number of operable channels and the number of channels when tripped will cause reactor trip.

1.7 INSTRUMENTATION SURVEILLANCE

1) CHANNEL CHECK

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.

2) CHANNEL FUNCTIONAL TEST

A CHANNEL FUNCTIONAL TEST consists of injecting a simulated signal into the channel to verify that it is operable, including alarm and/or trip initiating action.

3) CHANNEL CALIBRATION

CHANNEL CALIBRATION consists of the adjustment of channel output such that it responds, with acceptable range and accuracy, to known values of the parameter which the channel measures. Calibration shall encompass the entire channel, including alarm or trip, and shall be deemed to include the CHANNEL FUNCTIONAL TEST.

4) SOURCE CHECK

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

1.8 SHUTDOWN

1) Cold Shutdown

The reactor is in the cold shutdown condition when the reactor is subcritical by at least 1% $\Delta k/k$ and T_{avg} is less than 200F.

2) Hot Shutdown

The reactor is in the hot shutdown condition when it

1.0 DEFINITIONS

1.23 GASEOUS RADWASTE TREATMENT SYSTEM

A GASEOUS RADWASTE TREATMENT SYSTEM is the gas decay tank system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

1.24 VENTILATION EXHAUST TREATMENT SYSTEM

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

1.25 PROCESS CONTROL PROGRAM (PCP)

The PROCESS CONTROL PROGRAM shall contain the current formula, sampling, analysis, tests and determinations to be made to ensure that the processing and packaging of wet radioactive wastes based on demonstrated processing of actual or simulated wet radioactive wastes will be accomplished in such a way as to assure compliance with 10CFR20, 10CFR71, and Federal and State regulations and other requirements governing the disposal of radioactive wastes.

1.26 SOLIDIFICATION

SOLIDIFICATION shall be the conversion of wet radioactive wastes into a form that meets shipping and burial ground requirements.

1.27 OFFSITE DOSE CALCULATION MANUAL (ODCM)

The OFFSITE DOSE CALCULATION MANUAL shall contain the methodology and parameters used in the calculation of offsite doses due to radioactive gaseous and liquid effluents and in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints.

1.28 DOSE EQUIVALENT I-131

The DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcurie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites", or in NRC Regulatory Guide 1.109, Rev. 1 October, 1977.

1.29 PURGE - PURGING

PURGE or PURGING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.

1.30 VENTING

VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.

3.9 RADIOACTIVE MATERIALS RELEASE

Applicability: Applies to the controlled release of all liquid and gaseous waste discharge from the plant which may contain radioactive materials.

Objective: To establish conditions for the release of liquid and gaseous, radioactive materials and to assure that all such releases are within the limits specified in 10CFR20. In addition, every reasonable effort shall be made to control the rate of release of radioactive materials in liquid and gaseous waste discharged from the plant to unrestricted areas as low as reasonably achievable.

Specifications:

1. LIQUID WASTES

a. The concentration of radioactive material released at any time from the site to unrestricted areas shall not exceed the concentrations specified in 10CFR20, APPENDIX B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall not exceed 2×10^{-4} μCi/ml total activity.

1. The radioactivity content of each batch of radioactive liquid waste to be discharged shall be determined prior to release by sampling and analysis in accordance with Table 3.9-1. The results of pre-release analyses shall be used with the calculational methods described in the ODCM to verify that the concentration at the point of release does not exceed the values in Specification 3.9.1.a.

2. Post-release analyses of samples composited from batch releases shall be performed in accordance with Table 3.9-1. The results of the previous post-release analyses shall be used with the calculational methods described in the ODCM to assure that the concentrations at the point of release were maintained within the limits of Specification 3.9.1.a.

3. The radioactivity concentrations of liquids discharged from continuous release points shall be determined by collection and analysis of samples in accordance with Table 3.9-1. The results of the analyses shall be used with the calculational methods described in the ODCM to verify that the concentration at the point of release does not exceed the values in Specification 3.9.1.a.

4. If the concentration of radioactive material released from the site to unrestricted areas exceeds the above limits, restore the concentration below the above limits without delay.

b. The dose or dose commitment per reactor to an individual from any radioactive materials in liquid effluent released to unrestricted areas shall be limited, during any calendar quarter, to $\leq$ 1.5 mrem to the total body and to $\leq$ 5 mrem to any organ.

1. Calculations shall be performed in accordance with methods described in the ODCM at least once per 31 days to verify that the cumulative dose commitment due to liquid effluent does not exceed the limits stated above.

2. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of a licensee event report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2.b, a report which identifies the causes(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 remainder of the calendar year, so that the cumulative dose to an individual from these releases is within the above limits.

c. The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.9-2 shall be OPERABLE with their alarm/trip setpoints (if applicable) set to ensure that the limits of Specification 3.9.1.a are not exceeded. The setpoints shall be determined in accordance with methods described in the ODCM.

1. The concentration of radioactive materials in liquid effluents released from the site shall be continuously monitored by the instruments shown in Table 3.9-2.

2. The alarm/trip setpoint on a radioactive liquid effluent monitor will be set to ensure that the limits of Specification 3.9.1.a are not exceeded. If an alarm/trip setpoint is exceeded, the radioactive liquid release being monitored by the affected monitor will be suspended, or the monitor declared inoperable, or the monitor reset immediately to meet Specification 3.9.1.a.

3. When less than the minimum number of radioactive liquid effluent monitors are OPERABLE, the ACTION shown in Table 3.9-2 will be taken.

4. Each radioactive liquid effluent monitor shall be demonstrated OPERABLE by performance of operations at the frequencies shown in Table 4.1-3.

d. Appropriate subsystems of the liquid radwaste treatment system shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses in the unrestricted area due to liquid effluents, when averaged over 31 days, would exceed 0.12 mrem to the total body or 0.4 mrem to any organ.

1. Calculations shall be performed at least once every 31 days in accordance with methods described in the ODCM to determine if doses are likely to exceed the design objective doses stated above, unless the liquid radwaste system has been utilized to process radioactive liquid effluents during the previous 92 days.

2. The appropriate liquid radwaste subsystems shall be demonstrated OPERABLE once per 92 days unless the appropriate liquid radwaste subsystem has been utilized to process radioactive liquid effluents during the previous 92 days.

3. With the liquid radwaste treatment system inoperable for more than 31 days or with radioactive liquid waste being discharged without treatment and in excess of the above limits, in lieu of a licensee event report, prepare and submit to the Commission within 30 days pursuant to Specification 6.9.2.b a report which includes the following information:

   (1) Identification of the inoperable equipment or subsystems and the reason for inoperability,

   (2) Action(s) taken to restore the inoperable equipment to OPERABLE status, and

   (3) Summary description of action(s) taken to prevent a recurrence.

TABLE 3.9-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

LIQUID RELEASE TYPE	SAMPLING[g] FREQUENCY	MINIMUM[g] ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD)[a] (uCi/ml)
A. Batch Waste Release Tanks[c]	PR Each Batch	PR Each Batch	Principal Gamma Emitters[b,h]	5×10^{-7}
			I-131[h]	1×10^{-6}
	PR One Batch/M	M	Dissolved and Entrained Gases[b]	1×10^{-5}
	PR Each Batch	M Composite[d]	H-3	1×10^{-5}
			Gross Alpha	1×10^{-7}
	PR Each Batch	Q Composite[d]	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}
B. Plant Continuous Releases[e]				
1. Steam Generator Blowdown	4/M	4/M	Principal Gamma Emitters[b,h]	5×10^{-7}
			I-131[h]	1×10^{-6}
	M^f	M^f	Dissolved and Entrained Gases[b]	1×10^{-5}
	$4/M^f$	M^f Composite[d]	H-3	1×10^{-5}
			Gross Alpha	1×10^{-7}
	$4/M^f$	Q^f Composite[d]	Sr-89, Sr-90	5×10^{-8}
			Fe-55	1×10^{-6}
2. Storm Drain	M	M	Principal Gamma Emitters[b,h]	5×10^{-7}
			I-131[h]	1×10^{-6}

TABLE 3.9-1 (Cont.)

TABLE NOTATION

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

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

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

Where:

LLD is the "a priori" lower limit of detection as defined above for a blank sample (as microcurie per unit mass or volume),

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

E is the counting efficiency (as counts per transformation),

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

2.22×10^6 is the number of transformations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

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

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

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

TABLE 3.9-1 (Cont.)

TABLE NOTATION

b. The principal gamma emitters for which the LLD limit specification will apply are exclusively the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, Ce-144, Xe-133, Xe-133m and Xe-135. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below the LLD for the analyses should not be reported as being present at the LLD level. When a radionuclide's calculated LLD is greater than its listed LLD limit, the calculated LLD should be assigned as the activity of the radionuclide; or, the activity of the radionuclide should be calculated using measured ratios with those radionuclides which are routinely identified and measured.

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

d. 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. Prior to analysis, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

e. A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a volume of system that has an input flow during the continuous release.

f. Sampling and analysis of steam generator blowdown for these species is only necessary when primary to secondary leakage is occurring as indicated by the air ejector monitor.

g. Frequency designations are defined in Table 4.1-1, Sheet 4.

h. If performance of an isotopic analysis is not possible, liquid releases may be made for up to 7 days on the basis of a gross beta-gamma analysis at an LLD level of 1×10^{-7} μCi/ml.

TABLE 3.9-2

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	ACTION
1. Gross Radioactivity Monitors Providing Automatic Termination of Release		
a. Liquid Radwaste Effluent Line	(1)	1
b. Steam Generator Blowdown Effluent Line	(1)	2
2. Gross Radioactivity Monitors Providing Alarm But Not Providing Automatic Isolation		
a. Component Cooling Water System	(1)	3
3. Flow Rate Measurement Devices		
a. Liquid Radwaste Effluent Line	(1)	4
b. Steam Generator Blowdown Effluent Line	(1)	5

Table 3.9-2 (Cont.)

TABLE NOTATION

ACTION 1 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may be resumed for up to 14 days, provided that prior to initiating a release:

1. At least two independent samples are analyzed in accordance with Specification 3.9.1.a.1 and;

2. At least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge valving;

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 2 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 90 days if there is no primary to secondary leakage occurring as indicated by the air ejector monitor. If primary to secondary leakage is indicated, releases may continue for up to 30 days provided grab samples are analyzed for gross radioactivity (beta or gamma) at a limit of detection of at least 10^{-7} μCi/ml or analyzed isotopically (gamma) at a limit of detection of at least 5×10^{-7} μCi/ml:

1. At least once per 8 hours when the specific activity of the secondary coolant is > 0.01 μCi/ml DOSE EQUIVALENT I-131.

2. At least once per 24 hours when the specific activity of the secondary coolant is ≤ 0.01 μCi/ml DOSE EQUIVALENT I-131.

ACTION 3 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may be made for up to 90 days provided that grab samples are collected during releases at least once per 8 hours and analyzed for gross radioactivity (beta or gamma) at a limit of detection of at least 10^{-7} μCi/ml, or analyzed isotopically (gamma) at a limit of detection of at least 5×10^{-7} μCi/ml.

ACTION 4 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 30 days provided the flow rate is estimated at least once per 4 hours during actual releases. Pump curves may be used to estimate flow.

ACTION 5 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 90 days if there is no primary to secondary leakage occurring. If primary to secondary leakage is occurring, as indicated by the air ejector monitor, releases may continue for up to 30 days provided the flow rate is estimated:

1. At least once per 8 hours when the specific activity of the secondary coolant is > 0.01 μCi/ml DOSE EQUIVALENT I-131.

2. At least once per 24 hours when the specific activity of the secondary coolant is ≤ 0.01 μCi/ml DOSE EQUIVALENT I-131.

2. GASEOUS WASTE

a. The dose rate due to radioactive materials released in gaseous effluents from the site shall be limited to the following:

Less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin due to noble gases and less than or equal to 1500 mrem/yr to any organ due to I-131, tritium and for all radioactive materials in particulate form with half lives greater than 8 days.

1. The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methods described in the ODCM.

2. The release rate of radioactive materials, other than noble gases, in gaseous effluents shall be determined to be within the above limits in accordance with the methods described in the ODCM and by obtaining representative samples and performing analyses in accordance with the sampling and analysis program, specified in Table 3.9-3.

3. In the event the dose rate(s) exceeds the above limits, decrease the release rate without delay to comply with the limit(s) given in Specification 3.9.2.a.

b. The air dose per reactor in unrestricted areas due to noble gases released in gaseous effluents shall be limited, during any quarter, to $\leq$ 5 mrad for gamma radiation and $\leq$ 10 mrad for beta radiation.

1. Cumulative dose contributions for the current calendar quarter and current calendar year shall be determined in accordance with methods described in the ODCM at least once per 31 days.

2. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, in lieu of a licensee event report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2.b, a 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 remainder of

the calendar year, so that the cumulative dose is within the above limits.

c. The dose to a person offsite per reactor due to I-131, tritium and to particulates with half-lives greater than 8.0 days released in airborne effluents shall not exceed 7.5 mrem to any organ during any quarter.

1. Cumulative dose contributions for the current calendar quarter and current calendar year shall be determined in accordance with the ODCM at least once per 31 days.

2. With the calculated dose from the release of I-131, tritium and materials in particulate form with half lives greater than 8 days, in gaseous effluents exceeding any of the above limits, in lieu of a licensee event report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2.b, a report which identifies the cause(s) for exceeding the limit and defines the corrective actions to be taken to reduce the releases of I-131, tritium and radioactive materials in particulate form with half-lives greater than 8 days in gaseous effluents during the remainder of the current calendar quarter and during the remainder of the calendar year, so that the cumulative dose to an individual from these releases is within the above limits.

d. The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.9-4 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.9.2.a are not exceeded. The setpoints shall be determined in accordance with methods described in the ODCM.

1. The alarm/trip setpoint on a radioactive gaseous effluent monitor will be set to ensure that the limits of Specification 3.9.2.a are not exceeded. If an alarm/trip setpoint is exceeded, the radioactive gaseous release being monitored by the affected monitor will be suspended; or the monitor declared inoperable, or the monitor reset immediately to meet Specification 3.9.2.a.

2. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.9-4.

3. Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the operations at the frequencies shown in Table 4.1-4.

e. The GASEOUS RADWASTE TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge if the projected gaseous effluent dose per reactor due to gaseous effluent releases to unrestricted areas when averaged over 31 days exceeds 0.4 mrad for gamma radiation and 0.8 mrad for beta radiation, and VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge if the projected gaseous effluent dose per reactor due to gaseous effluent releases to unrestricted areas when averaged over 31 days exceeds 0.6 mrem to any organ.

1. Doses due to gaseous releases to unrestricted areas shall be projected at least once per 31 days.

2. The GASEOUS RADWASTE TREATMENT SYSTEM and VENTILATION EXHAUST TREATMENT SYSTEM shall be demonstrated OPERABLE by operating the GASEOUS RADWASTE TREATMENT SYSTEM equipment and VENTILATION EXHAUST TREATMENT SYSTEM equipment, at least once per 92 days unless the appropriate system has been utilized to process radioactive gaseous effluents during the previous 92 days.

3. With the GASEOUS RADWASTE TREATMENT SYSTEM and/or the VENTILATION EXHAUST TREATMENT SYSTEM inoperable for more than 31 days or with gaseous waste being discharged without treatment and in excess of the above limits, in lieu of a licensee event report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2.b, a report which includes the following information:

(1) Identification of the inoperable equipment or subsystems and the reason for inoperability,

(2) Action(s) taken to restore the inoperable equipment to OPERABLE status, and

(3) Summary description of action (s) taken to prevent a recurrence.

f. The dose or dose commitment to a real individual from all uranium fuel cycle sources is limited to $\leq$ 25 mrem to the total body or any organ (except the thyroid, which is limited to $\leq$ 75 mrem) over a period of 12 consecutive months.

1. With the calculated dose from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Specifications 3.9.1.b, 3.9.2.b, or 3.9.2.c, prepare and submit a report, in lieu of a licensee event report, to the Commission within 30 days pursuant to Specification 6.9.2.b and limit the subsequent releases such that the dose or dose commitment to any real individual from uranium fuel cycle sources is limited to $\leq$ 25 mrem to the total body or any organ (except thyroid, which is limited to $\leq$ 75 mrem) over 12 consecutive months. This report shall include an analysis which demonstrates that radiation exposures to any real individual from 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.

2. Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Specification 3.9.1.b, 3.9.2.b and 3.9.2.c, and in accordance with ODCM.

g. The quantity of radioactivity contained in each gas storage tank shall be limited to less than or equal to 70,000 curies noble gases (considered as Xe-133).

1. The quantity of radioactive material contained in each gas storage tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank and the reactor coolant system total activity exceeds the activity limit of Specification 3.1.4.

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

h. The concentration of oxygen in the gas decay tank system shall be limited to less than or equal to 4% by volume whenever the hydrogen concentration exceeds 4% by volume.

1. The concentration of hydrogen and oxygen in the gas decay tank system shall be determined to be within the above limits, at least once every 24 hours, using a gas analyzer required OPERABLE by Table 3.9-4.

2. With the concentration of oxygen in the gas decay tank system greater than 4% by volume and the hydrogen concentration greater than 4% by volume:

   (1) Immediately suspend all additions of waste gases to the affected gas decay tank,

   (2) Verify that the remainder of the gas decay tank system is within the limits of Specification 3.9.2.h,

   (3) The affected gas decay tank(s) shall be released without delay in compliance with Specification 3.9.2.a or the concentration of oxygen shall be reduced to less than or equal to 4% by volume without delay.

TABLE 3.9-3

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

GASEOUS RELEASE TYPE	SAMPLING[d] FREQUENCY	MINIMUM[d] ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LI OF DETEC (LLD)[a] (μCi/c
A. Gas Decay Tank (Batch)	PR Each Tank Grab Sample	PR Each Tank	Principal Gamma Emitters[b]	1 x 10⁻
B. Containment Purge (Batch)	PR Grab Sample	PR	Principal Gamma Emitters[b]	1 x 10⁻
			H-3	1 x 10⁻
C. Air Ejectors	M Grab Sample	M	Noble Gas[b]	1 x 10⁻
			H-3	1 x 10⁻
	Continuous[c]	4/M Charcoal Sample	I-131	1 x 10⁻
			I-133	1 x 10⁻
	Continuous[c]	4/M Particulate Sample	Particulate Principal Gamma Emitters[b]	1 x 10⁻
D. Plant Vent and #3 Spent Fuel Pit Building	M Grab Sample	M Grab Sample	Noble Gas[b]	1 x 10⁻
	M[e,f] Grab Sample	M Grab Sample	H-3	1 x 10⁻
	Continuous[c]	4/M Charcoal Sample	I-131	1 x 10⁻
			I-133	1 x 10⁻
	Continuous[c]	4/M Particulate Sample	Particulate Principal Gamma Emitters[b]	1 x 10⁻
	Continuous[c]	M Composite Particulate Sample	Gross Alpha	1 x 10⁻
	Continuous[c]	Q Composite Particulate Sample	Sr-89, Sr-90	1 x 10⁻
E. Plant Vent	Continuous	Noble Gas Monitor	Noble Gases Gross Beta-Gamma	1 x 10⁻

TABLE 3.9-3 (Cont.)

TABLE NOTATION

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

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

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

Where:

LLD is the "a priori" lower limit of detection as defined above for a blank sample (as microcurie per unit mass or volume),

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

E is the counting efficiency (as counts per transformation),

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

2.22×10^6 is the number of transformations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

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

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

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

TABLE 3.9-3 (Cont.)

TABLE NOTATION

b. The principal gamma emitters for which the LLD limit specification will apply are exclusively the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for noble gas emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, Ce-144, and I-131 for particulate emissions. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides shall also be identified and reported. Nuclides which are below the LLD for the analyses should not be reported as being present at the LLD level for that nuclide. When a radionuclide's calculated LLD is greater than its listed LLD limit, the calculated LLD should be assigned as the activity of the radionuclide; or, the activity of the radionuclide should be calculated using measured ratios with those radionuclides which are routinely identified and measured.

c. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.9.2.a, 3.9.2.b, and 3.9.2.c.

d. Frequency designations are defined in Table 4.1-1, sheet 4.

e. Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.

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

TAB[redacted].9-4

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	PARAMETER	ACTION
1. Plant Vent				
a. Noble Gas Activity Monitor ***	(1)	*	Radioactivity Concentration Measurement	11
b. Noble Gas Activity Monitor - High Range	(1)	*	Radioactivity Concentration Measurement	8
c. Iodine Sampler Cartridge	(1)	*	Verify Presence of Cartridge	10
d. Particulate Sampler Filter	(1)	*	Verify Presence of Filter	10
e. Sampler Flow Rate Measuring Device	(1)	*	Sampler Flow Rate Measurement	7
2. #3 Spent Fuel Pit Building Vent				
a. Noble Gas Activity Monitor	(1)	*	Radioactivity Concentration Measurement	8
b. Noble Gas Activity Monitor - High Range	(1)	*	Radioactivity Concentration Measurement	8
c. Iodine Sampler Cartridge	(1)	*	Verify Presence of Cartridge	10
d. Particulate Sampler Filter	(1)	*	Verify Presence of Filter	10
e. Sampler Flow Rate Measuring Device	(1)	*	Sampler Flow Rate Measurement	7
3. Air Ejector Vent				
a. Noble Gas Activity Monitor	(1)	*	Radioactivity Concentration Measurement	9
b. Noble Gas Activity Monitor - High Range	(1)	*	Radioactivity Concentration Measurement	8
c. Effluent System Flow Rate Measuring Device	(1)	**	System Flow rate Measurement	7

TABLE 3.9-4

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	PARAMETER	ACTION
4. Main Steam				
a. Gross Activity Monitor - High Range	(1)	*	Radioactivity Concentration Measurement	8
5. Gas Decay Tank System Explosive Gas Monitoring System				
a. Hydrogen	(1)	*	% Hydrogen	12
b. Oxygen	(1)	*	% Oxygen	12

---

* At all times
** Daily when primary to secondary leakage is occurring (as indicated by the air ejector monitor)
*** Includes Gas Decay Tank System Release Pathway

TABLE 3.9-4 (Cont.)

ACTION 7 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 30 days provided the flow rate is estimated at least once every 8 hours.

ACTION 8 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 30 days provided grab samples are collected every 8 hours and analyzed for activity within 24 hours.

ACTION 9 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 30 days provided grab samples are collected every 8 hours and analyzed within 24 hours for noble gas when primary to secondary leakage is occurring as indicated by the air ejector monitor.

ACTION 10 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 30 days, provided samples are continuously collected with auxiliary sampling equipment and analyzed approximately every seven (7) days.

ACTION 11 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases, excluding gas decay tank releases, via this pathway may continue for up to 30 days provided grab samples are collected at least once per 8 hours and these samples are analyzed for activity within 24 hours.

For Gas Decay Tank Releases:

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 14 days provided that prior to initiating the release:

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

2. At least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge valve lineup:

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 12 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, operation of the waste gas decay tank system may continue for up to 30 days provided that grab samples are collected and analyzed for hydrogen and oxygen concentration at least once every 24 hours.

3. CONTAINERIZED WASTES

a. Containers of radioactive waste materials shall be shipped from the site by licensed carriers in conformance with the Code of Federal Regulations.

b. Wet radioactive wastes shall be processed in accordance with a PROCESS CONTROL PROGRAM (PCP) prior to being shipped to a radioactive waste disposal facility.

TABLE 4.1-1 SHEET 2

	Channel Description	Check	Calibrate	Test	Remarks
10.	Rod Position Bank Counters	S†	N.A.	N.A.	With analog Rod Position
11.	Steam Generator Level	S†	R	M†	
12.	Charging Flow	N.A.	R	N.A.	
13.	Residual Heat Removal Pump Flow	N.A.	R	N.A.	
14.	Boric Acid Tank Level	W	R	N.A.	
15.	Refueling Water Storage Tank Level	W†	R	N.A.	
16.	Volume Control Tank Level	N.A.	R	N.A.	
17A.	Containment Pressure	D††	R	M††	Wide Range
17B.	Containment Pressure	D††	R	M††	Narrow Range
18A.	Process Radiation	***	***	***	
18B.	Area Radiation	D	A	M	
19.	Boric Acid Control	N.A.	N.A.	R	
20.	Containment Sump Level	N.A.	R	N.A.	
21.	Accumulator Level and Pressure	S†	R	N.A.	
22.	Steam Line Pressure	S†	R	M†	

TABLE 4.1-1 SHEET 3

	Channel Description	Check	Calibrate	Test	Remarks
23.	Logic Channels	N.A.	N.A.	M†	
24.	Seismograph	N.A.	N.A.	Q	Make trace, Test battery (change semi-annually)
25.	Auxiliary Feedwater Flow Rate	M†	R	N.A.	
26.	RCS Subcooling Margin Monitor	M†	R	N.A.	
27.	PORV Position Indicator (Primary Detector)	M†	N.A.	R	Check consists of monitoring indicated position and verifying by observation of related parameters
28.	PORV Block Valve Position Indicator	M†	N.A.	R	
29.	Safety Valve Position Indicator	M†	R	N.A.	
30.	Loss of Voltage (both 4kv busses)	N.A.	N.A.	R	For AFW actuation at power onl
31.	Trip of Both Main Feedwater Pump Breakers	N.A.	N.A.	R	For AFW actuation at power onl

* Using moveable in-core detector system
** Frequency only
*** R-17A, R-17B, R-18 and R-19 refer to Table 4.1-3; R-14 and R-15 refer to Table 4.1-4
PR - Prior to each release (for Radioactive Effluent Sampling)
S - Each Shift
D - Daily
W - Weekly
4/M - At least 4 per month and a minimum of 48 per year (for Radioactive Effluent Sampling)
B/W - Every Two Weeks
M - Monthly
Q - Quarterly
SA - Semiannually
P - Prior to each startup if not done previous week
R - Each Refueling Shutdown
A - Annually
N.A. - Not applicable

† - N.A. during cold or refueling shutdowns. The specified tests, however, shall be performed within one surveillance interval prior to startup.

†† - N.A. during cold or refueling shutdowns. The specified tests, however, shall be performed within one surveillance interval prior to heatup above 200F.

TABLE 4.1-3 SHEET 1

MINIMUM FREQUENCY FOR SURVEILLANCE OF RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Gross Beta or Gamma Radioactivity Monitors Providing Alarm and Automatic Isolation	(5)	(5)	(5)	(5)
a. Liquid Radwaste Effluent Line	D*	M*	A(3)	Q(1)
b. Steam Generator Blowdown Effluent Line	D*	M	A(3)	Q(1)
2. Gross Beta or Gamma Radioactivity Monitors Providing Alarm but Not Providing Automatic Isolation				
a. Component Cooling Water System	D*	M	A(3)	Q(2)
3. Flow Rate Monitor				
a. Liquid Radwaste Effluent Line	D*(4)	N/A	A	Q
b. Steam Generator Blowdown Effluent Line	D*(4)	N/A	A	Q

* During releases via this pathway.

TABLE NOTATION

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if the following condition exists:

1. Instrument indicated measured levels above the alarm/trip setpoint.

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if the following conditions exist:

1. Instrument indicated measured levels above the alarm/trip setpoint.

2. Instrument indicates a downscale failure.

3. Channel in test condition.

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

(4) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once daily on any day on which continuous, periodic or batch releases are made.

(5) Frequency designations are defined in Table 4.1-1, Sheet 4.

TABLE 4.1-4 SHEET 1

MINIMUM FREQUENCY FOR SURVEILLANCE OF RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	CHANNEL CHECK (6)	SOURCE CHECK (6)	CHANNEL CALIBRATION (6)	CHANNEL FUNCTIONAL TEST (6)
1. Plant Vent				
a. Noble Gas Activity Monitor *	D(1)	M	A(3)	Q(2)
b. Noble Gas Activity Monitor - High Range	D	M	A(3)	N/A
c. Iodine Sampler Cartridge	W	N/A	N/A	N/A
d. Particulate Sampler Filter	W	N/A	N/A	N/A
e. Sampler Flow Rate Measuring Device	D	N/A	A	N/A
2. #3 Spent Fuel Pit Building Vent				
a. Noble Gas Activity Monitor	D	M	A(3)	N/A
b. Noble Gas Activity Monitor - High Range	D	M	A(3)	N/A
c. Iodine Sampler Cartridge	W	N/A	N/A	N/A
d. Particulate Sampler Filter	W	N/A	N/A	N/A
e. Sampler Flow Rate Measuring Device	D	N/A	A	N/A
3. Air Ejector Vent				
a. Noble Gas Activity Monitor	D	M	A(3)	Q(2)
b. Noble Gas Activity Monitor - High Range	D	M	A(3)	N/A
c. Effluent System Flow Rate Measuring Device	D	N/A	N/A	N/A

MINIMUM FREQUENCY FOR SURVEILLANCE OF RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
4. Main Steam				
a. Gross Activity Monitor - High Range	D	M	A(3)	N/A
5. Gas Decay Tank System Explosive Gas Monitoring System				
a. Hydrogen Monitor	D	N/A	Q(4)	Q
b. Oxygen Monitor	D	N/A	Q(5)	Q

* Includes Gas Decay Tank System Release Pathway

TABLE NOTATION

(1) A CHANNEL CHECK for the plant vent noble gas activity monitor is performed prior to making a release through the gas decay tank release pathway.

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that control room alarm annunciation occurs if the following condition exists:

1. Instrument indicated measured levels above the alarm/trip setpoint.

For the Gas Decay Tank Release Pathway,

The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if the following conditions exist:

1. Instrument indicated measured levels above the alarm/trip setpoint.

2. Instrument indicates a downscale failure.

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

(4) The CHANNEL CALIBRATION shall include the use of standard gases containing a known concentration of hydrogen.

(5) The CHANNEL CALIBRATION shall include the use of standard gases containing a known concentration of oxygen.

(6) Frequency designations are defined in Table 4.1-1, Sheet 4.

4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

Applicability: Applies to routine monitoring of plant environs.

Objective: To establish a sampling schedule which will assure cognizance of radiological changes in the environs.

Specification:

1. Radiological environmental samples shall be collected and analyzed in accordance with Table 4.12-1. Maximum values for lower limits of detection shall be in accordance with Table 4.12-2. Specific sample locations shall be provided in a figure and a table in an approved procedure.

   a. With the radiological environmental surveillance program not being conducted in accordance with Specification 4.12.1, include in the annual Radiological Environmental Monitoring Report, a description of the reasons for not conducting the surveillance as specified. Deviations from Tables 4.12-1 and 4.12-2 may occur because samples are unobtainable due to hazardous conditions, biological or seasonal unavailability, or due to vandalism, malfunction of sampling or analytical equipment, laboratory accidents, sampling errors, or other legitimate reasons. If deviations occur because of a malfunction of sampling or analytical equipment, an effort shall be made to complete corrective actions prior to the end of the next sample interval. A description of all deviations from Table 4.12-1 or 4.12-2, the reasons for all such deviations, and a description of any corrective actions initiated or planned to bring the radiological environment surveillance program back in accordance with Specification 4.12-1 shall be provided in the annual Radiological Environmental Monitoring Report.

   b. With the confirmed* level of radioactivity in an environmental sampling medium at one or more of the locations, outside the closed cooling canal system, specified in Table 4.12-1 exceeding the limits of Table 6.9-1 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from the end of the affected calendar quarter (or from the time of the confirmatory result if such result is not received until after the end of the quarter in which the

* A confirmatory reanalysis of the original, a duplicate, or a new sample may be desirable, as appropriate. The results of the confirmatory analysis shall be completed at the earliest time consistent with the analysis, but in any case within 30 days.

original sample was collected), a special report pursuant to specification 6.9.2.b which includes an evaluation of any release conditions, environmental factors or other aspects which may have caused the limits of Table 6.9-1 to be exceeded. This report exempts the requirements for a Licensee Event Report (LER). In addition, this report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the conditions shall be reported and described in the Annual Radiological Environmental Monitoring Report.

c. With milk or edible garden vegetation samples unavailable from any of the sample locations required by Table 4.12-1, information shall be included in the Annual Radiological Environmental Monitoring Report identifying the cause of the unavailability of samples and plans for obtaining future samples. If temporary replacement locations are used to collect these samples, the temporary locations will be indentified in the Annual Report. If new permanent sample locations are required; once they have been selected and sample availability is established, the locations from which samples are unavailable may be deleted from the program, and the locations from which the samples will be obtained in the future are incorporated in the environmental monitoring program as new sample locations.

2. A land use census shall be conducted annually to 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. In addition, a survey shall be conducted semi-annually using one or more of the survey methods of specification 4.12-2.c to identify the location of milch herds producing milk for human consumption within a radius of 10 miles from the plant.

a. With a land use census identifying a location(s) which yields a calculated dose or dose commitment greater than the values curently being calculated in Specification 3.9.2.c.1, information shall be submitted in the Annual Radiological Environmental Monitoring Report which identifies the new locati

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

b. With a land use census identifying a location(s) which yields a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Table 4.12-1, information shall be submitted in the Annual Radiological Environmental Monitoring Report which identifies the new location(s). The new location(s) will be added to the Radiological Environmental Monitoring Program when samples become available. The sampling location having the lowest calculated dose or dose commitment (via the same exposure pathway) may be deleted from the monitoring program after October 31 of the year in which the land use census was conducted.

c. The land use census shall be conducted once per calendar year (during the period Feb. 1 - July 31), by a door-to-door survey, by aerial survey, or by consulting local agriculture authorities.

d. With a semi-annual survey that identifies a milch herd producing milk for human consumption within 10 miles from the plant, samples will be collected from that location (if available) and analyzed in accordance with Table 4.12-1 and 4.12-2. If more than one milch herd producing milk for human consumption is located within 10 miles from the plant, samples will be collected from the location having samples available with the highest exposure pathway. Once samples have been initiated the requirement for the 10 mile semi-annual survey is dropped. With samples unavailable reinitiate the 10 mile semi-annual survey.

3. If the Radiological Environmental Surveillance Program is carried out by the licensee, the licensee shall establish an Interlaboratory Comparison Program which has been approved by the NRC. If the licensee is not the principle investigator, the licensee shall require the principle investigator to take a part in an Interlaboratory Comparison Program. This condition may be satisfied by participation in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by the EPA.

a. With analyses not being performed as required above, notify the Commission as a part of the Annual Radiological Environmental Monitoring Report.

4. The annual Radiological Environmental Monitoring Report shall be submitted in accordance with Specification 6.9.4.b.

TABLE 4.12-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

TURKEY POINT

Exposure Pathway and/or sample	Sample Locations (a)	Collection Frequency (b)	Type & Frequency[c] of Analysis
1. Airborne			
a. Radioiodine and Particulates	8 locations	Continuous operation of sampler with sample collection at least weekly.	Radioiodine filters - I-131 - weekly. Particulate filters Gross beta - weekly: Analyze each filter for gross beta radioactivity $\geq$24 hours following filter change. Gamma Isotopic (Composite) - Quarterly A gamma isotopic is also required for each sample having a gross beta radioactivity which is > 1.0 pCi/m^3 and which is also $\geq$ 10 times that of the most recent control sample.
2. Direct Radiation	22 locations	Quarterly	Gamma exposure rate - Quarterly.

TABLE -1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

TURKEY POINT

Exposure Pathway and/or sample	Sample Locations (a)	Collection Frequency (b)	Type & Frequency[c] of Analysis
3. Waterborne			
a. Surface Water	9 locations	Monthly	Gamma isotopic analysis and tritium analysis - monthly.
b. Ground Water Wells,	7 locations	Quarterly	Gamma isotopic analysis and tritium analysis - quarterly.
c. Drinking water[d]	3 locations	Monthly	Gross beta, gamma isotopic analysis and tritium analysis - monthly.
d. Bottom Sediment	3 locations	Semi-annually	Gamma isotoic analysis - semi-annually

TABLE 4.12-1 (Cont.)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

TURKEY POINT

Exposure Pathway and/or sample	Sample Locations (a)	Collection Frequency (b)	Type & Frequency (c) of Analysis
4. Ingestion			
a. Milk	1 location (Additional locations as determined by Specification 4.12-2)	Semi-monthly Control Samples-Monthly	Gamma isotopic analysis and I-131 analysis - semi-monthly Gamma isotopic analysis and I-131 analysis on Control Samples - monthly
b. Fish and invertebrates			
1) Crustacea	3 locations	Semi-annually	Gamma isotopic analysis - Semi-annually
2) Fish	3 locations	Semi-annually	Gamma isotopic analysis - Semi-annually
c. Food Products			
1) Edible Garden Vegetation	3 locations	At harvest time	Gamma isotopic analysis - Each sampling

TABLE NOTATION 4.12-1

(a) A list of sample locations will be provided in a figure and Table in the ODCM.

(b) Sample collection frequency definitions follow:

Weekly	-	Not less than once per calendar week. A maximum interval of 11 days is allowed between the collection of any two consecutive samples.
Semi-monthly	-	Not less than 2 times per calendar month with an interval of not less than 7 days between sample collections. A maximum interval of 24 days is allowed between collection of any two consecutive samples.
Monthly	-	Not less than once per calendar month with an interval of not less than 10 days between sample collections.
Quarterly	-	Not less than once per calendar quarter with an interval of not less than 30 days between sample collections.
Semi-annually	-	One sample each between calendar dates (January 1 - June 30) and (July 1 - December 31). An interval of not less than 30 days will be provided between sample collections.

(c) Frequency of analysis to be consistent with collection frequency.

(d) No drinking water sources are affected by effluents from the plant.

TABLE 4.12-2

Detection Capabilities for Environmental Sample Analysis[a]

Analysis	Lower Limit of Detection (LLD)[b]					
	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
Gross Beta	4[c]	1×10^{-2}				
^{3}H	2000(1000[c])					
^{54}Mn	15		130			
^{59}Fe	30		260			
$^{58,60}Co$	15		130			
^{65}Zn	30		260			
^{95}Zr	30					
^{95}Nb	15					
^{131}I	1[c]	1×10^{-1}		1	60[d]	
^{134}Cs	15	6×10^{-2}	130	15	60[d]	150
^{137}Cs	18	6×10^{-2}	150	18	80[d]	180
$^{140}Ba\text{-}La$	35			35		

NOTE: This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

TABLE 4.12-2

NOTES

[a] Acceptable detection capabilities for thermoluminescent dosimeters used for environmental measurements are given in Regulatory Guide 4.13.

[b] Table indicates acceptable detection capabilities for radioactive materials in environmental samples. These detection capabilities are tabulated in terms of the lower limits of detection (LLDs). The LLD is defined, for purposes of this guide, as the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with at least 95% probability with at most 5% probability of falsely concluding that a blank observation represents a "real" signal.

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

$$LLD = \frac{* \ 4.66 \ s_b}{E \times V \times 2.22 \times Y}$$

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 disintegration)

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

2.22 is the number of disintegrations per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

[c] LLD for drinking water

[d] LLD for garden vegetation

[e] Total for parent and daughter

*4.66 is the factor used when background has been subtracted from the sample count. For measurements in which the background is not subtracted the factor 3.29 shall be used.

f. Review of facility operations to detect potential safety hazards.

g. Performance of special reviews and investigations and reports thereon as requested by the Chairman of the Company Nuclear Review Board.

h. Review of the Plant Security Plan and implementing procedures and submitting recommended changes to the Chairman of the Company Nuclear Review Board.

i. Review of the Emergency Plan and implementing procedures and submitting recommended changes to the Chariman of the Company Nuclear Review Board.

j. Review the results of the Radiological Environmental Monitoring Program at least once per 12 months.

k. Review the PROCESS CONTROL PROGRAM and any changes thereto prior to implementation.

6.5.1.7 AUTHORITY

The Plant Nuclear Safety Committee shall:

a. Recommend to the Plant Manager - Nuclear written approval or disapproval (in minutes of PNSC meeting) of items considered under 6.5.1.6(a) through (d) above.

b. Render determinations in writing (in minutes of PNSC meetings) 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 immediate written notification to the Vice President - of Nuclear Energy and the Company Nuclear Review Board of disagreement

(5) Calculated dose from the release of radioactive materials in liquid or gaseous effluents exceeding the limits of Technical Specification 3.9.

(6) Measured levels of radioactivity in an environmental sampling medium outside the closed cooling canal, determined to exceed the reporting level values of Table 6.9-1 when averaged over any calendar quarter sampling period pursuant to Specification 4.12.1.b. When more than one of the radionuclides in Table 6.9-1 are detected in the sampling medium, this report shall be submitted if:

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

When radionuclides other than those in Table 6.9-1 are detected and are the result of plant effluents, this report shall be submitted if the quarterly dose to an individual is equal to or greater than the quarterly limits of Specifications 3.9.1.b and 3.9.2.b. 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 Monitoring Report.

(b) The total estimated radioactivity (in curies) involved.

(c) The dates of shipment and disposition (if shipped off-site).

b. Annual Radiological Environmental Monitoring Report

A Radiological Environmental Monitoring Report covering the operation of the Turkey Point 3 & 4 units during the previous calendar year shall be submitted prior to May 1 of each year.

The annual Radiological Environmental Monitoring Report shall include summaries, interpretations, and information based upon trend analysis 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 plant operation on the environment. The reports shall also incude the results of the land use census and semi-annual milch herd survey required by Specification 4.12.2. 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 Monitoring Report shall include summarized and tabulated results in the format of Table 6.9-2 of all radiological environmental samples taken during the report period. In the event that some results are not available for inclusion within the report, the report shall be submitted noting and explaining the reasons for the missing results. Delayed results shall be submitted as soon as possible in a supplementary report.

In addition to the information required above the annual Radiological Environmental Monitoring Report shall include the following:

1) A summary description of the radiological environmental surveillance program.

2) A map showing all sampling locations keyed to a table giving distances and directions from the facility.

3) A summary of available results from the Interlaboratory Comparison Program.

4) Additional information as provided in Specifications 4.12.1 and 4.12.2 and 4.12.3

BLE 6.9-1

NON-ROUTINE REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

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

(1) Total for parent and daughter.

TABLE 6.9 - 2

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

NAME OF FACILITY _____ DOCKET NO. _____

LOCATION OF FACILITY _____ REPORTING PERIOD _____

Medium or Pathyway Sampled (Unit of Measurements)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[a] Range[a]	Location with Highest Annual Mean		Control Locations Mean (f)[a] Range[a]	Number of Nonroutine Reported Measurements
				Name Distance and Direction	Mean (f)[a] Range[a]		

a) Mean and range based upon detection measurements only. Fraction of detectable measurements at specific locations is indicated in parentheses (f)

i. Records of Quality Assurance activities as required by Corporate Quality Assurance 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 PNSC and the CNRB.

l. Records for Environmental Qualification which are covered under the provisions of paragraph 6.13.

m. Annual Radiological Environmental Monitoring Reports and records of analyses transmitted to the licensee which are used to prepare the Annual Radiological Environmental Monitoring Report.

n. Meterological data, summarized and reported in a format consistent with the recommendations of Regulatory Guides 1.21 and 1.23.

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

6.12.1 In lieu of the "control device" or "alarm signal" required by paragraph 20.203(c)(2) of 10 CFR 20:

a. 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 issuance of a Radiation Work Permit and any individual or group of individuals permitted to enter such areas shall be provided with a radiation monitoring device which continuously indicates the radiation dose rate in the area.

b. Each High Radiation Area in which the intensity of radiation is greater than 1000 mRem/hr shall be subject to the provisions of 6.13.1(a) above, and in addition locked doors shall be provided to prevent unauthorized entry into such areas and the keys shall be maintained under administrative control.

6.17 PROCESS CONTROL PROGRAM (PCP)

6.17.1 The PCP shall be approved by the PNSC prior to implementation.

6.17.2 Changes to the PCP shall be approved by the PNSC prior to implementation.

B3.9 BASES FOR LIMITING CONDITIONS FOR OPERATION, RADIOACTIVE MATERIALS RELEASE

A. Liquid Effluents

This specification is provided to ensure that the concentration of radioactive materials released in liquid waste effluents from the site to unrestricted areas will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II. This limitation provides additional assurance that the levels of radioactive materials in bodies of water outside the site will not result in exposures within (1) the Section IV.A limiting conditions for operation of Appendix I, 10 CFR Part 50, to an individual and (2) the limits of 10 CFR Part 20.106(e) to the population. The concentration limit for noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

This specification provides for the implementation of the requirements of Sections II.A, III.A and IV.A of Appendix I, 10 CFR Part 50. 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". The dose calculations in the ODCM implement the requirements in Section III.A of Appendix I that conformation with the guides of Appendix I is to be shown by calculational methods 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 ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents will be consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977, and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977. NUREG-0133 provides methods for dose calculations consistent with Regulatory Guides 1.109 and 1.113.

Dose calculations for the release of liquid effluents are to be done on a per reactor basis. For Turkey Point shared radwaste treatment systems, the liquid effluents are proportioned between the two units.

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases. The alarm/trip setpoints for these instruments shall be calculated in accordance with NRC-approved methods in the ODCM to 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.

B. Gaseous Effluents

This specification is provided to ensure that the dose rate at any time at the exclusion area boundary from gaseous effluents from all units on the site will be within the quarterly dose limits of 10 CFR Part 20 for unrestricted areas. The quarterly dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of an individual in an unrestricted area, either within or outside the exclusion area boundary, to annual average concentrations exceeding the limits specified in Appendix B, Table II of 10 CFR Part 20 (10 CFR Part 20.106(b)). For individuals who may at times be within the exclusion area boundary, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the exclusion area boundary. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to an individual at or beyond the exclusion area boundary to $\leq$ (500) mrem/year to the total body or to $\leq$ (3,000) 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 $\leq$ 1,500 mrem/year for the nearest cow to the plant.

This specification applies to the release of gaseous effluents from both reactors at the site. For Turkey Point with its shared radwaste treatment systems, the gaseous effluents from the shared system are proportioned between the two units.

This specification provides for the implementation of the requirements of Sections II.B, III.A, and IV.A of Appendix I, 10 CFR Part 50. 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 conform with the guides of Appendix I to be shown by calculational methods based on models and data such that the actual exposure of an individual through the appropriate pathways is unlikely to be substantially

underestimated. The dose calculations established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at the exclusion area boundary are based upon the historical average atmospheric conditions. NUREG-0133 provides methods for dose calculations consistent with Regulatory Guides 1.109 and 1.111.

This specification provides for the implementation of requirements of Sections II.C, III.A, and IV.A of Appendix I, 10 CFR Part 50. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." The ODCM calculational methods specified in the surveillance requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational methods based on models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methods for calculating the doses due to the actual release rates of the subject materials are required to be consistent with the methodology provided in Regulatory Guide 1.109, "Calculating of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for radioiodines, radioactive material in particulate form and radionuclides other than noble gases are dependent on the existing radionuclide pathways to man, in the unrestricted area. The pathways which are examined in the development of these calculations are: 1) individual inhalation of airborne radionuclides, 2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, 3) deposition onto grassy areas where milk animals and meat producing animals graze with consumption of the milk and meat by man, and 4) deposition on the ground with subsequent exposure of man.

This specification is provided to meet the reporting requirements of 40 CFR 190.

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the release of radioactive materials in gaseous effluents during actual or potential releases. The alarm/trip setpoints for these instruments shall be calculated in accordance with NRC-approved methods in the ODCM to 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.

B4.12 BASES FOR RADIOLOGICAL ENVIRONMENTAL MONITORING

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

The detection capabilities required by Table 4.12-2 are state-of-the-art for routine environmental measurements in industrial laboratories. The LLD's for drinking water meet the requirements of 40 CFR 141.

The land use census and semi-annual milch herd survey are 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 these surveys. The land use 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/yr) 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.

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