



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket file

50-289

July 11, 1978

GL-78-25

TO ALL POWER REACTOR LICENSEES

Gentlemen:

In order to provide reasonable assurance that the requirements of 10 CFR 50 Appendix I are implemented at all nuclear power facilities, the NRC staff has prepared the enclosed Appendix I model Technical Specifications. These model specifications are intended to provide guidance in the scope and types of required specifications for each facility in the areas of equipment and administrative requirements including actions we consider appropriate if a limiting condition for operation cannot be met.

The enclosure uses the Standard Technical Specification format with blanks or parentheses appearing where the information is plant specific.

We request that you submit a license amendment application to incorporate the applicable specifications of the enclosed guidance into your Appendix "A" Technical Specifications within the number of days indicated for your facility in the attachment to this letter. A staggered submittal schedule has been selected to facilitate staff review. The staff considers such an amendment to be a CLASS III Amendment per 10 CFR 170.22, provided the application is consistent with the enclosed guidance.

If you have any questions on this matter, please contact us.

Sincerely,

Brian K. Grimes, Assistant Director
for Engineering and Projects
Division of Operating Reactors

Enclosures:

- 1. Model Appendix I Technical Specifications
- 2. Submittal Schedule

} See 50-29

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RADIOLOGICAL EFFLUENT TECHNICAL
SPECIFICATIONS FOR PWR'S

MAY 1978

1.0 DEFINITIONS

CHANNEL CALIBRATION

1.9 A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds with the necessary range and accuracy to known values of the parameter which the channel monitors. The CHANNEL CALIBRATION shall encompass the entire channel including the sensor and alarm and/or trip functions, and shall include the CHANNEL FUNCTIONAL TEST. The CHANNEL CALIBRATION may be performed by any series of sequential, overlapping or total channel steps such that the entire channel is calibrated.

CHANNEL CHECK

1.10 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 instrumentation channels measuring the same parameter.

CHANNEL FUNCTIONAL TEST

1.11 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.

SOURCE CHECK

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

PROCESS CONTROL PROGRAM

1.30 A PROCESS CONTROL PROGRAM shall be the operating procedure and process parameters within which SOLIDIFICATION of radioactive wastes from liquid systems is assured.

SOLIDIFICATION

1.31 SOLIDIFICATION shall be the conversion of radioactive wastes from liquid systems to a homogeneous, monolithic, immobilized solid with definite volume and shape, bounded by a stable surface of distinct outline on all sides (free-standing).

TABLE 1.2
FREQUENCY NOTATION

<u>NOTATION</u>	<u>FREQUENCY</u>
S	At least once per 12 hours.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days.
Q	At least once per 92 days.
SA	At least once per 184 days.
R	At least once per 18 months.
S/U	Prior to each reactor startup.
P	Within 4 hours prior to each release.
N.A.	Not applicable.

INSTRUMENTATION

RADIOACTIVE LIQUID EFFLUENT INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.8 The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.3-11 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-11.

ACTION:

- a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than the value shown in Table 3.3-11, immediately suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable.
- b. With one or more radioactive liquid effluent monitoring instrumentation channels inoperable, take the ACTION shown in Table 3.3-11.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.8 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 during the MODES and at the frequencies shown in Table 4.3-11.

TABLE 3.3-11

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

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<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
1. Gross Activity Monitors Providing Automatic Isolation					
a. Liquid Radwaste Effluent Line	(1)	*	≤ (___ cpm)	(1-10 ⁵ cpm)	18
b. Steam Generator Blowdown Effluent Line	(1)	*	≤ (___ cpm)	(1-10 ⁵ cpm)	19
c. Turbine Building (Floor Drains) Sumps Effluent Line**	(1)	*	≤ (___ cpm)	(1-10 ⁵ cpm)	20
2. Gross Activity Monitors Not Providing Automatic Isolation Control					
a. Service Water Effluent Line	(1)	*	≤ (___ cpm)	(1-10 ⁵ cpm)	20
b. Component Cooling Water System	(1)	*	≤ (___ cpm)	(1-10 ⁵ cpm)	20

* During releases via this pathway

**Includes rinse, flush and slurry waste from secondary system condensate deep bed demineralizer or filter-demineralizers.

TABLE 3.3-11 (Continued)

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

PMR-STS-1

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<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
3. Continuous Composite Samplers and Sampler Flow Monitor					
a. Steam Generator Blowdown Effluent Line	(1)	*	N.A.	N.A.	19
b. Turbine Building Sumps Effluent Line**	(1)	*	N.A.	N.A.	20
4. Flow Rate Monitors					
a. Liquid Radwaste Effluent Line	(1)	*	≥ (___ gpm)	(0-___ gpm)	21
b. Steam Generator Blowdown Effluent Line	(1)	*	≥ (___ gpm)	(0-___ gpm)	21
c. Discharge Canal	(1)	*	≤ (___ gpm)	(0-___ gpm)	21

*During releases via this pathway

**Includes rinse, flush and slurry waste from secondary system condensate deep bed demineralizers or filter-demineralizers.

TABLE 3.3-11 (Continued)
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
5. Activity Recorders					
a. Steam Generator Blowdown Effluent Line	(1)	*	N.A.	(1-10 ⁵ cpm)	23
b. Liquid Radwaste Effluent Line	(1)	*	N.A.	(1-10 ⁵ cpm)	23
6. Tank Level Monitors (for tanks outside the buildings)					
a. _____	(1)	**	≤ (___ ft ³)	(0-1000 ft ³)	22
b. _____	(1)	**	≤ (___ ft ³)	(0-1000 ft ³)	22
c. _____	(1)	**	≤ (___ ft ³)	(0-1000 ft ³)	22
d. _____	(1)	**	≤ (___ ft ³)	(0-1000 ft ³)	22

* During releases via this pathway.
**During liquid addition to the tank.

TABLE 3.3-11 (Continued)

TABLE NOTATION

- ACTION 18 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases from the tank may continue for up to 72 hours provided that prior to initiating the release:
1. At least two independent samples of the tank's contents are analyzed, and
 2. At least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge line valving;
- otherwise, suspend release of radioactive effluents via this pathway.
- ACTION 19 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 7 days provided grab samples are analyzed for gross radioactivity (beta or gamma) at a limit of detection of at least 10^{-7} $\mu\text{Ci}/\text{gram}$:
1. At least once per hour when the specific activity of the secondary coolant is $> 0.001 \mu\text{Ci}/\text{gram DOSE EQUIVALENT I-131}$.
 2. At least once per 8 hours when the specific activity of the secondary coolant is $\leq 0.001 \mu\text{Ci}/\text{gram DOSE EQUIVALENT I-131}$.
- ACTION 20 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 7 days provided that at least once per 8 hours grab samples are analyzed for gross radioactivity (beta or gamma) at a limit of detection of at least $10^{-7} \mu\text{Ci}/\text{ml}$.
- ACTION 21 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 7 days provided the flow rate is estimated at least once per 4 hours.
- ACTION 22 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, liquid additions to this tank may continue for up to 7 days provided the tank liquid level is estimated during all liquid additions to the tank.

TABLE 3.3-11 (Continued)

TABLE NOTATION

ACTION 23 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue for up to 7 days provided the gross radioactivity level is recorded at least once per 4 hours.

TABLE 4.3-11

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
1. Gross Activity Monitors Providing Automatic Isolation					
a. Liquid Radwaste Effluents Line	P	P	R(3)	Q(1)	*
b. Steam Generator Blowdown Effluent Line	D	M	R(3)	Q(1)	*
c. Turbine Building (Floor Drains) Sumps Effluent Line	D	M	R(3)	Q(1)	*
2. Gross Activity Monitors Not Providing Automatic Isolation Control					
a. Service Water Effluent Line	D	M	R(3)	Q(2)	*
b. Component Cooling Water System	D	M	R(3)	Q(2)	*

TABLE 4.3-11 (Continued)

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
3. Continuous Composite Samplers and Sampler Flow Monitor					
a. Steam Generator Blowdown Effluent Line	D	N.A.	R	Q	*
b. Turbine Building Sumps Effluent Line	D	N.A.	R	Q	*
4. Flow Rate Monitors					
a. Liquid Radwaste Effluent Line	D	N.A.	R	Q	*
b. Steam Generator Blowdown Effluent Line	D	N.A.	R	Q	*
c. Discharge Canal	D	N.A.	R	Q	*

TABLE 4.3-11 (Continued)

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
5. Activity Recorders					
a. Steam Generator Blowdown Effluent Line	D	N.A.	R	Q	*
b. Liquid Radwaste Effluent Line	D	N.A.	R	Q	*
6. Tank Level Monitors (for tanks outside the building)					
a. _____	D	N.A.	R	Q	**
b. _____	D	N.A.	R	Q	**
c. _____	D	N.A.	R	Q	**
d. _____	D	N.A.	R	Q	**

TABLE 4.3-11 (Continued)

TABLE NOTATION

- * - During releases via this pathway.
- ** - During liquid additions to the tank.
- (1) - The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm/trip setpoint.
 - 2. Circuit failure.
 - 3. Instrument indicates a downscale failure.
 - 4. Instrument controls not set in operate mode.
- (2) - The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm/trip setpoint.
 - 2. Circuit failure.
 - 3. Instrument indicates a downscale failure.
 - 4. Instrument controls not set in operate mode.
- (3) - The CHANNEL CALIBRATION shall include the use of a known (traceable to the National Bureau of Standards radiation measurement system) liquid radioactive source positioned in a reproducible geometry with respect to the sensor and emitting beta and gamma radiation with fluences and energies in the ranges measured by the channel during normal operation.

INSTRUMENTATION

RADIOACTIVE GASEOUS EFFLUENT INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.9 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.3-12 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-12

ACTION:

- a. With a radioactive gaseous effluent monitoring instrumentation channel alarm/trip setpoint less conservative than the value shown in Table 3.3-12, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel or declare the channel inoperable.
- b. With one or more radioactive gaseous effluent monitoring instrumentation channels inoperable, take the ACTION shown in Table 3.3-12.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

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

TABLE 3.3-12

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
1. Waste Gas Holdup System					
a. Noble Gas Activity Monitor	(1)	*	≤ (___ cpm)	(10-10 ⁶ cpm)	25
b. Noble Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23
c. Iodine Sampler	(1)	*	N.A.	N.A.	25
d. Particulate Sampler	(1)	*	N.A.	N.A.	25
e. Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
g. Hydrogen Monitor	(1)	**	≤ (4%) by volume	(0-20%) by volume	29
h. Hydrogen Monitor (alternate)					
1) alarm	2	**	≤ (2%) by volume	(0-20%) by volume	30
2) alarm and initiate automatic control function	2	*	≤ (4%) by volume	(0-20%) by volume	30

* During releases via this pathway.

**During waste gas holdup system (treatment for primary system offgases) operation.

TABLE 3.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
1. Waste Gas Holdup System (continued)					
i. Oxygen Monitor	(1)	**	≤ (4%) by volume	(0-25%) by volume	29
j. Oxygen Monitor (alternate)					
1) alarm	(2)	**	≤ (2%) by volume	(0-25%) by volume	30
2) alarm and initiate automatic control function	(2)	*	≤ (4%) by volume	(0-25%) by volume	30
2. Condenser Evacuation System					
a. Noble Gas Activity Monitor	(1)	*	≤ (___ cpm)	(10-10 ⁶ cpm)	27
b. Noble Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23
c. Iodine Sampler	(1)	*	N.A.	N.A.	27
d. Particulate Sampler	(1)	*	N.A.	N.A.	27
e. Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26

* During releases via this pathway.

**During waste gas holdup system (treatment for primary system offgases) operation.

TABLE 3.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
3. Vent Header System					
a. Noble Gas Activity Monitor	(1)	*	≤ (___ cpm)	(10-10 ⁶ cpm)	27
b. Noble Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23
c. Iodine Sampler	(1)	*	N.A.	N.A.	27
d. Particulate Sampler	(1)	*	N.A.	N.A.	27
e. Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0- ___ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0- ___ cfm)	26
4. Containment Purge System					
a. Noble Gas Activity Monitor	(1)	*	≤ (___ cpm)	(10-10 ⁶ cpm)	28
b. Nobel Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23
c. Iodine Sampler	(1)	*	N.A.	N.A.	28
d. Particulate Sampler	(1)	*	N.A.	N.A.	28

* During releases via this pathway.

TABLE 3.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
e. Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
5. Auxiliary Building Ventilation System					
a. Noble Gas Activity Monitor	(1)	*	≤ (___ cpm)	(10-10 ⁶ cpm)	27
b. Noble Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23
c. Iodine Sampler	(1)	*	N.A.	N.A.	27
d. Particulate Sampler	(1)	*	N.A.	N.A.	27
e. Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
6. Fuel Storage Area Ventilation System					
a. Noble Gas Activity Monitor	(1)	*	≤ (___ cfm)	(10-10 ⁶ cpm)	27
b. Noble Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23

* During releases via this pathway.

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TABLE 3.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
6. Fuel Storage Area Ventilation System (continued)					
c. Iodine Sampler	(1)	*	N.A.	N.A.	27
d. Particulate Sampler	(1)	*	N.A.	N.A.	27
e. Flow Rate Monitor	(1)	*	≥ (____ cfm)	(0-____ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (____ cfm)	(0-____ cfm)	26
7. Radwaste Area Ventilation System					
a. Noble Gas Activity Monitor	(1)	*	≤ (____ cpm)	(10-10 ⁶ cpm)	27
b. Noble Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23
c. Iodine Sampler	(1)	*	N.A.	N.A.	27
d. Particulate Sampler	(1)	*	N.A.	N.A.	27
e. Flow Rate Monitor	(1)	*	≥ (____ cfm)	(0-____ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (____ cfm)	(0-____ cfm)	26

* During releases via this pathway.

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TABLE 3.3-12 (Continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>INSTRUMENT</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABILITY</u>	<u>ALARM/TRIP SETPOINT</u>	<u>MEASUREMENT RANGE</u>	<u>ACTION</u>
8. Steam Generator Blowdown Vent					
a. Noble Gas Activity Monitor	(1)	*	≤ (___ cpm)	(10-10 ⁶ cpm)	27
b. Noble Gas Activity Recorder	(1)	*	N.A.	(10-10 ⁶ cpm)	23
c. Iodine Sampler	(1)	*	N.A.	N.A.	27
d. Particulate Sampler	(1)	*	N.A.	N.A.	27
e. Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26
f. Sampler Flow Rate Monitor	(1)	*	≥ (___ cfm)	(0-___ cfm)	26

* During release via this pathway.

TABLE 3.3-12 (Continued)

TABLE NOTATION

- ACTION 23 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue for up to 7 days provided the gross radioactivity level is recorded at least once per 4 hours.
- ACTION 25 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank may be released to the environment for up to 72 hours provided that prior to initiating the release:
1. At least two independent samples of the tank's content are analyzed, and
 2. 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 26 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 7 days provided the flow rate is estimated at least once per 4 hours.
- ACTION 27 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 7 days provided grab samples are taken at least once per 4 hours and these samples are analyzed for gross activity at least once per 24 hours.
- ACTION 28 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, suspend release of radioactive effluents via this pathway.
- ACTION 29 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, operation of this waste gas holdup system may continue for up to 14 days provided gas samples are analyzed at least once per 4 hours.
- ACTION 30 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, operation of this waste gas holdup system may continue for up to 14 days. With both channels inoperable, immediately suspend operation of this waste gas holdup system.

TABLE 4.3-12

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
1. Waste Gas Holdup System					
a. Noble Gas Activity Monitor	P	P	R(3)	Q(1)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*
e. Flow Rate Monitor	P	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*
g. Hydrogen Monitor	D	N.A.	Q(4)	M	**
h. Hydrogen Monitor (alternate)	D	N.A.	Q(4)	M	**
i. Oxygen Monitor	D	N.A.	Q(5)	M	**
j. Oxygen Monitor (alternate)	D	N.A.	Q(5)	M	**

TABLE 4.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
2. Condenser Evacuation System					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*
e. Flow Rate Monitor	D	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*
3. Vent Header System					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*
e. Flow Rate Monitor	D	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*

TABLE 4.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
4. Containment Purge System					
a. Noble Gas Activity Monitor	D	P	R(3)	Q(1)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*
e. Flow Rate Monitor	D	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*
5. Auxiliary Building Ventilation System					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*
e. Flow Rate Monitor	D	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*

TABLE 4.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
6. Fuel Storage Area Ventilation System					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*
e. Flow Rate Monitor	D	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*
7. Radwaste Area Ventilation System					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*

TABLE 4.3-12 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>INSTRUMENT</u>	<u>CHANNEL CHECK</u>	<u>SOURCE CHECK</u>	<u>CHANNEL CALIBRATION</u>	<u>CHANNEL FUNCTIONAL TEST</u>	<u>MODES IN WHICH SURVEILLANCE REQUIRED</u>
7. Radwaste Area Ventilation System (continued)					
e. Flow Rate Monitor	D	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*
8. Steam Generator Blowdown Vent					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	*
b. Noble Gas Activity Recorder	D	N.A.	R	Q	*
c. Iodine Sampler	D	N.A.	N.A.	N.A.	*
d. Particulate Sampler	D	N.A.	N.A.	N.A.	*
e. Flow Rate Monitor	D	N.A.	R	Q	*
f. Sampler Flow Rate Monitor	D	N.A.	R	Q	*

TABLE 4.3-12 (Continued)

TABLE NOTATION

- * - During releases via this pathway.
- ** - During waste gas holdup system operation.
- (1) - The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm/trip setpoint.
 - 2. Circuit failure.
 - 3. Instrument indicates a downscale failure.
 - 4. Instrument controls not set in operate mode.
- (2) - The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:
 - 1. Instrument indicates measured levels above the alarm/trip setpoint.
 - 2. Circuit failure.
 - 3. Instrument indicates a downscale failure.
 - 4. Instrument controls not set in operate mode.
- (3) - The CHANNEL CALIBRATION shall include the use of a known (traceable to the National Bureau of Standards radiation measurement system) gaseous radioactive source positioned in a reproducible geometry with respect to the sensor and emitting beta and gamma radiation with fluences and energies in the ranges measured by the channel during normal operation.

TABLE 4.3-12 (Continued)

TABLE NOTATION

- (4) - The CHANNEL CALIBRATION shall include the use of standard gas samples containing a nominal:
 - 1. One volume percent hydrogen, balance nitrogen, and
 - 2. Four volume percent hydrogen, balance nitrogen.

- (5) - The CHANNEL CALIBRATION shall include the use of standard gas samples containing a nominal:
 - 1. One volume percent oxygen, balance nitrogen, and
 - 2. Four volume percent oxygen, balance nitrogen.

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1 LIQUID EFFLUENTS

CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.11.1.1 The concentration of radioactive material released from the site to unrestricted areas (see Figure 3.11-1) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than noble gases and 4×10^{-5} $\mu\text{Ci/ml}$ total activity concentration for all dissolved or entrained noble gases.

APPLICABILITY: At all times.

ACTION:

With the concentration of radioactive material released from the site to unrestricted areas exceeding the above limits, immediately decrease the release rate of radioactive materials and/or increase the dilution flow rate to restore the concentration to within the above limits and provide prompt notification to the Commission pursuant to Specification 6.9.1.12.

SURVEILLANCE REQUIREMENTS

4.11.1.1.1 The concentration of radioactive material in unrestricted areas shall be determined to be within the above limits by obtaining representative samples in accordance with the sampling and analysis program specified in Table 4.11-1.

4.11.1.1.2 Reports - The semiannual Radioactive Effluent Release Report shall include the results of analyses performed in accordance with the program of Table 4.11-1 and a summary of all releases of radioactive liquid effluents.

TABLE 4.11-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (pCi/ml) ^a
A. Batch Waste Release Tanks ^e	^P Each Batch	^P Each Batch	Principal Gamma Emitters	0.5 ^b
	^P One Batch/M	M	Dissolved and Entrained Gases	10
	^P Each Batch	^W Composite ^c	I-131	1.0
	^P Each Batch	^M Composite ^c	H-3	10
			Gross α	0.1
			P-32	1.0
	^P Each Batch	^Q Composite ^c	Sr-89, Sr-90	0.05
(Fe-55)			(1.0)	
B. Plant Continuous Releases ^e , (Steam generator blowdown and turbine building drainage)	Continuous ^d	^W Composite ^d	Principal Gamma Emitters	0.5 ^b
			I-131	1.0
	^M Grab Sample	M	Dissolved and Entrained Gases	10
	Continuous ^d	^M Composite ^d	H-3	10
			Gross α	0.1
			P-32	1.0
	Continuous ^d	^Q Composite ^d	Sr-89, Sr-90	0.05
			(Fe-55)	(1.0)

TABLE 4.11-1 (Continued)

TABLE NOTATION

- a. The lower limit of detection (LLD) is defined in Table Notation a. of Table 4.12-1 of Specification 4.12.1.1.
- b. For certain radionuclides with low gamma yield or low energies, or for certain radionuclide mixture, it may not be possible to measure radionuclides in concentrations near the detection limit of 5×10^{-7} $\mu\text{Ci/ml}$. Under these circumstances, it may be necessary to calculate the concentration of such radionuclides to a lower limit of detection of 5×10^{-7} $\mu\text{Ci/ml}$ using observed ratios with those radionuclides which are measurable, or the lower limit of detection of 5×10^{-7} $\mu\text{Ci/ml}$ may be increased proportionally to the magnitude of the gamma yield (i.e., $5 \times 10^{-7}/I$, where I is the photon abundance expressed as a decimal fraction), but in no case shall the lower limit of detection as calculated in this manner be greater than 10% of the MPC value specified in 10 CFR 20, Appendix B, Table II, Column 2.
- 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. To be representative of the average quantities and concentrations of radioactive materials in liquid effluents, samples shall be continuously collected in proportion to the rate of flow of the effluent stream. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the average effluent release.
- e. A batch release is the discharge of liquid wastes of a discrete volume. A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a volume or system that has an input flow during the continuous release.

This figure shall consist of a map of the site area showing the unrestricted area boundary for liquid effluents as defined in 10 CFR Part 20.3(a)(17).

Figure 3.11-1

RADIOACTIVE EFFLUENTS

DOSE

LIMITING CONDITION FOR OPERATION

3.11.1.2 The dose or dose commitment to an individual from radioactive materials in liquid effluents released to unrestricted areas (see Figure 3.11-1) shall be limited:

- a. During any calendar quarter to ≤ 1.5 mrem to the total body and to ≤ 5 mrem to any organ, and
- b. During any calendar year to ≤ 3 mrem to the total body and to ≤ 10 mrem to any organ.

APPLICABILITY: At all times.

ACTION:

- a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, 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(s) and defines the corrective actions to be taken to reduce the releases of radioactive materials in liquid effluents during the remainder of the current calendar quarter and during the subsequent three calendar quarters so that the average dose or dose commitment to an individual from such releases during these four calendar quarters is within 3 mrem to the total body and 10 mrem to any organ. (This report shall also include (1) the results of radiological analyses of the drinking water source and (2) the radiological impact on finished drinking water supplies with regard to the requirements of 40 CFR 141, Safe Drinking Water Act.)
- b. With the calculated dose from the release of radioactive materials in liquid effluents exceeding twice the limits of Specification 3.11.1.2.a or 3.11.1.2.b, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 and limit the subsequent releases such that the dose or dose commitment to a real individual from all uranium fuel cycle sources is limited to ≤ 25 mrem* to the total body or any organ (except thyroid, which is limited to ≤ 75 mrem*) over 12 consecutive months. This Special Report shall include

*The assessment of radiation doses shall be performed in accordance with NUREG-0133.

RADIOACTIVE EFFLUENTS

ACTION: (Continued)

an analysis which demonstrates that radiation exposures to all real individuals from all uranium fuel cycle sources (including all effluent pathways and direct radiation) are less than the 40 CFR Part 190 Standard. Otherwise, obtain a variance from the Commission to permit releases which exceed the 40 CFR Part 190 Standard.

- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.2.1 Dose Calculations - The dose contributions for the total

time period $\sum_{\ell=1}^m \Delta t_{\ell}$ shall be determined by calculation at least once per 7 days and a cumulative summation of these total body and any organ doses shall be maintained for each calendar quarter. These dose contributions shall be calculated for all radionuclides identified in liquid effluents released to unrestricted areas using the following expression:

$$D_{\tau} = \sum [A_{i\tau} \sum_{\ell=1}^m \Delta t_{\ell} C_{i\ell} F_{\ell}]$$

where:

D_{τ} = the cumulative dose or dose commitment to the total body or an organ τ from the liquid effluents for the total time period $\sum_{\ell=1}^m \Delta t_{\ell}$, in mrem.

Δt_{ℓ} = the length of the ℓ^{th} time period over which $C_{i\ell}$ and F_{ℓ} are averaged for all liquid releases, in hours.

$C_{i\ell}$ = The average concentration of radionuclide i in undiluted liquid effluent during time period Δt_{ℓ} from any liquid release, in $\mu\text{Ci/ml}$.

RADIOACTIVE EFFLUENTS

SURVEILLANCE REQUIREMENTS (Continued)

$A_{1\tau}$ = the site related ingestion dose and dose commitment factor to the total body or any organ τ for each identified principal gamma and beta emitter listed in Table 4.11-2, in mrem-ml per hr- μ Ci.

F_d = the near field average dilution factor for C_{10} during any liquid effluent release. Defined as the ratio of the maximum undiluted liquid waste flow during release to the product of the average flow from the site discharge structure to unrestricted receiving waters times _____. (_____ is the site specific applicable factor for the mixing effect of the discharge structure.)

For radionuclides not determined in each batch or weekly composite, the dose contribution to the current calendar quarter cumulative summation may be approximately by assuming an average monthly concentration based on the previous monthly or quarterly composite analyses. However, for reporting purposes, the calculated dose contributions shall be based on the actual composite analyses.

4.11.1.2.2 Reports - The calendar quarter cumulative summation of calculated dose contributions shall be included in the semiannual Radioactive Effluent Release Report.

TABLE 4.11-2

LIQUID EFFLUENT INGESTION DOSE FACTORS*

<u>Radionuclide</u>	<u>A_{iτ} Dose or Dose Commitment Factors</u> <u>(mrem-ml per hr-μCi)</u>	
	<u>Total Body</u>	<u>Critical Organs</u>
H-3		
P-32		
Cr-51		
Mn-54		
Fe-55		
Fe-59		
Co-58		
Co-60		
Zn-65		
Rb-86		
Sr-89		
Sr-90		
Y-91		
Zr-95		
Zr-97		
Nb-95		
Mo-99		
Ru-103		
Ru-106		
Ag-110m		
Sb-124		
Sb-125		
Te-125m		
Te-127m		
Te-129m		
Te-131m		
Te-132		
I-131		
I-133		
Cs-134		
Cs-136		
Cs-137		
Ba-140		
La-140		
Ce-141		
Ce-143		
Ce-144		
Np-239		

*The listed dose factors are for radionuclides that may be detected in liquid effluents.

RADIOACTIVE EFFLUENTS

LIQUID WASTE TREATMENT

LIMITING CONDITION FOR OPERATION

3.11.1.3 The liquid radwaste treatment system shall be OPERABLE. The appropriate subsystems shall be used to reduce the radioactive materials in liquid waste prior to their discharge when the projected doses due to the liquid effluent releases to unrestricted areas (see Figure 3.11-1) when averaged over 7 days, exceed 0.015 mrem to the total body or 0.05 mrem to any organ.

APPLICABILITY: At all times.

ACTION:

- a. With the liquid radwaste treatment system inoperable for more than 72 hours or with liquid waste being discharged without treatment as required above, 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,
 2. Cause of inoperability,
 3. Action(s) taken to restore the inoperable equipment to OPERABLE status,
 4. A description of alternate equipment used for treatment of radioactive materials,
 5. Length of time the above requirements were not satisfied,
 6. Volume and curie content of the waste discharged which was not processed by the inoperable equipment but which required processing.
 7. Action(s) taken to prevent a recurrence of equipment failures.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

RADIOACTIVE EFFLUENTS

SURVEILLANCE REQUIREMENTS

4.11.1.3 The liquid radwaste treatment system shall be demonstrated OPERABLE at least once per 31 days by operating the radwaste treatment system equipment.

RADIOACTIVE EFFLUENTS

LIQUID HOLDUP TANKS

LIMITING CONDITION FOR OPERATION

3.11.1.4 The quantity of radioactive material contained in each of the following tanks shall be limited to \leq ____ curies, excluding tritium and dissolved or entrained noble gases.

- a. _____
- b. _____
- c. _____

APPLICABILITY: At all times.

ACTION:

- a. With the quantity of radioactive material in any of the above listed tanks exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours either reduce the tank contents to within the limit or provide prompt notification to the Commission pursuant to Specification 6.9.1.12. The written followup report shall include a description of activities planned and/or taken to reduce the tank contents to within the above limit.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.4 The quantity of radioactive material contained in each of the above listed tanks shall be determined to be within the above limit by analyzing a representative sample of the tank's contents at least once per 7 days when radioactive materials are being added to the tank.

RADIOACTIVE EFFLUENTS

3/4.11.2 GASEOUS EFFLUENTS

DOSE

LIMITING CONDITION FOR OPERATION

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

- a. Release rate limit for noble gases:

$$\sum_i K_i [(\bar{x}/Q)\dot{Q}_i] < 500 \text{ mrem/yr, and}$$

$$\sum_i (L_i + 1.1 M_i) [(\bar{x}/Q)\dot{Q}_i] < 3000 \text{ mrem/yr}$$

where the terms are defined below:

- b. Release rate limit for all radioiodines and radioactive materials in particulate form and radionuclides other than noble gases:

$$\sum_i P_i [W \dot{Q}_i] < 1500 \text{ mrem/yr}$$

where:

K_i = The total body dose factor due to gamma emissions for each identified noble gas radionuclide, in mrem/yr per $\mu\text{Ci}/\text{m}^3$ from Table 4.11-3.

L_i = The skin dose factor due to beta emissions for each identified noble gas radionuclide, in mrem/yr per $\mu\text{Ci}/\text{m}^3$ from Table 4.11-3.

M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide, in mrad/yr per $\mu\text{Ci}/\text{m}^3$ from Table 4.11-3 (unit conversion constant of 1.1 mrem/mrad converts air dose to skin dose).

RADIOACTIVE EFFLUENTS

LIMITING CONDITION FOR OPERATION (Continued)

P_i = The dose parameter for radionuclides other than noble gases for the inhalation pathway, in mrem/yr per $\mu\text{Ci}/\text{m}^3$ and for the food and ground plane pathways in m^2 (mrem/yr) per $\mu\text{Ci}/\text{sec}$ from Table 4.11-4. The dose factors are based on the critical individual organ and most restrictive age group (child or infant).

Q_i = The release rate of radionuclides, i , add in gaseous effluent from all release points at the site, in $\mu\text{Ci}/\text{sec}$.

(\bar{x}/Q) = _____ sec/m^3 . The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary.

W = The highest calculated annual average dispersion parameter for estimating the dose to an individual at the controlling location:

$W =$ _____ sec/m^3 , for the inhalation pathway. The location is the unrestricted area in the _____ sector.

$W =$ _____ meter^{-2} , for the food and ground plane pathways. The location is the unrestricted area boundary in the _____ sector.

APPLICABILITY: At all times.

ACTION:

With the release rates exceeding the above limits, immediately decrease the release rate to within its limit and provide prompt notification to the Commission pursuant to Specification 6.9.1.12.

RADIOACTIVE EFFLUENTS

SURVEILLANCE REQUIREMENTS

4.11.2.1.1 The release rate of radioactive materials released in gaseous effluents from the site shall be determined to be within the above limits by obtaining representative samples in accordance with the sampling and analysis program specified in Table 4.11-5.

4.11.2.1.2 Reports - The semiannual Radioactive Effluent Release Report shall include the results of analyses performed in accordance with the program of Table 4.11-5 and a summary of all releases of radioactive gaseous effluents.

TABLE 4.11-3
DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS*

<u>Radionuclide</u>	<u>Total Body Dose Factor K_i (mrem/yr¹ per $\mu\text{Ci}/\text{m}^3$)</u>	<u>Skin Dose Factor L_i (mrem/yr per $\mu\text{Ci}/\text{m}^3$)</u>	<u>Gamma Air Dose Factor M_i (mrad/yr¹ per $\mu\text{Ci}/\text{m}^3$)</u>	<u>Beta Air Dose Factor N_i (mrad/yr per $\mu\text{Ci}/\text{m}^3$)</u>
Kr-83m	7.56E-02**	---	1.93E+01	2.88E+02
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Kr-89	1.66E+04	1.01E+04	1.73E+04	1.06E+04
Kr-90	1.56E+04	7.29E+03	1.63E+04	7.83E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-137	1.42E+03	1.22E+04	1.51E+03	1.27E+04
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03

*The listed dose factors are for radionuclides that may be detected in gaseous effluents.

**7.56E-02 = 7.56×10^{-2} .

TABLE 4.11-4

DOSE PARAMETERS FOR RADIOIODINES AND RADIOACTIVE PARTICULATE, GASEOUS EFFLUENTS*

Radio-nuclide	P_i Inhalation Pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$)	P_i Food & Ground Pathways ($\text{m}^2 \cdot \text{mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$)	Radio-nuclide	P_i Inhalation Pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$)	P_i Food & Ground Pathways ($\text{m}^2 \cdot \text{mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$)
H-3	6.5E+02	2.4E+03	Cd-115m	7.0E+04	4.8E+07
P-32	2.0E+06	1.5E+11	Sn-123	2.9E+05	3.4E+09
Mn-54	2.5E+04	1.1E+09	Sn-126	1.2E+06	1.1E+09
Fe-59	2.4E+04	7.0E+08	Sb-124	5.9E+04	1.1E+09
Co-58	1.1E+04	5.7E+08	Sb-125	1.5E+04	1.1E+09
Co-60	3.2E+04	4.6E+09	Te-127m	3.8E+04	7.4E+10
Zn-65	6.3E+04	1.7E+10	Te-129m	3.2E+04	1.3E+09
Rb-86	1.9E+05	1.6E+10	Cs-134	7.0E+05	5.3E+10
Sr-89	4.0E+05	1.0E+10	Cs-136	1.3E+05	5.4E+09
Sr-90	4.1E+07	9.5E+10	Cs-137	6.1E+05	4.7E+10
Y-91	7.0E+04	1.9E+09	Ba-140	5.6E+04	2.4E+08
Zr-95	2.2E+04	3.5E+08	Ce-141	2.2E+04	8.7E+07
Nb-95	1.3E+04	3.6E+08	Ce-144	1.5E+05	6.5E+08
Ru-103	1.6E+04	3.4E+10	I-131	1.5E+07	1.1E+12
Ru-106	1.6E+05	4.4E+11	I-133	3.6E+06	9.6E+09
Ag-110m	3.3E+04	1.5E+10	Unidentified**	4.1E+07	9.5E+10

*The listed dose parameters are for radionuclides that may be detected in gaseous effluents.

**If Sr-90 analysis is performed, use P_i given in Ru-106 for unidentified components.

If Sr-90 and Ru-106 analyses are performed, use P_i given in I-131 for unidentified components.

If Sr-90, Ru-106 and I-131 analyses are performed, use P_i given in P-32 for unidentified components.

TABLE 4.11-5

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

PMR-ST5-1

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Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (pCi/ml) ^a
A. Waste Gas Storage Tank	Each Tank Grab Sample ^P	Each Tank ^P	Principal Gamma Emitters	100 ^b
			H-3	1
B. Containment Purge	Each Purge ^P Grab Sample ^C	Each Purge ^P ^C	Principal Gamma Emitters	100 ^b
			H-3	1
C. (List other release points where gaseous effluents are discharged from the facility, e.g. air ejector, steam generator flash vent, equipment vents, ventilation exhausts, etc.)	M ^{C,f} Grab Sample	M ^C	Principal Gamma Emitters	100 ^b
			H-3	1
D. All Release Types as listed in A, B, C above.	Continuous ^g	W ^e Charcoal Sample	I-131	10 ⁻⁶
			I-133	10 ⁻⁴
	Continuous ^g	W ^e Particulate Sample	Principal Gamma Emitters (I-131, Others)	10 ⁻⁵
			Gross α	10 ⁻⁵
Continuous ^g	M Composite Particulate Sample			
Continuous ^g	Q Composite Particulate Sample		Sr-89, Sr-90	10 ⁻⁵

TABLE 4.11-5 (Continued)

TABLE NOTATION

- a. The lower limit of detection (LLD) is defined in Table Notation a. of Table 4.12-1 of Specification 4.12.1.1.
- b. 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 detection limit of 1×10^{-4} $\mu\text{Ci/ml}$. Under these circumstances, it may be necessary to calculate the concentration of such radionuclides to a lower limit of detection of 1×10^{-4} $\mu\text{Ci/ml}$ using observed ratios with those radionuclides which are measurable, or the lower limit of detection of 1×10^{-4} $\mu\text{Ci/ml}$ may be increased proportionally 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 lower limit of detection as calculated in this manner be greater than 10% of the MPC value specified in 10 CFR 20, Appendix B, Table II, Column 1.
- c. Analyses shall also be performed following shutdown, startup, or similar operational occurrence which could alter the mixture of radionuclides.
- d. Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.
- e. Analyses shall also be performed at least once per 24 hours for 7 days following each shutdown, startup or similar operational occurrence which could lead to significant increases or decreases in radioiodine releases. Samplers shall also be changed and analyzed at intervals in Specifications 3.11.2.1 and 3.11.2.3.
- f. Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area.
- g. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period in Specifications 3.11.2.1, 3.11.2.2 and 3.11.2.3.

RADIOACTIVE EFFLUENTS

DOSE, NOBLE GASES

LIMITING CONDITION FOR OPERATION

3.11.2.2 The air dose in unrestricted areas (see Figure 5.1-1) due to noble gases released in gaseous effluents from the site shall be limited to the following expressions:

- a. During any calendar quarter, for gamma radiation:

$$3.17 \times 10^{-8} \sum_i M_i [(\bar{x}/Q) \tilde{Q}_i + (\bar{x}/q) \tilde{q}_i] \leq 5 \text{ mrad, and}$$

During any calendar quarter, for beta radiation:

$$3.17 \times 10^{-8} \sum_i N_i [(\bar{x}/Q) \tilde{Q}_i + (\bar{x}/q) \tilde{q}_i] \leq 10 \text{ mrad, and}$$

- b. During any calendar year, for gamma radiation:

$$3.17 \times 10^{-8} \sum_i M_i [(\bar{x}/Q) \tilde{Q}_i + (\bar{x}/q) \tilde{q}_i] \leq 10 \text{ mrad, and}$$

During any calendar year, for beta radiation:

$$3.17 \times 10^{-8} \sum_i N_i [(\bar{x}/Q) \tilde{Q}_i + (\bar{x}/q) \tilde{q}_i] \leq 20 \text{ mrad}$$

where:

3.17×10^{-8} = The inverse of the number of seconds in a year.

M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide, in mrad/yr per $\mu\text{Ci}/\text{m}^3$ from Table 4.11-3.

N_i = The air dose factor due to beta emissions for each identified noble gas radionuclide, in mrad/yr per $\mu\text{Ci}/\text{m}^3$ from Table 4.11-3.

(\bar{x}/Q) = $\frac{\quad}{\quad}$ sec/ m^3 . The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary for long term releases (greater than 500 hrs/year).

(\bar{x}/q) = $\frac{\quad}{\quad}$ sec/ m^3 . The relative concentration for any area at or beyond the unrestricted area boundary for short term releases (equal to or less than 500 hrs/yr).

RADIOACTIVE EFFLUENTS

LIMITING CONDITION FOR OPERATION (Continued)

\bar{Q}_f = The release of noble gas radionuclides, f, in gaseous effluents, for long term releases (greater than 500 hrs/yr), in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.

q_f = The release of noble gas radionuclides, f, in gaseous effluents, for short term releases (equal to or less than 500 hrs/yr), in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.

(The dose design objectives may be reduced based on predicted noble gas releases from the turbine building if effluent sampling is not provided. The dose design objectives may also be reduced based on expected public occupancy of areas, e.g., beaches and visitor centers within the unrestricted area boundary.)

APPLICABILITY: At all times.

ACTION:

- a. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, 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(s) and defines the corrective actions to be taken to reduce the releases of radioactive noble gases in gaseous effluents during the remainder of the current calendar quarter and during the subsequent three calendar quarters so that the average dose during these four calendar quarters is within (10) mrad for gamma radiation and (20) mrad for beta radiation.
- b. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding twice the limits of Specification 3.11.2.2.a or 3.11.2.2.b, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 and limit the subsequent releases such that the dose or dose commitment to a real individual from all uranium fuel cycle sources is limited to < 25 mrem* to the total body or any organ (except thyroid, which is limited to < 75 mrem*) over 12 consecutive months. This Special Report shall include an analysis which

*The assessment of radiation doses shall be performed in accordance with NUREG-0133.

RADIOACTIVE EFFLUENTS

ACTION: (Continued)

demonstrates that radiation exposures to all real individuals from all uranium fuel cycle sources (including all effluent pathways and direct radiation) are less than the 40 CFR Part 190 Standard. Otherwise, obtain a variance from the Commission to permit releases which exceed the 40 CFR Part 190 Standard.

- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.2 The release of radioactive materials released in gaseous effluents from the site shall be determined to be within the above limits by obtaining representative samples in accordance with the sampling and analysis program specified in Table 4.11-5.

RADIOACTIVE EFFLUENTS

DOSE, RADIOIODINES, RADIOACTIVE MATERIAL IN PARTICULATE FORM AND RADIONUCLIDES OTHER THAN NOBLE GASES

LIMITING CONDITION FOR OPERATION

3.11.2.3 The dose to an individual from radioiodines, radioactive materials in particulate form and radionuclides other than noble gases in gaseous effluents released to unrestricted areas (see Figure 5.1-1) shall be limited to the following expressions:

- a. During any calendar quarter:

$$3.17 \times 10^{-8} \sum_i R_i [W \tilde{Q}_i + w \tilde{q}_i] \leq 7.5 \text{ mrem, and}$$

- b. During any calendar year:

$$3.17 \times 10^{-8} \sum_i R_i [W \tilde{Q}_i + w \tilde{q}_i] \leq 15 \text{ mrem}$$

where:

3.17×10^{-8} = The inverse of the number of seconds in a year.

\tilde{Q}_i = The release of radioiodines, radioactive materials in particulate form and radionuclides other than noble gases in gaseous effluents, i, for long term releases (greater than 500 hrs/yr), in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.

\tilde{q}_i = The release of radioiodines, radioactive materials in particulate form and radionuclides other than noble gases in gaseous effluents, i, for short term releases (equal to or less than 500 hrs/yr), in μCi . Releases shall be cumulative over the calendar quarter or year as appropriate.

W = The annual average dispersion parameter for estimating the dose to an individual at the controlling location for long term releases (greater than 500 hrs/yr):

W = (\bar{x}/Q) for the inhalation pathway, in sec/m^3 from Table 4.11-6a.

W = (\bar{D}/Q) for the food and ground plane pathways, in meters^{-2} from Table 4.11-6b.

w = The dispersion parameter for estimating the dose to an individual at the controlling location for short term releases (equal to or less than 500 hrs/yr):

RADIOACTIVE EFFLUENTS

LIMITING CONDITION FOR OPERATION (Continued)

$w = (\bar{x}/q)$ for the inhalation pathway, in sec/m^3 from Table 4.11-6c.

$w = (\bar{D}/q)$ for the food and ground plane pathway, in meters^{-2} from Table 4.11-6d.

R_i = The dose factor for each identified radionuclide, i , in m^2 (mrem/yr) per $\mu\text{Ci}/\text{sec}$ or mrem/yr per $\mu\text{Ci}/\text{m}^3$ from Table 4.11-7.

For the direction sectors with existing pathways within 5 miles from the unit, use the values of R_i for these pathways. If no real pathway exists within 5 miles from the center of the building complex, use the cow-milk R_i assuming that this pathway exists at the 4.5 to 5.0 mile distance in the worst sector. If the R_i for an existing pathway within 5 miles is less than a cow-milk R_i at 4.5 to 5.0 miles, then use the value of the cow-milk R_i at 4.5 to 5.0 miles. The values used for calculating dose contributions shall be consistent with the results of the land use census performed pursuant to Specification 3.12.2. The controlling value for each radionuclide of Table 4.11-7 shall be determined and made effective within 30 days after the completion of each required land use census. The parameters W and w shall correspond to the applicable R_i for the same sector, pathway and location condition.

(The dose design objective may be reduced based on predicted carbon-14 releases and turbine building releases if effluent sampling is not provided.)

APPLICABILITY: At all times.

ACTION:

- a. With the calculated dose from the release of radioiodines, radioactive materials in particulate form, or radionuclides other than noble gases in gaseous effluents exceeding any of the above limits, 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 of radioiodines, radioactive materials in particulate form, and radionuclides other than noble gases in gaseous effluents during the remainder of the current calendar quarter and during the subsequent three calendar quarters so that the average dose or dose commitment to an individual from such releases during these four calendar quarters is within (15) mrem to any organ.

RADIOACTIVE EFFLUENTS

ACTION: (Continued)

- b. With the calculated dose from the release of radioiodines, radioactive materials in particulate form, or radionuclides other than noble gases in gaseous effluents exceeding twice the limits of Specification 3.11.2.3.a. or 3.11.2.3.b, prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 and limit the subsequent releases such that the dose or dose commitment to a real individual from all uranium fuel cycle sources is limited to < 25 mrem* to the total body or any organ (except thyroid, which is limited to < 75 mrem*) over 12 consecutive months. This Special Report shall include an analysis which demonstrates that radiation exposures to all real individuals from all uranium fuel cycle sources (including all effluent pathways and direct radiation) are less than the 40 CFR Part 190 Standard. Otherwise, obtain a variance from the Commission to permit releases which exceed the 40 CFR Part 190 Standard.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.3 The release of radioactive materials released in gaseous effluents from the site shall be determined to be within the above limits by obtaining representative samples in accordance with the sampling and analysis program specified in Table 4.11-5.

*The assessment of radiation doses shall be performed in accordance with NUREG-0133.

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TABLE 4.11-6b

DISPERSION PARAMETER (D/Q) FOR LONG TERM RELEASES > 500 HR/YR OR > 125 HR/QTR

	<u>Distance to the control location, in miles</u>									
<u>Sector θ</u>	<u>0-0.5</u>	<u>0.5-1.0</u>	<u>1.0-1.5</u>	<u>1.5-2.0</u>	<u>2.0-2.5</u>	<u>2.5-3.0</u>	<u>3.0-3.5</u>	<u>3.5-4.0</u>	<u>4.0-4.5</u>	<u>4.5-5.0</u>
N										
NNE										
NE										
ENE										
E										
ESE										
SE										
SSE										
S										
SSW										
SW										
WSW										
W										
WNW										
NW										
NNW										

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TABLE 4.11-6c

DISPERSION PARAMETER ($\sqrt{x/q}$) FOR SHORT TERM RELEASES ≤ 500 HR/YR OR ≤ 125 HR/QTR

	<u>Distance to the control location, in miles</u>									
<u>Sector θ</u>	<u>0-0.5</u>	<u>0.5-1.0</u>	<u>1.0-1.5</u>	<u>1.5-2.0</u>	<u>2.0-2.5</u>	<u>2.5-3.0</u>	<u>3.0-3.5</u>	<u>3.5-4.0</u>	<u>4.0-4.5</u>	<u>4.5-5.0</u>
N										
NNE										
NE										
ENE										
E										
ESE										
SE										
SSE										
S										
SSW										
SW										
WSW										
W										
WNW										
NW										
NNW										

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TABLE 4.11-7

PATHWAY DOSE FACTORS DUE TO RADIONUCLIDES OTHER THAN NOBLE GASES

<u>Radio-nuclide</u>	<u>Inhalation Pathway R_i (mrem/yr per $\mu\text{Ci}/\text{m}^3$)</u>	<u>Meat Pathway R_i ($\text{m}^2 \cdot$ mrem/yr per $\mu\text{Ci}/\text{sec}$)</u>	<u>Ground Plane Pathway R_i ($\text{m}^2 \cdot$ mrem/yr per $\mu\text{Ci}/\text{sec}$)</u>	<u>Cow-Milk-Infant Pathway R_i ($\text{m}^2 \cdot$ mrem/yr per $\mu\text{Ci}/\text{sec}$)</u>	<u>Leafy Vegetables Pathway R_i ($\text{m}^2 \cdot$ mrem/yr per $\mu\text{Ci}/\text{sec}$)</u>
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RADIOACTIVE EFFLUENTS

GASEOUS WASTE TREATMENT

LIMITING CONDITION FOR OPERATION

3.11.2.4 The gaseous radwaste treatment system shall be OPERABLE. The appropriate subsystems shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent releases from all release points to unrestricted areas (see Figure 5.1-1) would result in a dose in any period of 7 days that exceeds 0.05 mrad for gamma radiation, 0.10 mrad for beta radiation, or 0.075 mrem to any organ for that same 7 day period.

APPLICABILITY: At all times.

ACTION:

- a. With the gaseous radwaste treatment system inoperable for more than 72 hours or with gaseous waste being discharged without treatment as required above, 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,
 2. Cause of inoperability,
 3. Action(s) taken to restore the inoperable equipment to OPERABLE status,
 4. A description of alternate equipment used for treatment of radioactive materials,
 5. Length of time the above requirements were not satisfied,
 6. Volume and curie content of the waste discharged which was not processed by the inoperable equipment but which required processing.
 7. Action(s) taken to prevent a recurrence of equipment failures.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

RADIOACTIVE EFFLUENTS

SURVEILLANCE REQUIREMENTS

4.11.2.4.1 The gaseous radwaste treatment system shall be demonstrated OPERABLE at least once per 31 days by operating the radwaste treatment system equipment.

4.11.2.4.2 Dose Calculations. The dose contributions shall be calculated for all radionuclides in gaseous effluents projected to be released to unrestricted areas during any projected 7 day period using the following expressions:

For noble gases, the gamma radiation:

$$3.17 \times 10^{-8} \sum_i M_i \left[\left(\frac{x}{Q}\right) \tilde{Q}_i + \left(\frac{x}{q}\right) \tilde{q}_i \right] \leq 0.05 \text{ mrad, and}$$

For noble gases, the beta radiation:

$$3.17 \times 10^{-8} \sum_i N_i \left[\left(\frac{x}{Q}\right) \tilde{Q}_i + \left(\frac{x}{q}\right) \tilde{q}_i \right] \leq 0.10 \text{ mrad, and}$$

For radioiodines, radioactive materials in particulate form and radionuclides other than noble gases:

$$3.17 \times 10^{-8} \sum_i R_i \left[W \tilde{Q}_i + w \tilde{q}_i \right] \leq 0.075 \text{ mrem}$$

where:

\tilde{Q}_i = The projected release over the next 7 days of radionuclides, i , in gaseous effluents for long term releases (greater than 500 hrs/yr), in μCi .

\tilde{q}_i = The projected release over the next 7 days of radionuclides, i , in gaseous effluents for short term releases (equal to or less than 500 hrs/yr), in μCi .

and all other terms are defined in Specifications 3.11.2.2 and 3.11.2.3.

RADIOACTIVE EFFLUENTS

EXPLOSIVE GAS MIXTURE (Systems designed to withstand a hydrogen explosion)

LIMITING CONDITION FOR OPERATION

3.11.2.5 The concentration of (hydrogen or oxygen) in the waste gas holdup system shall be limited to $\leq 4\%$ by volume.

APPLICABILITY: At all times.

ACTION:

- a. With the concentration of (hydrogen or oxygen) in the waste gas holdup system exceeding the limit, restore the concentration to within the limit within 48 hours.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.5 The concentration of (hydrogen or oxygen) in the waste gas holdup system shall be determined to be within the above limits by continuously monitoring the waste gases in the waste gas holdup system with the (hydrogen or oxygen) monitors required OPERABLE by Table 3.3-12 of Specification 3.3.3.9.

RADIOACTIVE EFFLUENTS

EXPLOSIVE GAS MIXTURE (Systems not designed to withstand a hydrogen explosion)

LIMITING CONDITION FOR OPERATION

3.11.2.5A The concentration of (hydrogen and/or oxygen) in the waste gas holdup system shall be limited to $\leq 2\%$ by volume.

APPLICABILITY: At all times.

ACTION:

- a. With the concentration of (hydrogen and/or oxygen) in the waste gas holdup system $> 2\%$ by volume but $\leq 4\%$ by volume, restore the concentration of (hydrogen and/or oxygen) to within the limit within 48 hours.
- b. With the concentration of (hydrogen and/or oxygen) in the waste gas holdup system $> 4\%$ by volume, immediately suspend all additions of waste gases to the system and reduce the concentration of (hydrogen and/or oxygen) to $\leq 2\%$ within 48 hours.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.5A The concentrations of (hydrogen and/or oxygen) in the waste gas holdup system shall be determined to be within the above limits by continuously monitoring the waste gases in the waste gas holdup system with the (hydrogen and/or oxygen) monitors required OPERABLE by Table 3.3-12 of Specification 3.3.3.9.

RADIOACTIVE EFFLUENTS

GAS STORAGE TANKS

LIMITING CONDITION FOR OPERATION

3.11.2.6 The quantity of radioactivity contained in each gas storage tank shall be limited to \leq ___ curies noble gases (considered as Xe-133).

APPLICABILITY: At all times.

ACTION:

- a. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours either reduce the tank contents to within the limit or provide prompt notification to the Commission pursuant to Specification 6.9.1.12. The written followup report shall include a description of activities planned and/or taken to reduce the tank contents to within the above limit.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.6 The quantity of radioactive material contained in each gas storage tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank.

RADIOACTIVE EFFLUENTS

3/4.11.3 SOLID RADIOACTIVE WASTE

LIMITING CONDITION FOR OPERATION

3.11.3.1 The solid radwaste system shall be OPERABLE and used, as applicable, in accordance with a PROCESS CONTROL PROGRAM, which provides SOLIDIFICATION of wet solid wastes, to solidify and package radioactive wastes and to meet the requirements of 10 CFR Part 20 and 10 CFR Part 71 prior to shipment of radioactive wastes from the site.

APPLICABILITY: At all times.

ACTION:

- a. With the requirements of 10 CFR Part 20 and 10 CFR Part 71 not satisfied, suspend shipments of solid radioactive wastes from the site.
- b. With the solid radwaste system inoperable for more than 72 hours, 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,
 2. Cause of inoperability,
 3. Action(s) taken to restore the inoperable equipment to OPERABLE status,
 4. Length of time the above requirements were not satisfied.
 5. A description of alternate equipment used to solidify and package radioactive materials,
 6. Type, volume and curie content of waste shipped using alternate equipment, and
 7. Action(s) taken to prevent a recurrence of equipment failures.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.3.1.1 The solid radwaste system shall be demonstrated OPERABLE at least once per 31 days by performing functional tests of the equipment and verifying that the system performs its design functions.

RADIOACTIVE EFFLUENTS

SURVEILLANCE REQUIREMENTS (Continued)

4.11.3.1.2 The above required PROCESS CONTROL PROGRAM shall verify SOLIDIFICATION of at least one representative test specimen obtained from at least every tenth batch of each type of radioactive waste from liquid systems when the test specimens are processed in accordance with the PROCESS CONTROL PROGRAM. If any test specimen fails to verify SOLIDIFICATION, additional waste samples shall be taken from consecutive batches of the same type waste until five consecutive test specimens demonstrate SOLIDIFICATION and the PROCESS CONTROL PROGRAM shall be modified as required.

4.11.3.1.3 Reports - The semiannual Radioactive Effluent Release Report shall include the following information for each type of solid waste shipped offsite during the report period:

- a. container burial volume,
- b. total curie quantity (determined by measurement or estimate),
- c. principal gamma radionuclides (determined by measurement or estimate),
- d. type of waste (e.g., spent resin, compacted dry waste, evaporator bottoms),
- e. type of container (e.g., LSA, Type A, Type B, Large Quantity),
and
- f. solidification agent (e.g., cement, urea formaldehyde).

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

3/4.12.1 MONITORING PROGRAM

LIMITING CONDITION FOR OPERATION

3.12.1 The radiological environmental monitoring program shall be conducted as specified in Table 3.12-1.

APPLICABILITY: At all times.

ACTION:

- a. With the radiological environmental monitoring program not being conducted as specified in Table 3.12-1, prepare and submit to the Commission, in the Annual Radiological Operating Report, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.
- b. With the level of radioactivity in an environmental sampling medium at one or more of the locations specified in Table 3.12-1 exceeding the limits of Table 6.9-2 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from the end of the affected calendar quarter, a Special Report which includes an evaluation of any release conditions, environmental factors or other aspects which caused the limits of Table 6.9-2 to be exceeded. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.
- c. With milk or fresh leafy vegetable samples unavailable from any of the sample locations required by Table 3.12-1, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the cause of the unavailability of samples and identifies locations for obtaining replacement samples. The locations from which samples were unavailable may then be deleted from Table 3.12-1 and Figure 3.12-1 provided the locations from which the replacement samples were obtained are added to the environmental monitoring program as replacement locations.
- d. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

RADIOLOGICAL ENVIRONMENTAL MONITORING

SURVEILLANCE REQUIREMENTS

4.12.1.1 The radiological environmental monitoring samples shall be collected pursuant to Table 3.12-1 from the locations shown on Figure 3.12-1 and shall be analyzed pursuant to the requirements of Tables 3.12-1 and 4.12-1.

4.12.1.2 Reports - The results of analyses performed on the radiological environmental monitoring samples shall be summarized in the Annual Radiological Environmental Operating Report.

TABLE 3.12-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Samples and Sample Locations**</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
1. AIRBORNE			
a. Radioiodine and Particulates	(Locations 1-5)	Continuous operation of sampler with sample col- lection as required by dust loading but at least once per 7 days.	Radioiodine canister. Analyze at least once per 7 days for I-131. Particulate sampler. Analyze for gross beta radioactivity \geq 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is $>$ 10 times the mean of control samples for any medium. Perform gamma isotopic analysis on composite (by location) sample at least once per 92 days.
2. DIRECT RADIATION	(Locations 1-8) $>$ 2 dosimeters or \geq 1 Instrument for con- tinuously measuring and recording dose rate at each location.	At least once per 31 days. or At least once per 92 days. (Read-out frequencies are determined by type of dosi- meters selected.)	Gamma dose. At least once per 31 days. or Gamma dose. At least once per 92 days.

** Sample locations are shown on Figure 3.12-1.

TABLE 3.12-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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<u>Exposure Pathway and/or Sample</u>	<u>Number of Samples and Sample Locations**</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
3. WATERBORNE			
a. Surface	(Locations 9 and 10)	Composite* sample collected over a period of \leq 31 days.	Gamma isotopic analysis of each composite sample. Tritium analysis of composite sample at least once per 92 days.
b. Ground	(Locations 11 and 12)	At least once per 92 days.	Gamma isotopic and tritium analyses of each sample.
c. Drinking	(Locations 13-15)	Composite* sample collected over a period of $<$ 14 days, if I-131 analysis is performed; or Composite* sample collected over a period of \leq 31 days.	I-131 analysis of each composite sample; and Gross beta and gamma isotopic analysis of each composite sample. Tritium analysis of composite sample at least once per 92 days.
d. Sediment from Shoreline	(Locations 18)	At least once per 184 days.	Gamma isotopic analysis of each sample.

* Composite samples shall be collected by collecting an aliquot at intervals not exceeding 2 hours.

**Sample locations are shown on Figure 3.12-1.

TABLE 3.12-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Samples and Sample Locations**</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
4. INGESTION			
a. Milk	(Locations 17-20)	At least once per 15 days when animals are on pasture; at least once per 31 days at other times.	Gamma isotopic and I-131 analysis of each sample.
b. Fish and Invertebrates	(Locations 21 and 22)	One sample in season, or at least once per 184 days if not seasonal. One sample of each of the following species: 1. _____ 2. _____	Gamma isotopic analysis on edible portions.
c. Food Products	(Locations 23-25)	At time of harvest. One sample of each of the following classes of food products: 1. _____ 2. _____ 3. _____	Gamma isotopic analysis on edible portion.
	(Location 26)	At time of harvest. One sample of broad leaf vegetation.	I-131 analysis.

**Sample locations are shown on Figure 3.12-1.

Figure 3.12-1

Radiological Environmental Monitoring Sample Locations

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TABLE 4.12-1

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

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m ³)	Fish (pCi/kg,wet)	Milk (pCi/l)	Food Products (pCi/kg,wet)	Sediment (pCi/kg, dry)
gross beta	2 ^b	1 x 10 ⁻²				
³ H	330					
⁵⁴ Mn	15		130			
⁵⁹ Fe	30		260			
^{58,60} Co	15		130			
⁶⁵ Zn	30		260			
⁹⁵ Zr-Nb	10					
¹³¹ I	0.5 ^c	7 x 10 ⁻²		0.8 ^c	25 ^{c,d}	
^{134,137} Cs	15	1 x 10 ⁻²	130	15	80	150
¹⁴⁰ Ba-La	15			15		

TABLE 4.12-1 (Continued)

TABLE NOTATION

- a - The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with only 5% probability of falsely concluding its presence.

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

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

where

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

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

E is the counting efficiency (as counts per transformation)

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

2.22 is the number of transformation per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

λ is the radioactive decay constant for the particular radionuclide

Δt is the elapsed time between sample collection and analysis

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

TABLE 4.12-1 (Continued)

TABLE NOTATION

- b - LLD for drinking water.
- c - LLDs for I-131 in water, milk and other food products correspond to one-quarter of the Appendix I (10 CFR Part 50) design objective dose-equivalent of 15 mrem/year for atmospheric releases and 10 mrem/year for liquid releases to the most sensitive organ and individual using the assumptions given in Regulatory Guide 1.109.
- d - LLD for leafy vegetables.

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 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. (For elevated releases as defined in Regulatory Guide 1.111, March 1976. The land use census shall also identify the locations of all milk animals and all gardens of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of three miles.)

APPLICABILITY: At all times.

ACTION:

- a. With a land use census identifying a location(s) which yields a calculated dose or dose commitment greater than the values currently being calculated in Specification 4.11.2.3.1, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the new location(s).
- b. With a land use census identifying a location(s) which yields a calculated dose or dose commitment (via the same exposure pathway) greater than at a location from which samples are currently being obtained in accordance with Specification 3.12.1, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the new location. The new location shall be added to the radiological environmental monitoring program within 30 days. The sampling location having the lowest calculated dose or dose commitment (via the same exposure pathway) may be deleted from this monitoring program after (October 31) of the year in which this land use census was conducted.
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

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

RADIOLOGICAL ENVIRONMENTAL MONITORING

SURVEILLANCE REQUIREMENTS

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

4.12.2.2 Reports - The results of the land use census shall be included in the Annual Radiological Environmental Operating Report.

RADIOLOGICAL ENVIRONMENTAL MONITORING

3/4.12.3 CROSSCHECK PROGRAM

LIMITING CONDITION FOR OPERATION

3.12.3 Analyses shall be performed on radioactive materials supplied as part of the Environmental Protection Agency's (EPA's) Environmental Radioactivity Laboratory Intercomparisons Studies (Crosscheck) Program that are also included in Table 3.12-1.

APPLICABILITY: At all times.

ACTION:

- a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.12.3 The results of analyses performed as part of the above required crosscheck program shall be included in the Annual Radiological Environmental Operating Report.

INSTRUMENTATION

BASES

3/4.3.3.8 RADIOACTIVE LIQUID EFFLUENT INSTRUMENTATION

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm/trip setpoints for these instruments are provided to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63 and 64 of Appendix A to 10 CFR Part 50.

3/4.3.3.9 RADIOACTIVE GASEOUS EFFLUENT INSTRUMENTATION

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

3/4.11 RADIOACTIVE EFFLUENTS

BASES

3/4.11.1 LIQUID EFFLUENTS

3/4.11.1.1 CONCENTRATION

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

3/4.11.1.2 DOSE

This specification is provided to implement the requirements of Sections II.A, 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.A 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 liquid effluents will be kept "as low as is reasonably achievable". Also, for fresh water sites with drinking water supplies which can be potentially effected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40 CFR 141. The 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 an individual through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the Surveillance Requirements for calculating the doses due to the actual release rates of radioactive materials in liquid effluents were developed from 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.

RADIOACTIVE EFFLUENTS

BASES

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

The OPERABILITY of the liquid radwaste treatment system ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. 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". 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 of Appendix I to 10 CFR Part 50. 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.

3/4.11.1.4 LIQUID HOLDUP TANKS

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting dose or dose commitment to an individual in an unrestricted area will not exceed 0.5 rem.

3/4.11.2 GASEOUS EFFLUENTS

3/4.11.2.1 DOSE

This specification is provided to ensure that the dose at the unrestricted area boundary from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of an individual either within or outside the unrestricted boundary, 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 unrestricted boundary, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the nearest unrestricted area. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose

RADIOACTIVE EFFLUENTS

BASES

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

This specification applies to the release of gaseous effluents from each reactor 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 an individual through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the Surveillance Requirements for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents were developed from 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 specified equations provide for determining the air doses at the unrestricted area boundary based upon the historical average atmospheric conditions.

3/4.11.2.3 DOSE, RADIOIODINES, RADIOACTIVE MATERIAL IN PARTICULATE FORM AND RADIONUCLIDES OTHER THAN NOBLE GASES

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

RADIOACTIVE EFFLUENTS

BASES

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 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 an individual through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the Surveillance Requirements for calculating the doses due to the actual release rates of the subject materials were also developed using 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. As with the equations used in Specification 4.2.2.2.1, these equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for radioiodines, radioactive material in particulate form and radionuclides other than noble gases are dependent on the existing radionuclide pathways to man, in the unrestricted area. The pathways which were examined in the development of these specifications 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 WASTE TREATMENT

The OPERABILITY of the gaseous radwaste treatment system ensures that the system will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides reasonable assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable". This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objectives of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the gaseous radwaste treatment system 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.

RADIOACTIVE EFFLUENTS

BASES

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. (Automatic control features are included in the system to prevent the hydrogen and oxygen concentrations from reaching these flammability limits. These automatic control features include isolation of the source of hydrogen and/or oxygen, automatic diversion to recombiners, or injection of dilutants to reduce the concentration below the flammability limits.) 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.

3/4.11.2.6 GAS STORAGE TANKS

Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that in the event of an uncontrolled release of the tanks contents, the resulting total body exposure to an individual at the nearest exclusion area boundary will not exceed 0.5 rem. This is consistent with Standard Review Plan 15.7.1, "Waste Gas System Failure".

3/4.11.3 SOLID RADIOACTIVE WASTE

The OPERABILITY of the solid radwaste system ensures that the system will be available for use whenever solid radwastes require processing and packaging prior to being shipped offsite. This specification implements the requirements of 10 CFR Part 50.36a and General Design Criteria 60 of Appendix A to 10 CFR Part 50. The process parameters included in establishing the PROCESS CONTROL PROGRAM may include, but are not limited to waste type, waste pH, waste/liquid/solidification agent/catalyst ratios, waste oil content, waste principal chemical constituents, mixing and curing times.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

BASES

3/4.12.1 MONITORING PROGRAM

The radiological monitoring program required by this specification provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides, which lead to the highest potential radiation exposures of individuals resulting from the station operation. This monitoring program thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways. The initially specified monitoring program will be effective for at least the first three years of commercial operation. Following this period, program changes may be initiated based on operational experience.

The detection capabilities required by Table 4.12-1 are state-of-the-art for routine environmental measurements in industrial laboratories. The specified lower limits of detection for I-131 in water, milk and other food products correspond to approximately one-quarter of the Appendix I to 10 CFR Part 50 design objective dose-equivalent of 15 mrem/year for atmospheric releases and 10 mrem/year for liquid releases to the most sensitive organ and individual. They are based on the assumptions given 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," March 1976, except the change for an infant consuming 330 liters/year of drinking water instead of 510 liters/year.

3/4.12.2 LAND USE CENSUS

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

RADIOLOGICAL ENVIRONMENTAL MONITORING

BASES

3/4.12.3 CROSSCHECK PROGRAM

The requirement for participation in the EPA crosscheck 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 the quality assurance program for environmental monitoring in order to demonstrate that the results are reasonably valid.

PWR-STS-I
STANDARD
TECHNICAL SPECIFICATIONS

SECTION 6.0
ADMINISTRATIVE CONTROLS

6.0 ADMINISTRATIVE CONTROLS

6.1 RESPONSIBILITY

6.1.1 The (Plant Superintendent) shall be responsible for overall unit operation and shall delegate in writing the succession to this responsibility during his absence.

6.2 ORGANIZATION

OFFSITE

6.2.1 The offsite organization for unit management and technical support shall be as shown on Figure 6.2-1.

UNIT STAFF

6.2.2 The unit organization shall be as shown on Figure 6.2-2 and:

- a. Each on duty shift shall be composed of at least the minimum shift crew composition shown in Table 6.2-1.
- b. At least one licensed Operator shall be in the control room when fuel is in the reactor.
- c. At least two licensed Operators shall be present in the control room during reactor start-up, scheduled reactor shutdown and during recovery from reactor trips.
- d. An individual qualified in radiation protection procedures shall be on site when fuel is in the reactor.
- e. All CORE ALTERATIONS shall be directly supervised by either a licensed Senior Reactor Operator or Senior Reactor Operator Limited to Fuel Handling who has no other concurrent responsibilities during this operation.
- f. A site Fire Brigade of at least 5 members shall be maintained onsite at all times. The Fire Brigade shall not include (3) members of the minimum shift crew necessary for safe shutdown of the unit and any personnel required for other essential functions during a fire emergency.

This figure shall show the organizational structure and lines of responsibility for the offsite groups that provide technical and management support for the unit. The organizational arrangement for performance and monitoring Quality Assurance activities should also be indicated.

Figure 6.2-1
OFFSITE ORGANIZATION

This figure shall show the organizational structure and lines of responsibility for the unit staff. Positions to be staffed by licensed personnel should be indicated.

Figure 6.2-2
UNIT ORGANIZATION

TABLE 6.2-1

MINIMUM SHIFT CREW COMPOSITION#

LICENSE CATEGORY	APPLICABLE MODES	
	1, 2, 3 & 4	5 & 6
SOL	1	1*
OL	2	1
Non-Licensed	2	1

*Does not include the licensed Senior Reactor Operator or Senior Reactor Operator Limited to Fuel Handling, supervising CORE ALTERATIONS.

#Shift crew composition may be less than the minimum requirements for a period of time not to exceed 2 hours in order to accommodate unexpected absence of on duty shift crew members provided immediate action is taken to restore the shift crew composition to within the minimum requirements of Table 6.2-1.

ADMINISTRATIVE CONTROLS

6.3 UNIT STAFF QUALIFICATIONS

Minimum qualifications for members of the unit staff may be specified by use of an overall qualification statement referencing ANSI N18.1-1971 or alternately by specifying individual position qualifications. Generally, the first method is preferable; however, the second method is adaptable to those unit staffs requiring special qualification statements because of a unique organizational structure.

6.3.1 Each member of the unit staff shall meet or exceed the minimum qualifications of ANSI N18.1-1971 for comparable positions, except for the (Radiation Protection Manager) who shall meet or exceed the qualifications of Regulatory Guide 1.8, September 1975.

6.4 TRAINING

6.4.1 A retraining and replacement training program for the unit staff shall be maintained under the direction of the (position title) and shall meet or exceed the requirements and recommendations of Section 5.5 of ANSI N18.1-1971 and Appendix "A" of 10 CFR Part 55.

6.4.2 A training program for the Fire Brigade shall be maintained under the direction of the (position title) and shall meet or exceed the requirements of Section 27 of the NFPA Code - 1975, except for Fire Brigade training sessions which shall be held at least once per 92 days.

6.5 REVIEW AND AUDIT

The method by which independent review and audit of facility operations is accomplished may take one of several forms. The licensee may either assign this function to an organizational unit separate and independent from the group having responsibility for unit operation or may utilize a standing committee composed of individuals from within and outside the licensee's organization.

Irrespective of the method used, the licensee shall specify the details of each functional element provided for the independent review and audit process as illustrated in the following example specifications.

6.5.1 UNIT REVIEW GROUP (URG)

FUNCTION

6.5.1.1 The (Unit Review Group) shall function to advise the (Plant Superintendent) on all matters related to nuclear safety.

ADMINISTRATIVE CONTROLS

COMPOSITION

6.5.1.2 The (Unit Review Group) shall be composed of the:

Chairman:	(Plant Superintendent)
Member:	(Operations Supervisor)
Member:	(Technical Supervisor)
Member:	(Maintenance Supervisor)
Member:	(Plant Instrument and Control Engineer)
Member:	(Plant Nuclear Engineer)
Member:	(Health Physicist)

ALTERNATES

6.5.1.3 All alternate members shall be appointed in writing by the (URG) Chairman to serve on a temporary basis; however, no more than two alternates shall participate as voting members in (URG) activities at any one time.

MEETING FREQUENCY

6.5.1.4 The (URG) shall meet at least once per calendar month and as convened by the (URG) Chairman or his designated alternate.

QUORUM

6.5.1.5 The minimum quorum of the (URG) necessary for the performance of the (URG) responsibility and authority provisions of these technical specifications shall consist of the Chairman or his designated alternate and four members including alternates.

RESPONSIBILITIES

6.5.1.6 The (Unit Review Group) shall be responsible for:

- a. Review of 1) all procedures required by Specification 6.8 and changes thereto, 2) any other proposed procedures or changes thereto as determined by the (Plant Superintendent) to affect nuclear safety.
- b. Review of all proposed tests and experiments that affect nuclear safety.

ADMINISTRATIVE CONTROLS

- c. Review of all proposed changes to Appendix "A" Technical Specifications.
- d. Review of all proposed changes or modifications to unit systems or equipment that affect nuclear safety.
- e. Investigation of all violations of the Technical Specifications including the preparation and forwarding of reports covering evaluation and recommendations to prevent recurrence to the (Superintendent of Power Plants) and to the (Company Nuclear Review and Audit Group).
- f. Review of events requiring 24 hour written notification to the Commission.
- g. Review of unit operations to detect potential nuclear safety hazards.
- h. Performance of special reviews, investigations or analyses and reports thereon as requested by the (Plant Superintendent) or the (Company Nuclear Review and Audit Group).
- i. Review of the Security Plan and implementing procedures and shall submit recommended changes to the (Company Nuclear Review and Audit Group).
- j. Review of the Emergency Plan and implementing procedures and shall submit recommended changes to the (Company Nuclear Review and Audit Group).

AUTHORITY

6.5.1.7 The (Unit Review Group) shall:

- a. Recommend to the (Plant Superintendent) written approval or disapproval of items considered under 6.5.1.6(a) through (d) above.
- b. Render determinations in writing with regard to whether or not each item considered under 6.5.1.6(a) through (e) above constitutes an unreviewed safety question.
- c. Provide written notification within 24 hours to the (Superintendent of Power Plants) and the (Company Nuclear Review and Audit Group) of disagreement between the (URG) and the (Plant Superintendent); however, the (Plant Superintendent) shall have responsibility for resolution of such disagreements pursuant to 6.1.1 above.

ADMINISTRATIVE CONTROLS

RECORDS

6.5.1.8 The (Unit Review Group) shall maintain written minutes of each (URG) meeting that, at a minimum, document the results of all (URG) activities performed under the responsibility and authority provisions of these technical specifications. Copies shall be provided to the (Superintendent of Power Plants) and the (Company Nuclear Review and Audit Group).

6.5.2 COMPANY NUCLEAR REVIEW AND AUDIT GROUP (CNRAG)

FUNCTION

6.5.2.1 The (Company Nuclear Review and Audit Group) shall function to provide independent review and audit of designated activities in the areas of:

- a. nuclear power plant operations
- b. nuclear engineering
- c. chemistry and radiochemistry
- d. metallurgy
- e. instrumentation and control
- f. radiological safety
- g. mechanical and electrical engineering
- h. quality assurance practices
- i. (other appropriate fields associated with the unique characteristics of the nuclear power plant)

ADMINISTRATIVE CONTROLS

COMPOSITION

6.5.2.2 The (CNRAG) shall be composed of the:

Director:	(Position Title)
Member:	(Position Title)

ALTERNATES

6.5.2.3 All alternate members shall be appointed in writing by the (CNRAG) Director to serve on a temporary basis; however, no more than two alternates shall participate as voting members in (CNRAG) activities at any one time.

CONSULTANTS

6.5.2.4 Consultants shall be utilized as determined by the (CNRAG) Director to provide expert advice to the (CNRAG).

MEETING FREQUENCY

6.5.2.5 The (CNRAG) shall meet at least once per calendar quarter during the initial year of unit operation following fuel loading and at least once per six months thereafter.

QUORUM

6.5.2.6 The minimum quorum of the (CNRAG) necessary for the performance of the (CNRAG) review and audit functions of these technical specifications shall consist of the Director or his designated alternate and (at least 4 CNRAG) members including alternates. No more than a minority of the quorum shall have line responsibility for operation of the facility.

ADMINISTRATIVE CONTROLS

REVIEW

6.5.2.7 The (CNRAG) shall review:

- a. The safety evaluations for 1) changes to procedures, equipment or systems and 2) tests or experiments completed under the provision of Section 50.59, 10 CFR, to verify that such actions did not constitute an unreviewed safety question.
- b. Proposed changes to procedures, equipment or systems which involve an unreviewed safety question as defined in Section 50.59, 10 CFR.
- c. Proposed tests or experiments which involve an unreviewed safety question as defined in Section 50.59, 10 CFR.
- d. Proposed changes to Technical Specifications or this Operating License.
- e. Violations of codes, regulations, orders, Technical Specifications, license requirements, or of internal procedures or instructions having nuclear safety significance.
- f. Significant operating abnormalities or deviations from normal and expected performance of unit equipment that affect nuclear safety.
- g. Events requiring 24 hour written notification to the Commission.
- h. All recognized indications of an unanticipated deficiency in some aspect of design or operation of structures, systems, or components that could affect nuclear safety.
- i. Reports and meetings minutes of the (Unit Review Group).

ADMINISTRATIVE CONTROLS

AUDITS

6.5.2.8 Audits of unit activities shall be performed under the cognizance of the (CNRAG). These audits shall encompass:

- a. The conformance of unit operation to provisions contained within the Technical Specifications and applicable license conditions at least once per 12 months.
- b. The performance, training and qualifications of the entire unit staff at least once per 12 months.
- c. The results of actions taken to correct deficiencies occurring in unit equipment, structures, systems or method of operation that affect nuclear safety at least once per 6 months.
- d. The performance of activities required by the Operational Quality Assurance Program to meet the criteria of Appendix "B", 10 CFR 50, at least once per 24 months.
- e. The Emergency Plan and implementing procedures at least once per 24 months.
- f. The Security Plan and implementing procedures at least once per 24 months.
- g. Any other area of unit operation considered appropriate by the (CNRAG) or the (Vice President Operations).
- h. The Fire Protection Program and implementing procedures at least once per 24 months.
- i. An independent fire protection and loss prevention inspection and audit shall be performed annually utilizing either qualified offsite licensee personnel or an outside fire protection firm.
- j. An inspection and audit of the fire protection and loss prevention program shall be performed by an outside qualified fire consultant at intervals no greater than 3 years.
- l. The radiological environmental monitoring program and the results there of at least once per 12 months.

ADMINISTRATIVE CONTROLS

AUTHORITY

6.5.2.9 The (CNRAG) shall report to and advise the (Vice President Operations) on those areas of responsibility specified in Sections 6.5.2.7 and 6.5.2.8.

RECORDS

6.5.2.10 Records of (CNRAG) activities shall be prepared, approved and distributed as indicated below:

- a. Minutes of each (CNRAG) meeting shall be prepared, approved and forwarded to the (Vice President-Operations) within 14 days following each meeting.
- b. Reports of reviews encompassed by Section 6.5.2.7 above, shall be prepared, approved and forwarded to the (Vice President-Operations) within 14 days following completion of the review.
- c. Audit reports encompassed by Section 6.5.2.8 above, shall be forwarded to the (Vice President-Operations) and to the management positions responsible for the areas audited within 30 days after completion of the audit.

6.6 REPORTABLE OCCURRENCE ACTION

6.6.1 The following actions shall be taken for REPORTABLE OCCURRENCES:

- a. The Commission shall be notified and/or a report submitted pursuant to the requirements of Specification 6.9.
- b. Each REPORTABLE OCCURRENCE requiring 24 hour notification to the Commission shall be reviewed by the (URG) and submitted to the (CNRAG) and the (Superintendent of Power Plants).

ADMINISTRATIVE CONTROLS

6.7 SAFETY LIMIT VIOLATION

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

- a. The unit shall be placed in at least HOT STANDBY within one hour.
- b. The Safety Limit violation shall be reported to the Commission, the (Superintendent of Power Plants) and to the (CNRAG) within 24 hours.
- c. A Safety Limit Violation Report shall be prepared. The report shall be reviewed by the (URG). This report shall describe (1) applicable circumstances preceding the violation, (2) effects of the violation upon facility components, systems or structures, and (3) corrective action taken to prevent recurrence.
- d. The Safety Limit Violation Report shall be submitted to the Commission, the (CNRAG) and the (Superintendent of Power Plants) within 14 days of the violation.

6.8 PROCEDURES

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

- a. The applicable procedures recommended in Appendix "A" of Regulatory Guide 1.33, Revision 2, February 1978.
- b. The radiological environmental monitoring program.
- c. Refueling operations.
- d. Surveillance and test activities of safety related equipment.
- e. Security Plan implementation.
- f. Emergency Plan implementation.
- g. Fire Protection Program implementation.
- h. Offsite releases of gaseous and liquid effluents containing radioactive materials.
- i. The PROCESS CONTROL PROGRAM for solidification of radioactive waste.

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6.8.2 Each procedure of 6.8.1 above, and changes thereto, shall be reviewed by the (URG) and approved by the (Plant Superintendent) prior to implementation and reviewed periodically as set forth in administrative procedures.

6.8.3 Temporary changes to procedures of 6.8.1 above may be made provided:

- a. The intent of the original procedure is not altered.
- b. The change is approved by two members of the plant management staff, at least one of whom holds a Senior Reactor Operator's License on the unit affected.
- c. The change is documented, reviewed by the (URG) and approved by the (Plant Superintendent) within 14 days of implementation.

6.9 REPORTING REQUIREMENTS

ROUTINE REPORTS AND REPORTABLE OCCURRENCES

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

STARTUP REPORT

6.9.1.1 A summary report of plant startup and power escalation testing shall be submitted following (1) receipt of an operating license, (2) amendment to the license involving a planned increase in power level, (3) installation of fuel that has a different design or has been manufactured by a different fuel supplier, and (4) modifications that may have significantly altered the nuclear, thermal, or hydraulic performance of the plant.

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

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

ANNUAL REPORTS^{1/}

6.9.1.4 Annual reports covering the activities of the unit as described below for the previous calendar year shall be submitted prior to March 1 of each year. The initial report shall be submitted prior to March 1 of the year following initial criticality.

6.9.1.5 Reports required on an annual basis shall include:

- a. A tabulation on an annual basis of the number of station, utility and other personnel (including contractors) receiving exposures greater than 100 mrem/yr and their associated man rem exposure according to work and job functions,^{2/} e.g., reactor operations and surveillance, inservice inspection, routine maintenance, special maintenance (describe maintenance), waste processing, and refueling. The dose assignment to various duty functions may be estimates based on pocket dosimeter, TLD, or film badge measurements. Small exposures totalling less than 20% of the individual total dose need not be accounted for. In the aggregate, at least 80% of the total whole body dose received from external sources shall be assigned to specific major work functions.
- b. The results of steam generator tube inservice inspections performed during the report period. (CE, ~~W~~ & B&W units only).
- c. The results of the core barrel movement monitoring activities performed during the report period. (CE units only).
- d. (Any other unit unique reports required on an annual basis.)

^{1/} 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.

^{2/} This tabulation supplements the requirements of §20.407 of 10 CFR Part 20.

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ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT^{3/}

6.9.1.6 Routine radiological environmental operating reports covering the operation of the unit during the previous calendar year shall be submitted prior to May 1 of each year. The initial report shall be submitted prior to May 1 of the year following initial criticality.

6.9.1.7 The annual radiological environmental operating reports shall include summaries, interpretations, and statistical evaluation of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of land use censuses required by Specification 3.12.2. If harmful effects or evidence of irreversible damage are detected by the monitoring, the report shall provide an analysis of the problem and a planned course of action to alleviate the problem.

The annual radiological environmental operating reports shall include summarized and tabulated results in the format of Table 6.9-1 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 including sampling methods for each sample type, size and physical characteristics of each sample type, sample preparation methods, analytical methods, and measuring equipment used; a map of all sampling locations keyed to a table giving distances and directions from one reactor; the results of land use censuses required by the Specification 3.12.2; and the results of licensee participation in the Environmental Protection Agency's Environmental Radioactivity Laboratory Intercomparisons Studies (Crosscheck) Program required by Specification 3.12.3.

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT^{3/}

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

^{3/} 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.

TABLE 6.9-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility _____ Docket No. _____
 Location of Facility _____ Reporting Period _____
 (County, State)

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range ^b	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range ^b	Number of REPORTABLE OCCURRENCE
				Name Distance and Direction	Mean (f) ^b Range ^b		
Air Particulates (pCi/m ³)	Gross β 416	0.003	0.08 (200/312) (0.05-2.0)	Middletown 5 miles 340°	0.10 (5/52) (0.08-2.0)	0.08 (8/104) (0.05-1.40)	1
	γ-Spec. 32 ¹³⁷ Cs	0.003	0.05 (4/24) (0.03-0.13)	Smithville 2.5 miles 160°	0.08 (2/4) (0.03-0.13)	<LLD	4
	¹⁴⁰ Ba	0.003	0.03 (2/24) (0.01-0.08)	Podunk 4.0 miles 270°	0.05 (2/4) (0.01-0.08)	0.02 (1/8)	1
	⁸⁹ Sr 40	0.002	<LLD	-	-	<LLD	0
	⁹⁰ Sr 40	0.0003	<LLD	-	-	<LLD	0
	γ-Spec. 8 ¹³⁷ Cs	80	<LLD	-	<LLD	90 (1/4)	0
	¹³⁴ Cs	80	<LLD	-	<LLD	<LLD	0
	⁶⁰ Co	80	120 (3/4) (90-200)	River Mile 35 Podunk River	See column 4	<LLD	0
Fish pCi/kg (dry weight)							

^aNominal Lower Limit of Detection (LLD) as defined in table notation a. of Table 4.12-1 of Specification 4.12.1.1.

^bMean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

^dNote: The example data are provided for illustrative purposes only.

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6.9.1.9 The 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," with data summarized on a quarterly basis following the format of Appendix B thereof.

The radioactive effluent release reports shall include a summary of the meteorological conditions concurrent with the release of gaseous effluents during each quarter as outlined in Regulatory Guide 1.21, with data summarized on a quarterly basis following the format of Appendix B thereof.

The radioactive effluent release reports shall include an assessment of the radiation doses from radioactive effluents to individuals due to their activities inside the unrestricted area boundary (Figure 5.1-1) during the report period. All assumptions used in making these assessments (e.g., specific activity, exposure time and location) shall be included in these reports.

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

- a. A description of the event and equipment involved.
- b. Cause(s) for the unplanned release.
- c. Actions taken to prevent recurrence.
- d. Consequences of the unplanned release.

The radioactive effluent release reports shall include an assessment of radiation doses from the radioactive liquid and gaseous effluents released from the unit during each calendar quarter as outlined in Regulatory Guide 1.21. In addition, the unrestricted area boundary maximum noble gas gamma air and beta air doses shall be evaluated. The meteorological conditions concurrent with the releases of effluents shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with NUREG-0133.

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MONTHLY REACTOR OPERATING REPORT

6.9.1.10 Routine reports of operating statistics and shutdown experience shall be submitted on a monthly basis to the Director, Office of Management and Program Analysis, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, with a copy to the Regional Office of Inspection and Enforcement, no later than the 15th of each month following the calendar month covered by the report.

REPORTABLE OCCURRENCES

6.9.1.11 The REPORTABLE OCCURRENCES of Specifications 6.9.1.12 and 6.9.1.13 below, including corrective actions and measures to prevent recurrence, shall be reported to the NRC. Supplemental reports may be required to fully describe final resolution of occurrence. In case of corrected or supplemental reports, a licensee event report shall be completed and reference shall be made to the original report date.

PROMPT NOTIFICATION WITH WRITTEN FOLLOWUP

6.9.1.12 The types of events listed below shall be reported within 24 hours by telephone and confirmed by telegraph, mailgram, or facsimile transmission to the Director of the Regional Office, or his designate no later than the first working day following the event, with a written followup report within 14 days. The written followup report shall include, as a minimum, a completed copy of a licensee event report form. Information provided on the licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

- a. Failure of the reactor protection system or other systems subject to limiting safety system settings to initiate the required protective function by the time a monitored parameter reaches the setpoint specified as the limiting safety system setting in the technical specifications or failure to complete the required protective function.
- b. Operation of the unit or affected systems when any parameter or operation subject to a limiting condition for operation is less conservative than the least conservative aspect of the limiting condition for operation established in the technical specifications.
- c. Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment.

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- d. Reactivity anomalies involving disagreement with the predicted value of reactivity balance under steady state conditions during power operation greater than or equal to 1% $\Delta k/k$; a calculated reactivity balance indicating a SHUTDOWN MARGIN less conservative than specified in the technical specifications; short-term reactivity increases that correspond to a reactor period of less than 5 seconds or, if subcritical, an unplanned reactivity insertion of more than 0.5% $\Delta k/k$; or occurrence of any unplanned criticality.
- e. Failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) used to cope with accidents analyzed in the SAR.
- f. Personnel error or procedural inadequacy which prevents or could prevent, by itself, the fulfillment of the functional requirements of systems required to cope with accidents analyzed in the SAR.
- g. Conditions arising from natural or man-made events that, as a direct result of the event require unit shutdown, operation of safety systems, or other protective measures required by technical specifications.
- h. Errors discovered in the transient or accident analyses or in the methods used for such analyses as described in the safety analysis report or in the bases for the technical specifications that have or could have permitted reactor operation in a manner less conservative than assumed in the analyses.
- i. Performance of structures, systems, or components that requires remedial action or corrective measures to prevent operation in a manner less conservative than assumed in the accident analyses in the safety analysis report or technical specifications bases; or discovery during unit life of conditions not specifically considered in the safety analysis report or technical specifications that require remedial action or corrective measures to prevent the existence or development of an unsafe condition.
- j. Occurrence of an unusual or important event that causes a significant environmental impact, that affects potential environmental impact from unit operation, or that has high public or potential public interest concerning environmental impact from unit operation.
- k. Occurrence of radioactive material contained in liquid or gaseous holdup tanks in excess of that permitted by the limiting condition for operation established in the technical specifications.

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THIRTY DAY WRITTEN REPORTS

6.9.1.13 The types of events listed below shall be the subject of written reports to the Director of the Regional Office within thirty days of occurrence of the event. The written report shall include, as a minimum, a completed copy of a licensee event report form. Information provided on the licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

- a. Reactor protection system or engineered safety feature instrument settings which are found to be less conservative than those established by the technical specifications but which do not prevent the fulfillment of the functional requirements of affected systems.
- b. Conditions leading to operation in a degraded mode permitted by a limiting condition for operation or plant shutdown required by a limiting condition for operation.
- c. Observed inadequacies in the implementation of administrative or procedural controls which threaten to cause reduction of degree of redundancy provided in reactor protection systems or engineered safety feature systems.
- d. Abnormal degradation of systems other than those specified in 6.9.1.12.c above designed to contain radioactive material resulting from the fission process.
- e. An unplanned offsite release of 1) more than 1 curie of radioactive material in liquid effluents, 2) more than 150 curies of noble gas in gaseous effluents, or 3) more than 0.05 curies of radioiodine in gaseous effluents. The report of an unplanned offsite release of radioactive material shall include the following information:
 1. A description of the event and equipment involved.
 2. Cause(s) for the unplanned release.
 3. Actions taken to prevent recurrence.
 4. Consequences of the unplanned release.

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- f. Measured levels of radioactivity in an environmental sampling medium determined to exceed the reporting level values of Table 6.9-2 when averaged over any calendar quarter sampling period. When more than one of the radionuclides in Table 6.9-2 are detected in the sampling medium, this report shall be submitted if:

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

When radionuclides other than those in Table 6.9-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose to an individual is equal to or greater than the calendar year limits of Specifications 3.11.1.2, 3.11.2.2 and 3.11.2.3. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

SPECIAL REPORTS

Special reports may be required covering inspections, test and maintenance activities. These special reports are determined on an individual basis for each unit and their preparation and submittal are designated in the Technical Specifications.

6.9.2 Special reports shall be submitted to the Director of the Office of Inspection and Enforcement Regional Office within the time period specified for each report.

TABLE 6.9-2

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Reporting Levels

Analysis	Water	Airborne Particulate or Gases (pCi/m ³)	Fish (pCi/Kg, wet)	Milk (pCi/l)	Vegetables (pCi/Kg, wet)
H-3	3 x 10 ⁴				
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				
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			3 x 10 ²	

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6.10 RECORD RETENTION

In addition to the applicable record retention requirements of Title 10, Code of Federal Regulations, the following records shall be retained for at least the minimum period indicated.

6.10.1 The following records shall be retained for at least five years:

- a. Records and logs of unit operation covering time interval at each power level.
- b. Records and logs of principal maintenance activities, inspections, repair and replacement of principal items of equipment related to nuclear safety.
- c. ALL REPORTABLE OCCURRENCES submitted to the Commission.
- d. Records of surveillance activities, inspections and calibrations required by these Technical Specifications.
- e. Records of changes made to the procedures required by Specification 6.8.1.
- f. Records of radioactive shipments.
- g. Records of sealed source and fission detector leak tests and results.
- h. Records of annual physical inventory of all sealed source material of record.

6.10.2 The following records shall be retained for the duration of the Unit Operating License:

- a. Records and drawing changes reflecting unit design modifications made to systems and equipment described in the Final Safety Analysis Report.
- b. Records of new and irradiated fuel inventory, fuel transfers and assembly burnup histories.
- c. Records of radiation exposure for all individuals entering radiation control areas.
- d. Records of gaseous and liquid radioactive material released to the environs.

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- e. Records of transient of operational cycles for those unit components identified in Table 5.7-1.
- f. Records of reactor tests and experiments.
- g. Records of training and qualification for current members of the unit staff.
- h. Records of in-service inspections performed pursuant to these Technical Specifications.
- i. Records of Quality Assurance activities required by the QA Manual.
- j. Records of reviews performed for changes made to procedures or equipment or reviews of tests and experiments pursuant to 10 CFR 50.59.
- k. Records of meetings of the (URG) and the (CNRAG).

6.11 RADIATION PROTECTION PROGRAM

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

6.12 HIGH RADIATION AREA (OPTIONAL)

6.12.1 In lieu of the "control device" or "alarm signal" required by paragraph 20.203(c)(2) of 10 CFR 20, each high radiation area in which the intensity of radiation is greater than 100 mrem/hr but less than 1000 mrem/hr shall be barricaded and conspicuously posted as a high radiation area and entrance thereto shall be controlled by requiring issuance of a Radiation Work Permit*. Any individual or group of individuals permitted to enter such areas shall be provided with or accompanied by one or more of the following:

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

*Health Physics personnel or personnel escorted by Health Physics personnel in accordance with approved emergency procedures shall be exempt from the RWP issuance requirement during the performance of their radiation protection duties, provided they comply with approved radiation protection procedures for entry into high radiation areas.

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- b. A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate level in the area has been established and personnel have been made knowledgeable of them.
- c. An individual qualified in radiation protection procedures who is equipped with a radiation dose rate monitoring device. This individual shall be responsible for providing positive control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified by the facility Health Physicist in the Radiation Work Permit.

6.12.2 The requirements of 6.12.1, above, shall also apply to each high radiation area in which the intensity of radiation is greater than 1000 mrem/hr. In addition, locked doors shall be provided to prevent unauthorized entry into such areas and the keys shall be maintained under the administrative control of the Shift Supervisor on duty and/or the Plant Health Physicist.

ENCLOSURE NO. 2

APPENDIX I TECHNICAL SPECIFICATIONS

LICENSEE SUBMITTAL DATES

60 Days

Farley
Hatch 1/2

120 Days

Big Rock Point
Ginna
Haddam Neck
La Crosse
Oyster Creek
San Onofre
Surry 1/2
Yankee Rowe

150 Days

Arkansas 1
Brunswick 1/2
Crystal River
Dresden 1/2/3
FitzPatrick
Indian Point 1/2/3
Millstone 1/2
Monticello
Nine Mile Point
Oconee 1/2/3
Peach Bottom 2/3
Pilgrim 1
Quad Cities 1/2
Robinson 2
Turkey Point 3/4
Vermont Yankee
Zion 1/2

180 Days

Beaver Valley
Browns Ferry 1/2/3
Calvert Cliffs 1/2
Cook 1/2
Cooper
Davis Besse
Duane Arnold
Fort Calhoun
Humboldt Bay
Kewaunee
Maine Yankee
North Anna 1/2
Palisades
Point Beach 1/2
Prairie Island 1/2
Rancho Seco
Salem 1
St. Lucie 1
Three Mile Island 1/2
Trojan