 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the grab samples are taken at least once per 8 hours and these samples are analyzed for noble gas gross activity within 24 hours.
- ACTION 43 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, operation of this waste gas disposal system may continue ~~for up to 14 days~~ provided grab samples are taken and analyzed either (1) every 4 hours during degassing operations of the reactor coolant system or (2) daily during other operations.
- ACTION 44 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continued provided that within 4 hours after the channel has been declared inoperable samples are continuously collected with auxiliary sampling equipment as required in table 4.11-2.

TABLE 4.11-1 (Continued)

$2.22 \times 10^6$  is the number of disintegrations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

$\lambda$  is the radioactive decay constant for the particular radionuclide, and

$\Delta t$  from plant effluents is the elapsed time between midpoint of sample collection and time of counting (midpoint).

It should be recognized that the LLD is defined as 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 particulate measurement.

- b. A composite sample is one 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.
- c. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.
- d. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed, by a method described in the ODCM, to assure representative sampling.
- e. A continuous release is the discharge of liquid wastes of a non-discrete volume; e.g., from a volume of system that has an input flow during the continuous release.  
*shall also be measured, with an LLD of  $5 \times 10^{-6}$*
- f. The principal gamma emitters for which the LLD specification applies exclusively are 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.
- g. Releases from these tanks are continuously composited during releases. With the composite sampler or the sampler flow monitor inoperable, the sampling frequency shall be changed to require representative batch samples from each tank to be released to be taken prior to release and manually composite for these analyses.
- h. Applicable only during periods of primary to secondary leakage or the release of radioactivity as detected by the effluent radiation monitor provided the radiation monitor setpoint is at a LLD of  $\leq 1 \times 10^{-6}$   $\mu\text{Ci/ml}$  and allowing for background radiation during periods when primary to secondary leakage is not occurring.

## RADIOACTIVE EFFLUENTS

### LIQUID WASTE TREATMENT

#### LIMITING CONDITION FOR OPERATION

---

3.11.1.3 The liquid radwaste treatment system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent to unrestricted areas (see figure 5.1-1) when averaged over 31 days, would exceed 0.06 mrem to the total body\* or 0.2 mrem to any organ\* in a 31 day period.

APPLICABILITY: At all times.

#### ACTION:

- a. With radioactive liquid waste being discharged without treatment ~~for more than 31 days~~ and in excess of the above limits, in lieu of a LER, prepare and submit to the Commission within 30 days pursuant to Specification 6.9.2 a Special Report which includes the following information:
  1. Identification of the inoperable equipment or subsystems and the reason for inoperability,
  2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and
  3. Summary description of action(s) taken to prevent a recurrence.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

---

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

---

\*Per reactor unit



## RADIOACTIVE EFFLUENTS

### 3/4.11.2 GASEOUS EFFLUENTS

#### DOSE RATE

#### LIMITING CONDITION FOR OPERATION

---

3.11.2.1 The dose rate due to radioactive materials released in gaseous effluents to areas at or beyond the site boundary (unrestricted areas) (see figure 5.1-1) shall be limited to the following:

- a. 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, and  
**Iodine 133,**
- b. For Iodine 131, <sup>↓</sup>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.

APPLICABILITY: At all times.

#### ACTION:

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

#### SURVEILLANCE REQUIREMENTS

---

4.11.2.1.1 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and parameters in the ODCM.

**I-133**

4.11.2.1.2 The dose rate due to I-131, <sup>↓</sup>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 methodology and parameters in the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in table 4.11-2.

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) ( $\mu\text{Ci/ml}$ ) <sup>a</sup>
A. Waste Gas Storage Tank	P Each Tank Grab	P Each Tank	<del>Principal Gamma Emitter</del> <del>Noble Gases</del> <sup>g</sup> <del>Principal Gamma Emitter</del>	$1 \times 10^{-4}$
B. Containment	Pi	Di	<del>Noble Gas</del> <sup>g</sup> H-3	$1 \times 10^{-4}$ $1 \times 10^{-6}$
1. Purge	Each Purge Grab Sample	Each Purge	<del>Principal Gamma Emitter</del> <del>Noble Gas</del> <sup>g</sup> H-3	$1 \times 10^{-4}$ $1 \times 10^{-6}$
2. Vent	Dj Each Day Grab Sample	Dj Each Day	<del>Principal Gamma Emitter</del> <del>Noble Gas</del> <sup>g</sup> H-3	$1 \times 10^{-4}$ $1 \times 10^{-6}$
C. Noble Gases and Tritium	M	M	<del>Principal Gamma Emitter</del> <del>Noble Gases</del> <sup>g</sup> H-3	$1 \times 10^{-4}$ $1 \times 10^{-6}$
1. Condenser Vacuum Exhaust <sup>h</sup>	Grab Sample			
2. Auxiliary Building Exhaust <sup>b,e</sup>				
3. Service Building Exhaust				
4. Shield Building Exhaust <sup>b,c,h</sup>				
D. Iodine and Particulates	Continuous <sup>f</sup> Sampler	W <sup>d</sup> Charcoal Sample	I-131	$1 \times 10^{-12}$
1. Auxiliary Building Exhaust	Continuous <sup>f</sup> Sampler	W <sup>d</sup> Particulate Sample	Principal Gamma Emitter <sup>g</sup> (I-131, Others)	$1 \times 10^{-11}$
2. Shield Building Exhaust	Continuous <sup>f</sup> Sampler	M Composite Particulate Sample	Gross Alpha	$1 \times 10^{-11}$
	Continuous <sup>f</sup> Sampler	O Composite Particulate Sample	Sr-89, Sr-90	$1 \times 10^{-11}$
E. Noble Gases all Releases types as listed in C	Continuous <sup>f</sup> Monitor	Sample Noble Gas Monitor	Noble Gases Gross Beta or Gamma	$1 \times 10^{-6}$

Table 4.11-2  
Radioactive Gaseous Waste Monitoring  
Sampling and Analysis Program

TABLE 4.11-2 (Continued)

TABLE NOTATION

- a. The LLD is defined, for the purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count above system background that will be detected with 95% probability with only a 5% probability of falsely concluding that a blank observation represents a "real" signal.

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

$$LLD = \frac{4.66s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot \exp(\lambda \Delta t)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above in microcurie 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 disintegration,

V is the sample size in units of mass or volume,

$2.22 \times 10^6$  is the number of disintegrations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

$\lambda$  is the radioactive decay constant for the particular radionuclide, and

$\Delta t$  for plant effluents is the elapsed time between midpoint of sample collection and time of counting (midpoint).

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

- b. Sampling and analysis shall also be performed following shutdown, startup, or a thermal power change exceeding 15% of rated thermal power within 1 hour unless (1) analysis shows that the dose equivalent I-131 concentration in the primary coolant has not increased more than a factor of 3 and (2) the noble gas activity monitor shows that the effluent activity has not increased by more than a factor of 3. ~~and the noble gas monitor reading is at least 50% of the monitor setpoint.~~



Withdraw  
(IP-d only)

TABLE 4.11-2 (Continued)

TABLE NOTATION

- c. Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.
- d. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from sampler). Sampling shall also be performed at least once per 24 hours for at least 2 days following each shutdown from  $\geq 15\%$  RATED THERMAL POWER, startup to  $\geq 15\%$  RATED THERMAL POWER or THERMAL POWER change exceeding 15% of RATED THERMAL POWER in one hour and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLD's may be increased by a factor of 10.
- e. Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.
- f. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.11.2.1, 3.11.2.2 and 3.11.2.3.
- g. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for noble gases and Mn-54, Fe-59, I-131, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate principal gamma emitters. This list does not mean that only these nuclides are to be detected and reported. Other gamma peaks that are measureable and identifiable, together with the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.12.
- h. During releases via this exhaust system.
- i. Purging - Applicable in MODES 1, 2, 3, and 4, the upper and lower compartments of the containment shall be sampled prior to PURGING. Prior to breaking containment integrity in MODE 5 or 6, the upper and lower compartments of the containment shall be sampled. The incore instrument room purge sample shall be obtained at the shield building exhaust between 20 and 25 minutes following initiation of the incore instrument room purge.
- j. Venting - Applicable in Modes 1, 2, 3, and 4; the containment will be vented to the containment annulus and then to the auxiliary building via containment annulus fans. The lower containment compartment shall be sampled daily when venting is to occur to account for the radioactivity being discharged from the venting process.

## RADIOACTIVE EFFLUENTS

### DOSE - I-131, <sup>I-133,</sup> TRITIUM, AND RADIONUCLIDES IN PARTICULATE FORM

#### LIMITING CONDITION FOR OPERATION

3.11.2.3 The dose to a MEMBER OF THE PUBLIC from I-131, <sup>I-133,</sup> tritium, and radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to areas at or beyond the site boundary (see figure 5.1-1) shall be limited to the following from each reactor unit.

- a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ, and
- b. During any calendar year: Less than or equal to 15 mrem to any organ.

APPLICABILITY: At all times.

#### ACTION:

- a. With the calculated dose from the release of I-131, <sup>I-133,</sup> 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 a LER, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

4.11.2.3 Cumulative dose contributions for the current calendar quarter and current calendar year for I-131, <sup>I-133,</sup> tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the methodology and parameters in the ODCM at least once per 31 days.

TABLE 3.12-2

## REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Reporting Levels				
	Water (pCi/l)	Airborne Particulate or Gases (pCi/m <sup>3</sup> )	Fish (pCi/Kg, wet)	Milk (pCi/l)	Food Products (pCi/Kg, wet)
H-3	$2 \times 10^4$ <sup>(a)</sup>	N.A.	N.A.	N.A.	N.A.
Mn-54	$1 \times 10^3$	N.A.	$3 \times 10^4$	N.A.	N.A.
Fe-59	$4 \times 10^2$	N.A.	$1 \times 10^4$	N.A.	N.A.
Co-58	$1 \times 10^3$	N.A.	$3 \times 10^4$	N.A.	N.A.
Co-60	$3 \times 10^2$	N.A.	$1 \times 10^4$	N.A.	N.A.
Zn-65	$3 \times 10^2$	N.A.	$2 \times 10^4$	N.A.	N.A.
Zr-Nb-95	$4 \times 10^2$	N.A.	N.A.	N.A.	N.A.
I-131	2 <sup>(b)</sup>	0.9	N.A.	3	$1 \times 10^2$
Cs-134	30	10	$1 \times 10^3$	60	$1 \times 10^3$
Cs-137	50	20	$2 \times 10^3$	70	$2 \times 10^3$
Ba-La-140	$2 \times 10^2$	N.A.	N.A.	$3 \times 10^2$	N.A.

(a) For drinking water samples. This is 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

(b) If no drinking water pathway exists, a value of 20 pCi/l may be used.



TABLE 4.12-1

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)<sup>a, b</sup>

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m <sup>3</sup> )	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
gross beta	4	$1 \times 10^{-2}$	N.A.	N.A.	N.A.	N.A.
H-3	2000 *	N.A.	N.A.	N.A.	N.A.	N.A.
Mn-54	15	N.A.	130	N.A.	N.A.	N.A.
Fe-59	30	N.A.	260	N.A.	N.A.	N.A.
Co-58,60	15	N.A.	130	N.A.	N.A.	N.A.
Zn-65	30	N.A.	260	N.A.	N.A.	N.A.
Zr-95	30	N.A.	N.A.	N.A.	N.A.	N.A.
Nb-95	15	N.A.	N.A.	N.A.	N.A.	N.A.
I-131	<del>15</del> 1 **	$7 \times 10^{-2}$	N.A.	1	60	N.A.
Cs-134	15	$5 \times 10^{-2}$	130	15	60	150
Cs-137	18	$6 \times 10^{-2}$	150	18	80	180
Ba-140	60	N.A.	N.A.	60	N.A.	N.A.
La-140	15	N.A.	N.A.	15	N.A.	N.A.

\* If no drinking water pathway exists, a value of 3000 pCi/l may be used.

\*\* If no drinking water pathway exists, a value of 15 pCi/l may be used.

TABLE 4.12-1 (Continued)

TABLE NOTATION

~~b. The LLD for analysis of drinking water and surface water samples shall be performed by gamma spectroscopy at approximately 15 pCi/l. If levels greater than 15 pCi/l are identified in surface water samples downstream from the plant, or in the event of an unanticipated release of I-131, drinking water samples will be analyzed at a LLD of 1.0 pCi/l for I-131.~~

b. ~~c.~~

Other peaks which are measurable and identifiable, together with the radionuclides in Table 4.12-1, shall be identified and reported.

## RADIOLOGICAL ENVIRONMENTAL MONITORING

### 3/4.12.2 LAND USE CENSUS

#### LIMITING CONDITION FOR OPERATION

3.12.2 A Land Use Census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden\* of greater than 50 m<sup>2</sup> (500 ft<sup>2</sup>) producing fresh leafy vegetation.

APPLICABILITY: At all times.

#### ACTION:

- a. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment 20% greater than the values currently being calculated in Specification 4.11.2.3, identify the new location(s) in the next Semiannual Radioactive Effluent Release Report, pursuant to Specification 6.9.1.7.
- b. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with Specification 3.12.1, add the new location(s) within 30 days to the Radiological Environmental Monitoring Program given in the ODCM, if samples are available. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), 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. Pursuant to Specification 6.14, submit in the next Semiannual Radioactive Effluent Release Report documentation for a change in the ODCM including a revised figure(s) and table(s) for the ODCM reflecting the new location(s) with information supporting the change in sampling locations.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

4.12.2 The Land Use Census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, mail survey, telephone survey, aerial survey, or by consulting local agriculture authorities. The results of the Land Use Census shall be included in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.1.6.

\*Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 3.12-1.4c. shall be followed, including analysis of control samples.



## RADIOACTIVE EFFLUENTS

### BASES

#### 3/4.11.2.2 DOSE, NOBLE GASES

This specification is provided to implement the requirements of Sections II.B, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.B of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable". The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix 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 in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, "Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at the site boundary are based upon the historical average atmospheric conditions.

IODINE-133,

#### 3/4.11.2.3 DOSE - IODINE-131, TRITIUM, AND RADIONUCLIDES

This specification is provided to implement the requirements of Sections II.C, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation are the guides set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable". The ODCM calculational methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methods for calculating the doses due to the actual release rates of the subject materials are consistent with the methodologies provided in NUREG/CR-1004, "A Statistical Analysis of Selected Parameters for Predicting Food Chain Transport and Internal Dose of Radionuclides", October, 1979 and Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for I-131, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent



Figure 5-1-1 Exclusion Area and Radiative Effluent Release Points

## ADMINISTRATIVE CONTROLS

The annual radiological environmental operating reports shall include summarized and tabulated results in the format of Regulatory Guide 4.8, December 1975 of all radiological environmental samples taken during the report period. In the event that some results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the radiological environmental monitoring program; a map of all sampling locations keyed to a table giving distances and directions from one reactor; and the results of licensee participation in the Interlaboratory Comparison Program, required by Specification 3.12.3.

### SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT<sup>1/</sup>

6.9.1.8 The semiannual radioactive effluent release report covering the operation of the unit during the previous 6 months of operation shall be submitted within 60 days after January 1 and July 1 of each year. The period of the first report shall begin with the date of initial criticality.

6.9.1.9 Semiannual radioactive effluent release reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof.

The annual radioactive effluent release report (Radiological Impact) to be submitted 60 days after January 1 of each year shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing of wind speed, wind direction, atmospheric stability, and precipitation (if measured) on magnetic tape, or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability. This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to members of the public due to their activities inside the site boundary (Figure 5.1-1) during the report period. All assumptions used in making these assessments (i.e., specific activity, exposure time and location) shall be included in these reports. The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents (as determined by sampling frequency and measurement) shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the OFFSITE DOSE CALCULATION MANUAL (ODCM).

<sup>1/</sup> A single submittal may be made for a multiple unit station. The submittal should combine those sections that are common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit.

### SEQUOYAH - UNIT 2

\* In lieu of submission with the annual <sup>6-23 radioactive effluent</sup> release report, this summary of required meteorological data may be retained on site in a file that shall be provided to NRC upon request.



## ADMINISTRATIVE CONTROLS

### 6.13 PROCESS CONTROL PROGRAM (PCP)

#### 6.13.1 Licensee initiated changes to the PCP:

1. Shall be submitted to the Commission in the semi-annual Radioactive Effluent Release Report for the period in which the change(s) was made. This submittal shall contain:
  - a. sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information,
  - b. a determination that the change did not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes; and
  - c. documentation of the fact that the change has been reviewed and found acceptable by the PORC.
2. Shall become effective upon review and acceptance by the PORC.

### 6.14 OFFSITE DOSE CALCULATION MANUAL (ODCM)

6.14.1 The ODCM shall be approved by the Commission prior to implementation.

#### 6.14.2 Licensee initiated changes to the ODCM:

1. Shall be submitted to the Commission in the <sup>semi-</sup>next annual radioactive <sup>effluent</sup> release report pursuant to specification 6.9.1.9. This submittal shall contain:
  - a. sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information. Information submitted should consist of a package of those pages of the ODCM to be changed with each page numbered and provided with an approval and date box, together with appropriate analyses or evaluations justifying the change(s);
  - b. a determination that the change will not reduce the accuracy or reliability of dose calculations or setpoint determinations; and
  - c. documentation of the fact that the change has been reviewed and found acceptable by the RARC.
2. Shall become effective upon review and acceptance by the RARC.

## ADMINISTRATIVE CONTROLS

### 6.15 MAJOR CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS (Liquid, Gaseous and Solid)

6.15.1 Licensee initiated major changes to the radioactive waste systems (liquid, gaseous and solid): \*

1. Shall be reported to the Commission in the ~~Monthly Operating~~ *Semi-annual radioactive effluent* Report for the period in which the evaluation was reviewed by the PORC. The discussion of each change shall contain:
  - a. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59;
  - b. sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information;
  - c. a detailed description of the equipment, components and processes involved and the interfaces with other plant systems;
  - d. an evaluation of the change which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the license application and amendments thereto;
  - e. an evaluation of the change which shows the expected maximum exposures to individual in the unrestricted area and to the general population that differ from those previously estimated in the license application and amendments thereto;
  - f. a comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be made;
  - g. an estimate of the exposure to plant operating personnel as a result of the change; and
  - h. documentation of the fact that the change was reviewed and found acceptable by the PORC.
2. Shall become effective upon review and acceptance by the PORC.

\* Submittal of information required by this section may be made as part of the annual FSAR update.