PALISADES PLANT TECHNICAL SPECIFICATIONS

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Amendment No. 31, 51, 57, 83

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1.4 MISCELLANEOUS DEFINITIONS

Operable

A system or component is operable if it is capable of fulfilling its design functions.

Operating

A system or component is operating if it is performing its design functions.

Control Rods

All full-length shutdown and regulating rods.

Containment Integrity

Containment integrity is defined to exist when all of the following are true:

a. All nonautomatic containment isolation valves and blind flanges are closed.

b. The equipment door is properly closed and sealed.

c. At least one door in each personnel air lock is properly closed and sealed.

d. All automatic containment isolation valves are operable or are locked closed.

e. The uncontrolled containment leakage satisfies Specification 4.5.1.

Dose Equivalent I-131

Dose Equivalent I-131 shall be that concentration of I-131 (uCi/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."

E - Average Disintegration Energy

E shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MEV) for isotopes, other than iodines, with half lives greater than 15 minutes, making up at least 95% of the total noniodine activity in the coolant.

Safety

Safety as used in these Technical Specifications refers to those safety issues related to the nuclear process and, for example, does not encompass OSHA considerations.

1.4 MISCELLANEOUS DEFINITIONS (Continued)

Reportable Event

A reportable event shall be any of those conditions specified in Section 50.73 to 10 CFR Part 50.

1.4 MISCELLANEOUS DEFINITIONS (Contd)

GASEOUS RADWASTE TREATMENT SYSTEM

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

MEMBER(S) OF THE PUBLIC

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

OFFSITE DOSE CALCULATION MANUAL (ODCM)

The OFFSITE DOSE CALCULATION MANUAL shall contain the current 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 set points.

PROCESS CONTROL PROGRAM (PCP)

The PROCESS CONTROL PROGRAM shall contain the current formula, sampling, analyses, tests and determinations to be made to ensure that the processing and packaging of solid radioactive wastes based on demonstrated processing of actual or simulated wet solid wastes will be accomplished in such a way as to assure compliance with 10 CFR Part 20, 10 CFR Part 71 and Federal and State regulations and other requirements governing the disposal of the radioactive waste.

SITE BOUNDARY

The SITE BOUNDARY shall be that line beyond which the land is neither owned nor otherwise controlled by the licensee.

UNRESTRICTED AREA

An UNRESTRICTED AREA shall be any area at or beyond the SITE BOUNDARY access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials or, any area within the SITE BOUNDARY used for residential quarters or for industrial, commercial, institutional and/or recreational purposes.

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 clean-up systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

LIMITING CONDITIONS FOR OPERATION

3.0 APPLICABILITY

LIMITING CONDITIONS FOR OPERATION

3.0.1 Compliance with the Limiting Conditions for Operation contained in the succeeding Specifications is required during the plant conditions or other conditions specified therein; except that upon failure to meet the Limiting Conditions for Operation, the associated ACTION requirements shall be met.

3.0.2 Noncompliance with a Specification shall exist when the requirements of the Limiting Condition for Operation and associated ACTION requirements are not met within the specified time intervals. If the Limiting Condition for Operation is restored prior to expiration of the specified time intervals, completion of the Action requirements is not required.

3.0.3 When a Limiting Condition for Operation and/or associated ACTION requirements cannot be satisfied because of circumstances in excess of those addressed in the specification, within one hour action shall be initiated to place the unit in a condition in which the Specification does not apply by placing it, as applicable, in:

1. At least HOT STANDBY within the next 6 hours,

2. At least HOT SHUTDOWN within the following 6 hours, and

3. At least COLD SHUTDOWN within the subsequent 24 hours.

Where corrective measures are completed that permit operation under the ACTION requirements, the ACTION may be taken in accordance with the specified time limits as measured from the time of failure to meet the Limiting Condition for Operation. Exceptions to these requirements are stated in the individual Specifications.

3.0.4 Entry into a plant condition or other specified condition shall not be made unless the conditions for the Limiting Condition for Operation are met without reliance on provisions contained in the ACTION requirements. This provision shall not prevent passage through or to plant conditions as required to comply with ACTION requirements. Exceptions to these requirements are stated in the individual Specifications.

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TO CONTAIN 8/21/80 SECTION 3.0.5 (PROPOSED)

3.1 PRIMARY COOLANT SYSTEM

Applicability

Applies to the operable status of the primary coolant system.

Objective

To specify certain conditions of the primary coolant system which must be met to assure safe reactor operation.

Specifications

3.1.1 Operable Components

a. At least one primary coolant pump or one shutdown cooling pump shall be in operation whenever a change is being made in the boron concentration of the primary coolant.

b. Four primary coolant pumps shall be in operation whenever the reactor is operated continually above 5% of rated power (exception to this specification is permitted as described in Table 2.3.1, Item 1).

c. The minimum flow for various power levels shall be as shown in Table 2.3.1.

The measured four primary coolant pumps operating reactor vessel flow (as determined by reactor coolant pump differential pressures and pump performance curves) shall be 126.9×10^6 lb/h or greater, when corrected to 532°F.

In the event the measured flow is less than that required above, the limits specified on Figure 2-3 shall be reduced by 1°F in inlet temperature for each 1% of reactor flow deficiency.

Continuous operation at power shall be limited to four-pump operation. Following loss of a pump, thermal power shall be reduced as specified in Table 2.3.1 and appropriate corrective action implemented. With one or more pumps out of service, return the pumps to service (return to four-pump operation) or be in hot standby (or below) within 24 hours. Start-up (above hot standby) with less than four pumps is not permitted.

d. Both steam generators shall be capable of performing their heat transfer function whenever the average temperature of the primary coolant is above 325°F.

e. Maximum primary system pressure differentials shall not exceed the following:

(1) Maximum steam generator operating transient differential of 1530 psi.

3.1 PRIMARY COOLANT SYSTEM (Continued)

3.1.1 Operable Components (Continued)

(2) Hydrostatic tests shall be conducted in accordance with applicable paragraphs of Section XI ASME Boiler & Pressure Vessel Code (1974). Such tests shall be conducted with sufficient pressure on the secondary side of the steam generators to restrict primary to secondary pressure differential to a maximum of 1380 psi. Maximum hydrostatic test pressure shall not exceed 1.1 Po plus 50 psi where Po is nominal operating pressure.

(3) Primary side leak tests shall be conducted at normal operating pressure. The temperature shall be consistent with applicable fracture toughness criteria for ferritic materials and shall be selected such that the differential pressure across the steam generator tubes is not greater than 1380 psi.

(4) Maximum secondary hydrostatic test pressure shall not exceed 1250 psia. A minimum temperature of 100°F is required. Only ten cycles are permitted.

(5) Maximum secondary leak test pressure shall not exceed 1000 psia. A minimum temperature of 100°F is required.

(6) In performing the tests identified in 3.1.1.e(4) and 3.1.1.e(5), above, the secondary pressure shall not exceed the primary pressure by more than 350 psi.

f. Nominal primary system operation pressure shall not exceed 2100 psia.

g. The reactor inlet temperature (indicated) shall not exceed the value given by the following equation at steady state 100% power operation:

$$T_{inlet} \leq 538.0 + 0.03938 (P-2060) + 0.00004843 (P-2060)^2 + 1.0342 (W-120.2)$$

Where: T_{inlet} = reactor inlet temperature in F°
P = nominal operating pressure in psia
W = total recirculating mass flow in 10^6 lb/h corrected to the operating temperature conditions.

Note: This equation is shown in Figure 3-0 for a variety of mass flow rates.

h. A reactor coolant pump shall not be started with one or more of the PCS cold leg temperatures $\leq$ 250°F unless 1) the pressurizer water volume is less than 700 cubic feet or 2) the secondary water temperature of each steam generator is less than 70°F above each of the PCS cold leg temperatures.

3.1 PRIMARY COOLANT SYSTEM (Cont'd)

3.1.1 Operable Components (Cont'd)

i. The PCS shall not be heated or maintained above 325°F unless a minimum of 375 kW of pressurizer heater capacity is available from both buses 1D and 1E. Should heater capacity from either bus 1D or 1E fall below 375 kW, either restore the inoperable heaters to provide at least 375 kW of heater capacity from both buses 1D and 1E within 72 hours or be in hot shutdown within the next 12 hours.

3.1 PRIMARY COOLANT SYSTEM (Continued)

3.1.4 Maximum Primary Coolant Radioactivity

Specifications

a. The specific activity of the primary coolant shall be limited to:

   1) $<$1.0 μCi/gram dose equivalent I-131, and

   2) $<$100/E μCi/gram.

b. With the specific activity of primary coolant $>$ 1.0 μCi/gram dose equivalent I-131 but less than 40 μCi/gram, operation may continue for up to 72 hours provided that operation under these circumstances shall not exceed 36 days per calendar year.

c. With the specific activity of the primary coolant $>$ 1.0 μCi/gram dose equivalent I-131 for more than 72 hours during one continuous time interval or exceeding 40 μCi/gram, be shutdown with T_{avg} $<$500°F within 6 hours.

d. With the specific activity of the primary coolant $>$ 100/E μCi/gram, be shutdown with T_{avg} $<$ 500°F within 6 hours.

e. With the specific activity of the primary coolant $>$ 1.0 μCi/gram dose equivalent I-131 or $>$ 100/$\bar{E}$ μCi/gram, perform the sampling and analysis requirements of item 1 of Table 4.2.1 until the specific activity of the primary coolant is restored to within its limits. A Special Report shall be prepared and submitted to the Director of the appropriate Regional Office within thirty days of the occurrence of the event. This report shall contain the results of the specific activity analyses together with the following information:

   1. Reactor power history starting 48 hours prior to the first sample in which the limit was exceed,

   2. Fuel burnup by core region,

   3. Clean-up flow history starting 48 hours prior to the first sample in which the limit was exceeded,

   4. History of de-gassing operation, if any, starting 48 hours prior to the first sample in which the limit was exceeded, and

   5. The time duration when the specific activity of the primary coolant exceeded 1.0 μCi/gram dose equivalent I-131.

3.9 EFFLUENT RELEASE

DELETED IN ITS ENTIRETY

Information now contained in Section 3.24 "Radiological Effluent Releases"

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3.24 RADIOLOGICAL EFFLUENT RELEASES

3.24.1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.24.1.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.24-1 shall be OPERABLE with their alarm/trip set points set to ensure that the limits of Specification 3.24.3 are not exceeded. The alarm/trip set points of these channels shall be determined and adjusted in accordance with the methodology and parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

APPLICABILITY: At all times.

ACTION:

a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip set point less conservative than required by the above specification, without delay suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable, or change the set point so it is acceptably conservative.

b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.24-1. Exert best efforts to return the instruments to OPERABLE status within 30 days and, if unsuccessful, explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

c. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.1.1

TABLE 3.24-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	ACTION
1. GROSS RADIOACTIVITY MONITORS PROVIDING ALARM AND AUTOMATIC TERMINATION OF RELEASE		
a. Liquid Radwaste Effluent Line (RIA 1049)	(1)	28
b. Steam Generator Blowdown Effluent Line (RIA 0707)	(1)	29
2. GROSS BETA OR GAMMA RADIOACTIVITY MONITORS PROVIDING ALARM BUT NOT PROVIDING AUTOMATIC TERMINATION OF RELEASE		
a. Service Water System Effluent Line (RIA 0833)	(1)	30
b. Turbine Building (Floor Drains) Sumps Effluent Line (RIA 5211)	(1)	30
3. FLOW RATE MEASUREMENT DEVICES		
a. Liquid Radwaste Effluent Line (FIC 1051 or 1050)	(1)	31
4. CONTINUOUS COMPOSITE SAMPLERS		
a. Turbine Building Sumps Effluent Line	(1)	30

TABLE 3.24-1 (Contd)

TABLE NOTATION

ACTION 28 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may continue provided that prior to initiating a release:

a. At least two independent samples are analyzed in accordance with Specification 4.24.3.1, and

b. 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 29 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are analyzed for gross radioactivity (beta or gamma) at a lower limit of detection of at least 10^{-7} microcuries/ml at least once per 12 hours.

ACTION 30 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided that, at least once per 24 hours, grab samples are collected and analyzed for gross radioactivity (beta or gamma) at a lower limit of detection of at least 10^{-7} microcurie/ml.

ACTION 31 - With the number of channels OPERABLE less than required by the Minimum channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump performance curves or tank levels may be used to estimate flow.

3.24.2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.24.2.1 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.24.2 shall be OPERABLE with their alarm/trip set points set to ensure that the limits of Specification 3.24.5.1 are not exceeded. The alarm/trip set points of these channels shall be determined and adjusted in accordance with the methodology and parameters in the ODCM.

APPLICABILITY: As shown in Table 3.24-2.

ACTION:

a. With a radioactive gaseous effluent monitoring instrumentation channel alarm/trip set point less conservative than required by the above Specification, without delay, suspend the release of radioactive gaseous effluents monitored by the affected channel or declare the channel inoperable or change the set point so it is acceptably conservative.

b. With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.24-2. Exert best efforts to return the instruments to OPERABLE status within 30 days and, if unsuccessful, explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

c. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.2.1

TABLE 3.24-2

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
1. WASTE GAS HOLDUP SYSTEM			
a. Noble Gas Activity Monitor (RIA 1113) Providing Alarm and Automatic Termination of Release	(1)	At All Times	35
b. Effluent System Flow Rate Measuring Device (FI 1121)	(1)	At All Times	36
2. CONDENSER EVACUATION SYSTEM (RIA 0631)			
a. Noble Gas Activity Monitor	(1)	Above 210°F	37
3. STACK GAS EFFLUENT SYSTEM			
a. Noble Gas Activity Monitor (RIA 2326 or RIA 2318)	(1)	At All Times	37
b. Iodine/Particulate/Sampler/Monitor (RIA 2325)	(1)	At All Times	37
c. Sampler Flow Rate Monitor	(1)	At All Times	36
d. Hi Range Noble Gas (RIA 2327)	(1)	Above 210°F	38
4. STEAM GENERATOR BLOWDOWN VENT SYSTEM			
a. Noble Gas Activity Monitor (RIA 2320)	(1)	Above 210°F	37
5. MAIN STEAM SAFETY AND DUMP VALVE DISCHARGE LINE			
a. Gross Gamma Activity Monitor (RIA 2323 and 2324)	1 per Main Steam Line	Above 325°F	38
6. ENGINEERED SAFEGUARDS ROOM VENT SYSTEM			
a. Noble Gas Activity Monitor (RIA 1810 and 1811)	1 per room	Above 210°F	38

TABLE 3.24-2 (Cont.)

TABLE NOTATION - ACTION STATEMENTS

ACTION 35 - With the number of channels OPERABLE less than required by Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment provided that prior to initiating the release:

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

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

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 36 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 24 hours for continuous releases or four hours for batch releases.

ACTION 37 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for gross activity within 24 hours.

ACTION 38 - With the number of OPERABLE Channels less than required by the Minimum Channels OPERABLE requirements, initiate the preplanned alternate method of monitoring the appropriate parameter(s), within 72 hours, and:

1) either restore the inoperable Channel(s) to OPERABLE status within 7 days of the event, or

2) prepare and submit a Special Report to the Commission pursuant to Specification 6.9.3.3.d within 30 days following the event outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status

3.24.3 LIQUID EFFLUENTS CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.24.3.1 The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (see Figure 5-1) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2 x 10^{-4} microcuries/ml total activity.

APPLICABILITY: At all times.

ACTION:

a. With the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS exceeding the above limits, without delay, restore the concentration to within the above limits.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.3.1.a

Refer to 4.24.3.1.b

3.24.4 LIQUID EFFLUENT DOSE

LIMITING CONDITION FOR OPERATION

3.24.4.1 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released from each reactor unit to UNRESTRICTED AREAS (see Figure 5-1) shall be limited:

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

b. During any calendar year to less than or equal to 3 mrems to the total body and to less than or equal to 10 mrems 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 a Special Report per Specification 6.9.3.3.d that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits. This Special Report shall also include the results of radiological analyses of the drinking water source.

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.4.1

3.24.5 GASEOUS EFFLUENTS DOSE

LIMITING CONDITION FOR OPERATION

3.24.5.1 The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY (see Figure 5-1) shall be limited to the following:

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

b. For iodine-131, for iodine-133, for tritium and for all radionuclides in particulate form with half lives greater than 8 days: Less than or equal to 1500 mrems/yr to any organ.

APPLICABILITY: At all times.

ACTION:

a. With the dose rate(s) averaged over a period of one hour exceeding the above limits, without delay, restore the release rate to within the above limit(s).

SURVEILLANCE REQUIREMENTS

Refer to 4.24.5.1.a

Refer to 4.24.5.1.b

LIMITING CONDITION FOR OPERATION

3.24.5.2 The air dose due to noble gases released in gaseous effluents to areas at and beyond the SITE BOUNDARY (see Figure 5-1) shall be limited to the following:

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

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

APPLICABILITY: At all times.

ACTION

a. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days a Special Report per Specification 6.9.3.3.d that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.5.2

LIMITING CONDITION FOR OPERATION

3.24.5.3 The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY (see Figure 5-1) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrems to any organ, and

b. During any calendar year: Less than or equal to 15 mrems to any organ.

APPLICABILITY: At all times.

ACTION:

a. With the calculated dose from the release of iodine-131, iodine-133, tritium and radionuclides in particulate form with half lives greater than 8 days, in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days a Special Report per Specification 6.9.3.3.d that identifies the cause(s) for exceeding the limit and define(s) the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.5.3

3.24.6 GASEOUS WASTE TREATMENT SYSTEM

LIMITING CONDITION FOR OPERATION

3.24.6.1 THE WASTE GAS DECAY TANK SYSTEM shall be used to reduce radioactive gaseous effluents by holding gaseous waste collected by the system for a minimum of 15 days up to 60 days.

APPLICABILITY: When gaseous waste exceeds a Xe-133 concentration of 1E-05 μCi/cc.

ACTION:

a. If a waste gas decay tank is required to be released with less than 60 days holdup time, the system waste gas tank contents shall be evaluated and the waste gas decay tank with the lowest Xe-133 concentration shall be released.

b. Gaseous waste may be discharged directly from the waste gas surge tank through a high-efficiency filter or from a waste gas decay tank with less than 15 days of holdup directly to the stack for a period not to exceed 7 days if the holdup system equipment is not available and the release rates meet Specification 3.24.5.

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

SURVEILLANCE REQUIREMENTS

Not applicable.

3.24.7 SOLID RADIOACTIVE WASTE

LIMITING CONDITION FOR OPERATION

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

APPLICABILITY: At all times.

ACTION:

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

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.7.1

3.24.8 TOTAL DOSE

LIMITING CONDITION FOR OPERATION

3.24.8.1 The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

APPLICABILITY: At all times.

ACTION:

a. With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Specifications 3.24.4.1.a, 3.24.4.1.b, 3.24.5.2.a, 3.24.5.2.b, 3.24.5.3.a or 3.24.5.3.b, calculations should be made including direct radiation contributions from the reactor units and from outside storage tanks to determine whether the above limits of Specification 3.24.8.1 have been exceeded. If such is the case prepare and submit to the Commission within 30 days a Special Report per Specification 6.9.3.3.d that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This Special Report, as defined in 10 CFR Part 20.405c, shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request and a variance is granted until staff action on the request is complete.

b. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

Refer to 4.24.8.1.a

Refer to 4.24.8.1.b

3.24.1 RADIOACTIVE LIQUID EFFLUENT MONITORING 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 set points for these instruments shall be calculated and adjusted in accordance with the methodology and parameters 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.

3.24.2 RADIOACTIVE GASEOUS EFFLUENT MONITORING 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 set points for these instruments shall be calculated and adjusted in accordance with the methodology and parameters 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.

3.24.3 LIQUID EFFLUENTS CONCENTRATION

This specification is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to UNRESTRICTED AREAS will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a MEMBER OF THE PUBLIC, and (2) the limits of 10 CFR Part 20.106(e) to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its Maximum Permissible Concentration (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 applies to the release of liquid effluents from all reactors at the site.

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L A, "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Anal Chem 40, 586-93 (1968), and Hartwell, J K, "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

3.24.4 LIQUID EFFLUENT 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 to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." Also, for fresh-water sites with drinking water supplies that can be potentially affected 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 Part 141. The dose calculation methodology and parameters in the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to man from Routine Releases of Reactor Effluents for the Purpose of Evaluating compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

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

3.24.5 GASEOUS EFFLUENTS DOSE

3.24.5.1 DOSE RATE

This specification is provided to ensure that the dose at any time at and beyond the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20 to UNRESTRICTED AREAS. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II, Column 1. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC in an UNRESTRICTED AREA, either within or outside the SITE 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 MEMBERS OF THE PUBLIC who may at times be within the SITE BOUNDARY, the occupancy of that MEMBER OF THE PUBLIC will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. Examples of calculations for such MEMBERS OF THE PUBLIC, with the appropriate occupancy factors, shall be given in the ODCM. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrems/yr to the total body or to less than or equal to 3000 mrems/yr to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrems/yr.

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

The required detection capabilities for radioactive materials in gaseous waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L A, "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Anal Chem 40, 586-93 (1968), and Hartwell, J K, "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

3.24.5.2 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 to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculation methodology and parameters established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at and beyond the SITE BOUNDARY are based upon the historical average atmospheric conditions.

3.24.5.3 DOSE - IODINE-131, IODINE-133, TRITIUM AND RADIONUCLIDES IN PARTICULATE FORM

This specification is provided to implement the requirements of Sections II.C, III.A and IV.A of Appendix I, 10 CFR Part 50. The Limiting Conditions for Operation are the guides set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable." The ODCM calculational methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methodology and parameters for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating

BASES

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

3.24.6 GASEOUS RADWASTE TREATMENT SYSTEM

The requirement that the appropriate portions of these systems be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable" by meeting the design objectives given in Section II.D of Appendix I to 10 CFR 50.

It is expected that releases of radioactive materials in effluents shall be kept at small fractions of the limits specified in 20.106 of 10 CFR 20. At the same time the licensee is permitted the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power even under unusual operating conditions which may temporarily result in releases higher than such small fractions, but still within the limits specified in Specification 3.24.5.

3.24.7 SOLID RADIOACTIVE WASTE

This specification implements the requirements of 10 CFR Part 50.36a and General Design Criterion 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 and mixing and curing times.

3.24.8 TOTAL DOSE

This specification is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46 FR 18525. The specification requires the preparation and submittal of a Special Report whenever the calculated doses from plant generated radioactive effluents and direct radiation exceed 25 mrems to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. For sites containing up to 4 reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I and if direct radiation doses from the reactor units and outside storage tanks are kept small. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR Part 190.11 and 10 CFR Part 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190 and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in Specifications 3.11.1.1 and 3.11.2.1. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

4.1.3

Minimum Frequencies for Checks, Calibrations and Testing of Miscellaneous Instrumentation and Controls

Channel Description	Surveillance Function	Frequency	Surveillance Method
1. Start-Up Range Neutron Monitors	a. Check	S	a. Comparison of both channel count rate indications when in service.
	b. Test	P	b. Internal test signals.
2. Primary Rod Position Indication System	a. Check	S	a. Comparison of output data with secondary RPIS
	b. Check	M	b. Check of power dependent insertion limits monitoring system.
	c. Calibrate(1)	R	c. Physically measured rod drive position used to verify system accuracy. Check rod position interlocks.
3. Secondary Rod Position Indication System	a. Check	S	a. Comparison of output data with primary RPIS.
	b. Check	M	b. Same as 2(b) above.
	c. Calibrate(1)	R	c. Same as 2(c) above, including out-of-sequence alarm function.
4. Area Monitors Note: Process Monitor Surveillance Requirements are located in Tables 4.24-1 and 4.24-2	a. Check	D	a. Normal readings observed and internal test signals used to verify instrument operation.
	b. Calibrate	R	b. Exposure to known external radiation source.
	c. Test	M	c. Detector exposed to remote operated radiation check source.
5. Emergency Plan Radiation Instruments	a. Calibrate	A	a. Exposure to known radiation source.
	b. Test	M	b. Battery check.
6. Environmental Monitors	a. Check	M	a. Operational check.
	b. Calibrate	A	b. Verify airflow indicator.
7. Pressurizer Level Instruments	a. Check	S	a. Comparison of six independent level readings.
	b. Calibrate	R	b. Known differential pressure applied to sensor.
	c. Test	M	c. Signal to meter relay adjusted with test device.

Amendment No. 30, 37, 38,

4.11 RADIOLOGICAL ENVIRONMENTAL MONITORING

4.11.1 The radiological environmental monitoring program shall be conducted as specified in Table 4.11-1.

APPLICABILITY: At all times.

ACTION:

a. With the radiological environmental monitoring program not being conducted as specified in Table 4.11-1, prepare and submit to the Commission, in the Annual Radiological Environmental Operating Report required by Specification 6.9.3.1B 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 as the result of plant effluents in an environmental sampling medium at a specified location exceeding the reporting levels of Table 4.11-2 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents. When more than one of the radionuclides in Table 4.11-2 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{Concentration (1)}}{\text{Reporting Level (1)}} + \frac{\text{Concentration (2)}}{\text{Reporting Level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those in Table 4.11-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose to A MEMBER OF THE PUBLIC is equal to or greater than the calendar year limits of Specifications 3.24.4.1, 3.24.5.2 and 3.24.5.3. 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.

c. With milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 4.11-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the cause of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Annual Radiological Environmental Report.

4.11.2 The radiological environmental monitoring samples shall be collected pursuant to Table 4.11-1 and shall be analyzed pursuant to the requirements of Table 4.11-1 and the detection capabilities required by Table 4.11-3.

4.11.3 A land use census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 9 overland meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden* of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation.

4.11.4 The land use census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, aerial survey or by consulting local agriculture authorities. The results of the land use census shall be included in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.3.1B and shall be included in a revision of the ODCM for use in the following calendar year.

4.11.5 Analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program that has been approved by the Commission.

4.11.6 A summary of the results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.3.1.B.

*Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the site boundary in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 4.11-1.4c shall be followed, including analysis of control samples.

TABLE 4.11-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
1. DIRECT RADIATION[b]	21 routine monitoring stations either with two or more dosimeters or with one instrument for measuring and recording dose rate continuously, placed as follows: An inner ring of stations, one in each overland meteorological sector (9) in the general area of the SITE BOUNDARY. An outer ring of stations, one in each overland meteorological sector (9) within the 12 km range from the site. The balance of the stations (3) to be placed to serve as control stations.	Quarterly.	Gamma dose quarterly.

TABLE 4.11-1 (Contd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
2. AIRBORNE			
Radioiodine and Particulates	Samples from 5 locations: 3 samples from within 6 km of the SITE BOUNDARY in different sectors (2.4 km-SSW, 5.6 km - ESE and 1.6 km - N). 1 sample from the vicinity of a community having the highest calculated annual average ground level D/Q (Covert - 5.6 km - SE). 1 sample from a control location in the least prevalent wind direction[c] (Grand Rapids 89 km - NNE).	Continuous sampler operation with sample collection weekly or more frequently if required by dust loading.	Radioiodine Cannister: I-131 analysis weekly for each filter change. Particulate Sampler: Gross beta radioactivity analysis following filter change.[d] Gamma isotopic analysis[e] if gross beta > 1.0 pCi/m^3.

Amendment 26, 83

TABLE 4.11-1 (Contd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
3. WATERBORNE			
a. Lake (Surface)	Plant lake water inlet.	Composite sample over 1-month period.[f]	Gross beta (> 10 pCi/ℓ requires gamma) and tritium monthly.
b. Well (Drinking)	Samples from plant, state park and Covert Township park wells.	Monthly - grab sample.	Gross beta (> 10 pCi/ℓ requires gamma) and tritium monthly.
c. Lake (Drinking)	1 sample of South Haven drinking water supply.	Composite sample over 1-month period.[f]	Gross beta (> 10 pCi/ℓ requires gamma) and tritium monthly.
d. Sediment From Shoreline	1 sample from between north boundary and Van Buren State Park beach.	Semiannually.	Gamma isotopic analysis[e] semiannually.

Amendment 63

TABLE 4.11-1 (Contd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
4. INGESTION			
a. Milk	Samples from milking animals in 3 locations between 5-13 km distance.	Monthly.	Gamma isotopic[e] and I-131 analysis monthly.
	1 sample from milking animals at a control location, 15-30 km distance.		
b. Fish and Invertebrates	Sample 2 species of commercially and/or recreationally important species in vicinity of plant discharge area.	Sample in season or semiannually if they are not seasonal.	Gamma isotopic analysis[e] on edible portions.
	1 sample of same species in areas not influenced by plant discharge.		

Amendment No. 63,

TABLE 4.11-1 (Contd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
c. Food Products	1 sample each of two principal fruit crops (blueberries and apples).	At time of harvest.[g]	Gamma isotopic analyses[e] on edible portion.
	Samples of 3 different kinds of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted annual average ground level D/Q if milk sampling is not performed. (SE or SSE sectors near site)	Monthly when available.	Gamma isotopic[e] and I-131 analysis.
	1 sample of each of the similar broad leaf vegetation grown 15-30 km distance in the least prevalent wind direction if milk sampling is not performed. (SSW or S sectors)	Monthly when available.	Gamma isotopic[e] and I-131 analysis.

TABLE 4.11-1 (Contd)

TABLE NOTATION

[a]Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, every effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.3.1B. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program.

[b]One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors or phosphor readout zones in a packet are considered as two or more dosimeters.

[c]The purpose of this sample is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites that provide valid background data may be substituted.

[d]Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

[e]Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

TABLE 4.11-1 (Contd)

TABLE NOTATION

[f]A composite sample is one in which the quantity (aliquot) of liquid samples is proportional to the quantity of liquid discharged and in which the method of sampling employed results in a specimen that is representative of the liquid released (continuous composites or daily grab composites which meet this criteria are acceptable).

[g]If harvest occurs more than once a year, sampling shall be performed during each discrete harvest.

TABLE 4.11-2

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Reporting Levels

Analysis	Water (pCi/ℓ)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, Wet)	Milk (pCi/ℓ)	Food Products (pCi/kg, Wet)
H-3	20,000*				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

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

Change No. 10
Amendment No.

TABLE 4.11-3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS[a]

LOWER LIMIT OF DETECTION (LLD)[b,c]

Analysis	Water (pCi/ℓ)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, Wet)	Milk (pCi/ℓ)	Food Products (pCi/kg, Wet)	Sediment (pCi/kg, Dry)
Gross Beta	4	0.01				
H-3	2,000*					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1[d]	0.07		1	60	
Cs-134	15	0.05	130	15	80	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

*If no drinking water pathway exists, a value of 3,000 pCi/ℓ may be used.

Amendment No. 2[illegible], 63, 8[illegible]

TABLE 4.11-3 (Contd)

TABLE NOTATION

[a]This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.3.1B.

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

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

For a particular measurement system, which may include radiochemical separation:

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

Where:

LLD is the "a priori" lower limit of detection as defined above, as picocuries 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,

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

Δt for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting.

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

TABLE 4.11-3 (Contd)

TABLE NOTATION

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.3.1B.

[d] LLD for drinking water samples. If no drinking water pathway exists, the LLD of gamma isotopic analysis may be used.

4.11 BASES-RADIOLOGICAL ENVIRONMENTAL MONITORING

4.11.1 MONITORING PROGRAM

The radiological environmental monitoring program required by this specification provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures of MEMBERS OF THE PUBLIC resulting from the station operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and 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 the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring. 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 required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table 4.11-3 are considered optimum for routine environmental measurements in industrial laboratories.

Detailed discussion of the LLD, and other detection limits, can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L A, "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Anal Chem 40, 586-93 (1968), and Hartwell, J K, "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

4.11.3 LAND USE CENSUS

This specification is provided to ensure that changes in the use of areas at and beyond the Site Boundary are identified and that modifications to the radiological environmental monitoring program are made if required by results of this census. The best information from the door-to-door survey, from aerial survey or from consulting with local agricultural authorities shall be used. 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 40 m^2 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 (16 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 made: (1) 20% of the garden was used for growing broad leaf vegetation (ie, similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/m^2.

4.11.5 INTERLABORATORY COMPARISON PROGRAM

The requirement for participation in an approved 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 the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

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4.24 RADIOLOGICAL EFFLUENT RELEASES

4.24.1 RADIOLOGICAL LIQUID EFFLUENT MONITORING INSTRUMENTATION

4.24.1.1 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations at the frequencies shown in Table 4.24-1.

4.24.2 RADIOLOGICAL GASEOUS EFFLUENT MONITORING INSTRUMENTATION

4.24.2.1 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations at the frequencies shown in Table 4.24-2.

4.24.3 LIQUID EFFLUENT CONCENTRATION

4.24.3.1.a Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program of Table 4.24-3.

4.24.3.1.b The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in the ODCM to assure that the concentrations at the point of release are maintained within the limits of Specification 3.24.3.1.

4.24.4 LIQUID EFFLUENT DOSE

4.24.4.1 Cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined in accordance with the methodology and parameters in the ODCM at least once per 31 days.

4.24.5 GASEOUS EFFLUENT DOSE

4.24.5.1.a The dose rate due to noble gases in gaseous effluents shall be determined to be within the limits of 3.24.5.1.a in accordance with the methodology and parameters in the ODCM.

4.24.5.1.b The dose rate due to iodine-131, iodine-133, tritium and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents shall be determined to be within the limits of 3.24.5.1.b in accordance with the methodology and parameters in the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 4.24-5.

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

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

4.24.6 GASEOUS WASTE SYSTEM - NONE

4.24.7 SOLID RADIOACTIVE WASTE

4.24.7.1 The PROCESS CONTROL PROGRAM shall be used to verify the SOLIDIFICATION of at least one representative test specimen from at least every tenth batch of each type of wet radioactive waste (eg, filter sludges, spent resins, evaporator bottoms and boric acid solutions).

a. If any test specimen fails to verify SOLIDIFICATION, the SOLIDIFICATION of the batch under test shall be suspended until such time as additional test specimens can be obtained, alternative SOLIDIFICATION parameters can be determined in accordance with the PROCESS CONTROL PROGRAM and a subsequent test verifies SOLIDIFICATION. SOLIDIFICATION of the batch may then be resumed using the alternative SOLIDIFICATION parameters determined by the PROCESS CONTROL PROGRAM.

b. If the initial test specimen from a batch of waste fails to verify SOLIDIFICATION, the PROCESS CONTROL PROGRAM shall provide for the collection and testing of representative test specimens from each consecutive batch of the same type of wet waste until at least 3 consecutive initial test specimens demonstrate SOLIDIFICATION. The PROCESS CONTROL PROGRAM shall be modified as required, as provided in Specification 6.19, to assure SOLIDIFICATION of subsequent batches of waste.

4.24.8 TOTAL DOSE

4.24.8.1.a Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Specifications 4.24.4.1, 4.24.5.2 and 4.24.5.3 and in accordance with the methodology and parameters in the ODCM.

4.24.8.1.b Cumulative dose contributions from direct radiation from the reactor units and from radwaste storage tanks shall be determined in accordance with the methodology and parameters in the ODCM. This requirement is applicable only under conditions set forth in Specification 3.24.8.1.a.

TABLE 4.24-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. GROSS RADIOACTIVITY MONITORS PROVIDING ALARM AND AUTOMATIC TERMINATION OF RELEASE				
a. Liquid Radwaste Effluent Line (RIA 1049)	P	P	R(3)	Q(1)(2)
b. Steam Generator Blowdown Effluent Line (RIA 0707)	D	M	R(3)	Q(1)(2)
2. GROSS BETA OR GAMMA RADIOACTIVITY MONITORS PROVIDING ALARM BUT NOT PROVIDING AUTOMATIC TERMINATION OF RELEASE				
a. Service Water System Effluent Line (RIA 0833)	D	M	R(3)	Q(2)
b. Turbine Building (Floor Drains) Sumps Effluent Line (RIA 5211)	D	M	R(3)	Q(2)
3. FLOW RATE MEASUREMENT DEVICES				
a. Liquid Radwaste Effluent Line (FIC 1051 or 1050)	D(4)	NA	R	Q
4. TURBINE SUMP EFFLUENT COMPOSITER	D(4)	NA	NA	NA

TABLE 4.24-2

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. WASTE GAS HOLDUP SYSTEM					
a. Noble Gas Activity Monitor-Providing Alarm and Automatic Termination of Release	D(4)	P	R(3)	Q(1)(2)	*
b. WGDT Effluent Flow Rate Device	D(4)	NA	R	NA	*
2. CONDENSER EVACUATION SYSTEM					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	Above 210°F
3. STACK GAS EFFLUENT SYSTEM					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	*
b. Iodine Particulate Sampler/Monitor	W	M**	R(3)**	NA	*
c. Sampler Flow Rate Monitor	D	NA	R	NA	*
d. Hi Range Noble Gas	D	M	R(3)	Q(2)	Above 210°F
4. STEAM GENERATOR BLOWDOWN VENT SYSTEM					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(2)	Above 210°F

*At all times other than when the line is valved out and locked.

**Sampler not applicable

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TABLE 4.24-2(Cont.)

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
5. MAIN STEAM SAFETY AND DUMP VALVE DISCHARGE LINE					
a. Gross Gamma Activity Monitor	D	M	R(3)	Q(2)	Above 325°F
6. ENGINEERED SAFEGUARDS ROOM VENT SYSTEM					
a. Noble Gas Activity Monitor	D	M	R(3)	Q(1)(2)	Above 210°F

TABLE NOTATION

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway occurs if instrument indicates measured levels above the alarm/trip set point.

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

a. Instrument indicates measured levels above the alarm set point.
b. Circuit failure.

(3) a. The CHANNEL CALIBRATION shall be performed using one or more of the reference standards traceable to 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.

b. For subsesquent CHANNEL CALIBRATION, sources that have been related to the (a) calibration may be used.

(4) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once per 24 hours on days on which continuous or batch releases are made.

TABLE FREQUENCY NOTATION

D	At least once per 24 hours	Q	At least once per 92 days
M	At least once per 31 days	R	At least once per 18 months
P	Prior to radioactive batch release	W	At least once per week

TABLE 4.24-3

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)[a] (μCi/ml)
A. Batch Waste Release Tanks[b]	P Each Batch	P Each Batch	Principal Gamma Emitters[c]	5×10^{-7}
			I-131	1×10^{-6}
	P One Batch/M	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
	P Each Batch	M Composite[d]	H-3	1×10^{-5}
			Gross Alpha	1×10^{-7}
	P Each Batch	Q Composite[d]	Sr-89, Sr-90	5×10^{-8}
B. Continuous Releases[e]	Continuous[f]	W Composite[f]	Principal Gamma Emitters[c]	5×10^{-7}
			I-131	1×10^{-6}
Turbine Sump	M Grab Sample	M	Dissolved and Entrained Gases (Gamma Emitters)	1×10^{-5}
Steam Generator Blowdown	Continuous[f]	M Composite[f]	H-3	1×10^{-5}
Service Water			Gross Alpha	1×10^{-7}
	Continuous[f]	Q Composite[f]	Sr-89, Sr-90	5×10^{-8}

FREQUENCY NOTATION

P	Prior to batch release
M	Calendar month
Q	Calendar quarter
W	Calendar week

TABLE 4.24-3 (Contd)

TABLE NOTATION

[a]The LLD is defined, in Table 4.11-3, note C.

[b]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.

[c]The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99,* Cs-134, Cs-137, Ce-141 and Ce-144.* This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.3.1.a.

*(LLD - 5E-06 because of low gamma yields.)

[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 that is representative of the liquids released.

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

[f]To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be collected continuously in proportion to the rate of flow of the effluent stream. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

TABLE 4.24-5

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)[a] (μCi/ml)
A. Waste Gas Storage Tank	P Each Tank Grab Sample	P Each Tank	Principal Gamma Emitters[b]	1×10^{-4}
B. Containment PURGE	P Each PURGE Grab Sample	P Each PURGE	Principal Gamma Emitters[b]	1×10^{-4}
C. Stack Gas Effluent	Continuous[c]	W[d,e] Charcoal Sample	I-131, I-133	1×10^{-12}
	Continuous[c]	W[d,e] Particulate Sample	Principal Gamma Emitters[b] (I-131, Others)	1×10^{-11}
	Continuous[c]	Q Composite Particulate Sample	Sr-89, Sr-90 and Gross Alpha	1×10^{-11}
	Continuous[c]	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	1E-06

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TABLE 4.24-5 (Contd)

TABLE NOTATION

[a]The LLD is defined, in Table 4.11-3, note C.

[b]The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135 and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99*, Cs-134, Cs-137, Ce-141 and Ce-144* for particulate emissions. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.3.1.a.

*(LLD 1E-10 because of low gamma yields)

[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 3.24.5.1, 3.25.5.2 and 3.24.5.3.

[d]Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing or after removal from sampler.

[e]With channels operable on iodine monitor RIA 2325 less than required per Specification 3.24.2, sampling shall also be performed at least once per 24 hours for at least 7 days following each shutdown, start-up or THERMAL POWER change exceeding 15 percent of RATED THERMAL POWER in one hour and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10. This requirement does not apply if (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the primary coolant has not increased more than a factor of 3, and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

5.0 DESIGN FEATURES

5.1 SITE

The Palisades reactor shall be located on 487 acres owned by Consumers Power Company on the eastern shore of Lake Michigan approximately four and one-half miles south of the southern city limits of South Haven, Michigan. Figure 5-1 shows the plan of the site. The minimum distance to the boundary of the exclusion area as defined in 10 CFR 100.3 shall be 677 meters.

5.2 CONTAINMENT DESIGN FEATURES

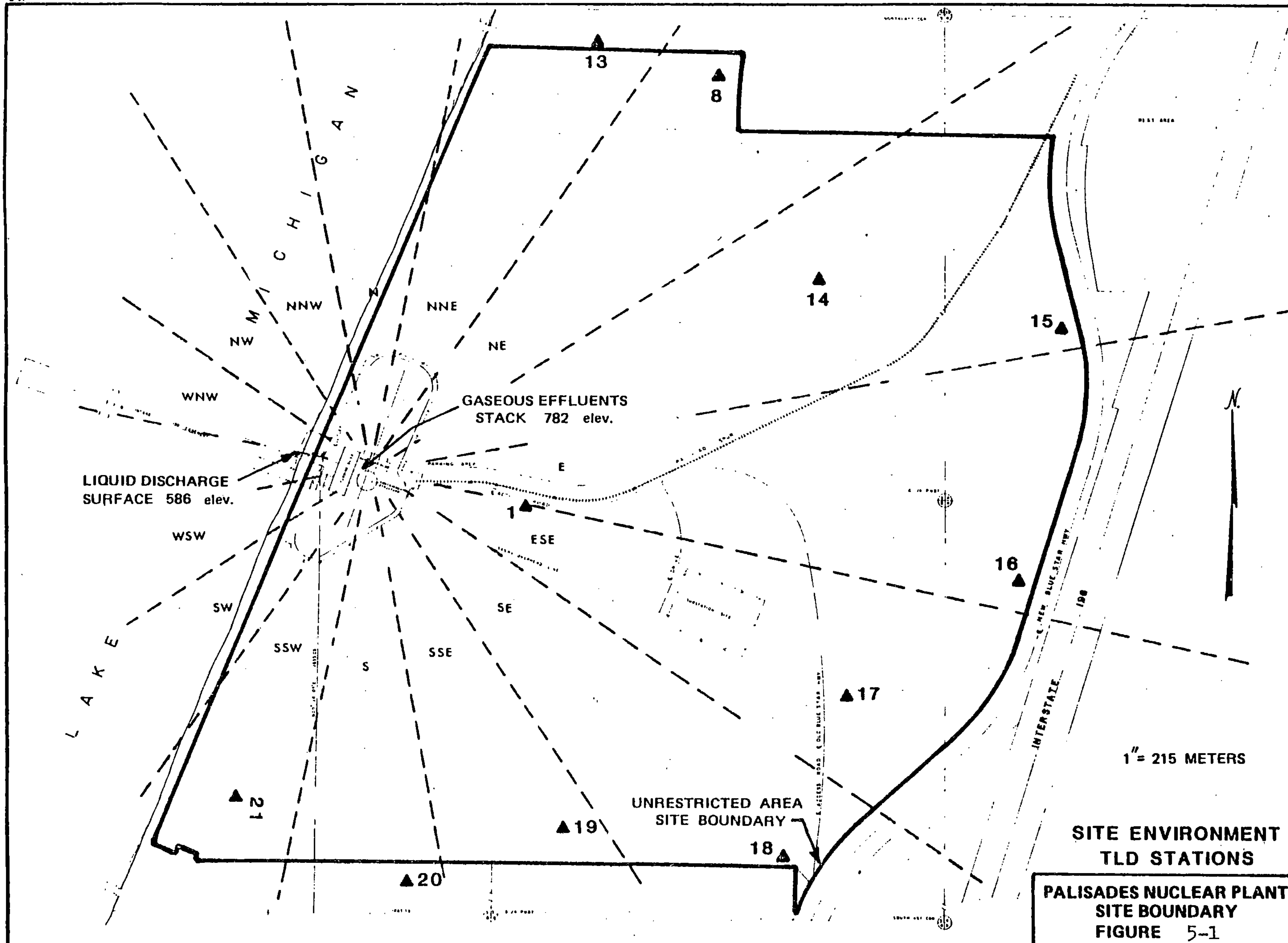
5.2.1 Containment Structure

a. The containment structure completely encloses the primary coolant system to minimize release of radioactive material to the environment should a failure of the primary coolant system occur. The prestressed, post-tensioned concrete structure provides adequate biological shielding for both normal operation and accident situations and is designed for low leakage at a design pressure of 55 psig and 283°F.

   The principal design basis for the structure is that it be capable of withstanding the internal pressure resulting from a design basis loss-of-coolant accident. In this event, the total energy contained in the water of the primary coolant system is assumed to be released into the containment through a double-ended break of the largest primary coolant pipe coincident with a loss of normal and standby electrical power. Subsequent pressure behavior is determined by the engineered safety features and the combined influence of energy sources and heat sinks.

b. The external design pressure of the containment shell is 3 psig. This value is approximately 0.5 psig greater than the maximum external pressure that could be developed if the containment were sealed during a period of low barometric pressure and high temperature and, subsequently, the containment atmosphere were cooled with a concurrent major rise in barometric pressure. Vacuum breakers are therefore not provided.

c. The containment is designed as a seismic Class I structure.



SITE ENVIRONMENT TLD STATIONS

PALISADES NUCLEAR PLANT SITE BOUNDARY

FIGURE 5-1

c. Review of all proposed changes to Appendix "A" Technical Specifications.

d. Review of all proposed changes or modifications to plant systems or equipment that affect nuclear safety.

e. Investigation of all violations of the Technical Specifications. (A report shall be prepared covering evaluation and recommendations to prevent recurrence and forwarded to the Vice President - Nuclear Operations and to the Executive Engineer - NAPO.)

f. Review of plant operations to detect potential nuclear safety hazards.

g. Performance of special reviews and investigations and reports thereof as requested by the Plant General Manager or Chairman of NSB.

h. Review of the Site Emergency Plan and implementing procedures.

i. Review of all reportable events as defined in Section 1.4.

6.5.1.7 AUTHORITY

The PRC shall:

a. Recommend in writing to the Plant General Manager approval or disapproval of items considered under Specifications 6.5.1.6.a. through d. above.

b. Render determinations in writing with regard to whether or not each item considered under Specifications 6.5.1.6.a. through e. above constitutes an unreviewed safety question.

c. Provide written notification within 24 hours to the Vice President - Nuclear Operations and to the Vice Chairman of NSB of any disagreement between the PRC and the Plant General Manager; however, the Plant General Manager shall have responsibility for the resolution of such disagreements pursuant to Specification 6.1.1 above.

RECORDS

6.5.1.8 The PRC shall maintain written minutes of each PRC meeting and shall provide copies to the NSB.

6.5.2 NUCLEAR SAFETY BOARD (NSB)

RESPONSIBILITIES

6.5.2.1 The Nuclear Safety Board (NSB) is responsible for maintaining a continuing examination of nuclear safety-related Corporate and plant activities and defining opportunities for policy changes related to improved nuclear safety performance. The NSB shall operate in accordance with a written charter, approved by the Vice President - Nuclear Operations, which designates the membership, authority, and rules for conducting the meetings.

FUNCTION

6.5.2.2 The NSB shall function to provide review of designated activities in the areas specified in Specification 6.5.2.3.

QUORUM

6.5.2.7 A quorum of NSB shall consist of the Chairman and four (4) members. (The Vice Chairman may be a voting member when not acting in the capacity of Chairman.) No more than a minority of the quorum shall have line responsibility for operation of the facility. It is the responsibility of the Chairman to ensure that the quorum convened for a meeting contains appropriately qualified members or has at its disposal consultants sufficient to carry out the review functions required by the meeting agenda.

6.5.2.8 RESPONSIBILITIES

REVIEW

6.5.2.8.1 NSB shall be responsible for the review of:

a. Significant operating abnormalities or deviations from normal and expected performance of plant equipment that affect nuclear safety.

b. All reportable events and other violations (of applicable statutes, codes, regulations, orders, Technical Specifications, license requirements or of internal procedures or instructions) having nuclear safety significance.

c. Issues of safety significance identified by the Plant General Manager, the NSB Chairman, Executive Engineer - NAPO or the PRC.

d. Proposed changes in the operating license or Appendix "A" Technical Specifications.

e. The results of actions taken to correct deficiencies identified by the audit program specified in Specifications 6.5.2.8.2 and 6.5.2.8.3 at least once every six months.

f. Safety evaluations for changes to procedures, equipment, or systems and tests or experiments completed under the provisions of 10 CFR 50.59, to verify that such actions did not constitute an unreviewed safety question.

g. Maintain cognizance of PRC activities through NAPO attendance at scheduled PRC meetings or through review of PRC meeting minutes.

AUDITS

6.5.2.8.2 Audits of operational nuclear safety-related facility activities shall be performed under the cognizance of NSB. These audits shall encompass:

a. The conformance of plant 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 facility staff at least once per 12 months.

c. The performance of activities required by the operational qualifty assurance program (CPC-2A QAPD) to meet the criteria of Appendix "B", 10 CFR 50, at least once per 24 months.

d. The Site Emergency Plan and implementing procedures at least once per 12 months.

e. The Site Security Plan and implementing procedures (as required by the Site Security Plan) at least once per 12 months.

f. Any other area of plant operation considered approriate by NSB or the Vice President - Nuclear Operations.

g. The plant Fire Protection Program and implementing procedures at least once per 24 months.

h. 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.

i. 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.

Audit reports encompassed by Specification 6.5.2.8.2 above shall be forwarded to the NSB Vice Chairman and Secretary, and Management positions responsible for the areas audited within thirty (30) days after completion of the audit.

6.5.2.8.3 Audits of Nuclear Operations Department activities shall be performed under the cognizance of the NSB. These audits shall encompass:

a. The radiological environmental monitoring program and the results thereof at least once per 12 months.

b. The OFFSITE DOSE CALCULATION MANUAL and implementing procedures at least once per 24 months.

c. The PROCESS CONTROL PROGRAM and implementing procedures for processing and packaging of radioactive wastes at least once per 24 months.

Audit reports encompassed by Specification 6.5.2.8.3 above shall be forwarded to the NSB Vice Chairman and Secretary, and Management poistions responsible for the areas audited within thirty (30) days after completion of the audit.

AUTHORITY

6.5.2.9 The NSB Chairman shall report to and advise the Vice President - Nuclear Operations of significant findings associated with NSB activities and of recommendations related to improving plant nuclear safety performance.

c. Monthly Operating Report - Routine reports of operating statistics and shutdown experience shall be submitted on a monthly basis to the Director, Office of Management Information and Program Control, US Nuclear Regulatory Commission, Washington, DC 20555, with a copy to the appropriate Regional Office to arrive no later than the fifteenth of each month following the calendar month covered by the report.

6.9.2. Reportable Events

The Commission shall be notified of Reportable Events and a report submitted pursuant to the requirements of Section 50.73 to 10 CFR Part 50.

6.9.2.a (DELETED)

6.9.2.a (Continued) (DELETED)

6.9.2.b (DELETED)

d. Alpha Radioactivity

Total curies of gross alpha-emiting material determined to be released in liquid effluents.

e. Volumes

(1) Total measured volume (liters), prior to dilution, of liquid effluent released.

(2) Total determined volume, in liters, of dilution water used during the period of the report.

4. Solid Wastes

The Radioactive Effluent Release Reports shall include the following information for each class of solid waste (as defined by 10 CFR Part 61) shipped offsite during the report period:

a. Container burial volume,

b. Total curie quantity (specify whether determined by measurement or estimate),

c. Principal radionuclides (specify whether determined by measurement or estimate),

d. Source of waste and processing employed (e.g., dewatered spent resin, compacted dry waste, evaporator bottoms),

e. Type of container (e.g., LSA, Type A, Type B, Large Quantity), and

f. Solidification agent or absorbent (e.g., cement, asphalt).

5. Radiological Impact on Man

The Radioactive Effluent Release Report to be submitted within 60 days after January 1 of each year shall include potential doses to individuals and populations calculated using measured effluent and averaged meteorological data in accordance with the methodologies in the ODCM.

a. Total body and significant organ doses (greater than 1 milliRem) to individuals in unrestricted areas from receiving water-related exposure pathways.

b. The maximum offsite air doses (greater than 1 milliRad) due to beta and gamma radiation at locations near ground level from gaseous effluents.

c. Organ doses (greater than 1 milliRem) to individuals in unrestricted areas from radioactive iodine and radioactive material in particulate form from the major pathways of exposure.

d. Total body doses (greater than 1 manRem) to the population and average doses (greater than 1 milliRem) to individuals in the population from receiving water-related pathways to a distance of 50 miles from the site.

e. Total body doses (greater than 1 manRem) to the population and average doses (greater than milliRem) to individuals in the population from gaseous effluents to a distance of 50 miles from the site.

6. PCP and ODCM Changes

The Radioactive Effluent Release Reports shall include any changes made during the reporting period to the PROCESS CONTROL PROGRAM (PCP) and to the OFFSITE DOSE CALCULATION MANUAL (ODCM), as well as a listing of new locations for dose calculations and/or environmental monitoring identified by the land use census pursuant to Specification 4.11.4.

6.9.3.1.B ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

6.9.3.1.B 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 annual radiological environmental operating reports shall include summaries, interpretation 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 census required by Specification 4.11.3.

6.9.3.1.B (Continued)

The annual radiological environmental operating reports shall include summarized and tabulated results in the format of Table 4.11-4 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, a map of all sampling locations keyed to a table giving distances and directions from one reactor and the results of land use censuses required by the Specification 4.11.3, and results of the interlaboratory comparison program required by Specification 4.11.5.

DELETED IN ITS ENTIRETY

6.9.3.2 Nonroutine Reports

A report shall be submitted in the event that (a) the radiological monitoring programs are not substantially conducted as described in Section 4.11; or (b) an unusual or important event occurs from plant operation that causes a significant environmental impact or affects a potential environmental impact. Reports shall be submitted within 30 days.

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: Name Distance and Direction	Location with Highest Annual Mean: Mean (f)[b] Range[b]	Control Locations Mean (f)[b] Range[b]	Number of REPORTABLE OCCURRENCES
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

TABLE 6.9-1 (Continued)

Medium of 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: Name Distance and Direction	Location with Highest Annual Mean: Mean (f)[b] Range[b]	Control Locations Mean (f)[b] Range[b]	Number of REPORTABLE OCCURRENCES
Fish pCi/kg (dry weight)	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

[a] Nominal Lower Limit of Detection (LLD) as defined in table notation a of Table 6.6-3 of Specification 6.6.
[b] Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)
[d] Note: The example data are provided for illustrative purposes only.

6.9.3.3 Special Report

a. Special reports shall be submitted covering the activities identified below pursuant to the requirements of the applicable referenced specification:

Area	Specification Reference	
Prestressing, Anchorage, Liner and Penetration Tests	4.5.4 4.5.5	90 Days After Completion of the Test*
Primary System Surveillance Evaluation and Review	4.3	Five Years

* A test is considered to be complete after all associated mechanical, chemical, etc., tests have been completed.

b. Bimonthly status reports on the program to improve the reliability of the paths to prevent post-LOCA boron precipitation shall be submitted to the Division of Operating Reactors until completed.

c. Deleted.

6.9.3.3.d

Special reports shall be submitted to the Director of the NRC Regional Office listed in Appendix D, 10 CFR Part 20, with a copy to the Director, Office of Inspection and Enforcement, US Nuclear Regulatory Commission, Washington, DC 20555 within the time period specified for each report.

6.10 RECORD RETENTION

(Records not previously required to be retained shall be retained as required below commencing with the effective date of Technical Specification Change No 20. A system for efficient record retrieval shall be in effect not later than June 1976.)

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

a. Records and logs of facility 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 events as defined in Section 1.4.

d. Records of surveillance activities, inspections and calibrations required by these Technical Specifications.

(Intentionally Left Blank)

6.18 OFFSITE DOSE CALCULATION MANUAL (ODCM)

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

6.18.2 Licensee initiated changes to the ODCM:

1. Shall be submitted to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the changes(s) was made effective. This submittal shall contain:

   a. Sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information. Information submitted should consist of a package of those pages of the ODCM to be changed with each page numbered together with appropriate analyses or evaluations justifying the change(s);

   b. A determination that the change will not reduce the accuracy or reliability of dose calculations or setpoint determinations; and

   c. Documentation of the fact that the change has been reviewed and found acceptable as defined by Specification 6.18.3.

6.18.3 Licensee initiated changes to and implementing procedures for the ODCM shall become effective upon review and approval by the responsible Nuclear Operations Department per CPC 2A (Quality Assurance Program).

6.19 PROCESS CONTROL PROGRAM (PCP)

6.19.1 The PCP shall be approved by the Commission prior to implementation.

6.19.2 Licensee initiated changes to the PCP:

1. Shall be submitted to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the changes(s) was made. This submittal shall contain:

   a. Sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information;

   b. A determination that the change did not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes; and

   c. Documentation of the fact that the change has been reviewed and found acceptable as defined by Specification 6.19.3.

6.19.3 Licensee initiated changes to and implementing procedures for the PCP shall become effective upon review and approval by the responsible Nuclear Operations Department per CPC 2A (Quality Assurance Program).

6.20 MAJOR MODIFICATIONS TO RADIOACTIVE LIQUID, GASEOUS AND SOLID WASTE TREATMENT SYSTEMS

6.20.1 Licensee initiated major modifications to the radioactive waste systems (liquid, gaseous and solid):

1. Shall be reported to the Commission in a special report pursuant to Specification 6.9.3.3d within six months of the time the safety evaluation was reviewed by the (PRC). The discussion of each modification shall contain:

   a. A summary of the evaluation that led to the determination that the modification could be made in accordance with 10 CFR Part 50.59,

   b. A description of the equipment, components and processes involved and the interfaces with other plant systems;

   c. Documentation of the fact that the modification was reviewed and found acceptable by the (PRC).

2. Shall become effective upon review and acceptance by the Plant General Manager.

SPECIAL TECHNICAL SPECIFICATIONS
PURSUANT TO AGREEMENT

DELETED IN ITS ENTIRETY

S-1 through S-13

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 85 TO PROVISIONAL OPERATING LICENSE NO. DPR-20

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

To comply with Section V of Appendix I of 10 CFR Part 50, the Consumers Power Company has filed with the Commission plans and proposed technical specifications developed for the purpose of keeping releases of radioactive materials to unrestricted areas during normal operations, including expected operational occurrences, as low as is reasonably achievable. Consumers Power filed this information with the Commission by letter dated July 31, 1984 which requested changes to the Technical Specifications appended to Provisional Operating License No. DPR-20 for the Palisades Plant. The proposed technical specifications update those portions of the technical specifications addressing radioactive waste management and make them consistent with the current staff positions as expressed in NUREG-0472. These revised technical specifications would reasonably assure compliance, in radioactive waste management, with the provisions of 10 CFR 50.36a, as supplemented by Appendix I to 10 CFR Part 50, with 10 CFR 20.105(c), 106(g), and 405(c); with 10 CFR Part 50, Appendix A, General Design Criteria 60, 63, and 64; and with 10 CFR Part 50, Appendix B.

A Notice of Consideration of Issuance of Amendment to License and Proposed No Signficant Hazards Consideration Determination and Opportunity for Hearing related to the requested action was published in the Federal Register on September 19, 1984 (49 FR 36714). A request for hearing and public comments were not received.

On July 30, 1984, Consumers Power Company requested an amendment to make the reporting requirements in the technical specifications consistent with 10 CFR 50.72 and 50.73 in response to Generic Letter No. 83-43, dated December 19, 1983. These changes to the reporting requirements have been incorporated into this amendment to ensure consistency with the new radiological effluent technical specifications.

A Notice of Consideration of Issuance of Amendment to License and Proposed No Significant Hazards Consideration Determination and Opportunity for Hearing related to the requested action was published in the Federal Register on September 28, 1984 (49 FR 38397). A request for hearing and public comments were not received.

2.0 BACKGROUND AND DISCUSSION

2.1 Regulations

10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities", Section 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors", provides that each license authorizing operation of a nuclear power reactor will include technical specifications that: (1) require compliance with applicable provisions of Part 20.106, "Radioactivity in Effluents to Unrestricted Areas"; (2) require that operating procedures developed for the control of effluents be established and followed; (3) require that equipment installed in the radioactive waste system be maintained and used; and (4) require the periodic submission of reports to the NRC specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and gaseous effluents, any quantities of radioactive materials released that are significantly above design objectives, and such other information as may be required by the Commission to estimate maximum potential radiation dose to the public resulting from the effluent releases.

10 CFR Part 20, "Standards for Protection Against Radiation," paragraphs 20.105(c), 20.106(g), and 20.405(c), require that nuclear power plant and other licensees comply with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations" and submit reports to the NRC when the 40 CFR Part 190 limits have been or may be exceeded.

10 CFR Part 50, Appendix A - General Design Criteria for Nuclear Power Plants, contains Criterion 60, Control of releases for radioactive materials to the environment; Criterion 63, Monitoring fuel and waste storage; and Criterion 64, Monitoring radioactivity releases. Criterion 60 requires that the nuclear power unit design include means to control suitably the release of radioactive materials in gaseous and liquid effluents and to handle radioactive solid wastes produced during normal reactor operation, including anticipated operational occurrences. Criterion 63 requires that appropriate systems be provided in radioactive waste systems and associated handling areas to detect conditions that may result in excessive radiation levels and to initiate appropriate safety actions. Criterion 64 requires that means be provided for monitoring effluent discharge paths and the plant environs for radioactivity that may be released from normal operations, including anticipated operational occurrences and postulated accidents.

10 CFR Part 50, Appendix B, establishes quality assurance requirements for nuclear power plants.

10 CFR Part 50, Appendix I, Section IV, provides guides on technical specifications for limiting conditions for operation for light-water-cooled nuclear power reactors licensed under 10 CFR Part 50.

2.2 Standard Radiological Effluent Technical Specifications

NUREG-0472 provides radiological effluent technical specifications for pressurized water reactors which the staff finds to be an acceptable standard for licensing actions. Further clarification of these acceptable methods is provided in NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants." NUREG-0133 describes methods found acceptable to the staff of the NRC for the calculation of certain key values required in the preparation of proposed radiological effluent technical specifications for light-water-cooled nuclear power plants. NUREG-0133 also provides guidance to licensees in preparing requests for changes to existing radiological effluent technical specifications for operating reactors. It also describes current staff positions on the methodology for estimating radiation exposure due to the release of radioactive materials in effluents and on the administrative control of radioactive waste treatment systems.

The above NUREG documents address all of the radiological effluent technical specifications needed to assure compliance with the guidance and requirements provided by the regulations previously cited. However, alternative approaches to the preparation of radiological effluent technical specifications and alternative radiological effluent technical specifications may be acceptable if the staff determines that the alternatives are in compliance with the regulations and with the intent of the regulatory guidance.

The standard radiological effluent technical specifications can be grouped under the following categories:

(1) Instrumentation
(2) Radioactive effluents
(3) Radiological environmental monitoring
(4) Design
(5) Administrative controls.

Each of the specifications under the first three categories is comprised of two parts: the limiting condition for operation and the surveillance requirements. The limiting condition for operation provides a statement of the limiting condition, the times when it is applicable, and the actions to be taken in the event that the limiting condition is not met.

In general, the specifications established to assure compliance with 10 CFR Part 20 standards provide, in the event the limiting conditions for operation are exceeded, that without delay conditions are restored to within the limiting conditions. Otherwise, the facility is required to effect approved shutdown procedures. In general, the specifications established to assure compliance with 10 CFR Part 50 provide, in the event the limiting conditions for operation are exceeded, that within specified times corrective actions are to be taken, alternative means of operation are to be employed, and certain reports are to be submitted to the NRC describing these conditions and actions.

The specifications concerning design features and administrative controls contain no limiting conditions for operation or surveillance requirements.

Table 1 indicates the standard radiological effluent technical specifications that are needed to assure compliance with the particular provisions of the regulations described in Section 1.0.

2.3 Reporting Requirements of 10 CFR Part 50, Sections 50.72 and 50.73

Section 50.72 of Title 10 of the Code of Federal Regulations was recently revised and became effective January 1, 1984. A new Section 50.73 of Title 10 of the Code of the Federal Regulations was recently added and it also became effective January 1, 1984. Section 50.72 revises the immediate notification requirements for operating nuclear power reactors. The new Section 50.73 provides for a revised Licensee Event Report System.

Since paragraph (g) of Section 50.73 specifically states that: "the requirements contained in this section replace all existing requirements for licensees to report 'Reportable Occurrences' as defined in individual plant Technical Specifications," the reporting requirements incorporated into the "Administrative Controls" section of the licensee's technical specifications required modification. Also, the definition "Reportable Occurrence" needed to be replaced by a new term, "Reportable Event."

3.0 EVALUATION

3.1 Radiological Effluent Technical Specifications

The enclosed technical evaluation report (TER-C5506-107) was prepared for the NRC by Franklin Research Center as part of the technical assistance contract program. Their report provides their technical evaluation of the compliance of the licensee's submittal with NRC provided criteria. The staff has reviewed this TER and agrees with the evaluation. Therefore, the staff concludes that the proposed changes to the radiological effluent technical specifications for the Palisades Plant have been reviewed, evaluated, and found to be in compliance with the requirements of the NRC regulations and with the intent of NUREG-0133 and NUREG-0472 (the Palisades Plant is a pressurized water reactor) and thereby fulfill all the requirements of the regulations related to radiological effluent technical specifications.

The proposed changes will not remove or relax any existing requirement needed to provide reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner. The staff, therefore, finds the proposed changes acceptable.

3.2 NUREG-0737 Technical Specifications

In the July 31, 1984 radiological effluent technical specifications submittal, the licensee modified portions of the November 5, 1982 submittal concerning technical specifications that incorporate some of the requirements of NUREG-0737. The licensee determined that in keeping with the guidance of NUREG-0472, all process monitor operability and surveillance requirements should be located in one table within each section of the technical specifications to facilitate plant operations. The staff finds this approach to be acceptable and an evaluation of the technical specifications for each of the process monitors required by NUREG-0737 is given below:

Noble Gas Effluent Monitors (II.F.1.1)

The licensee has supplemented the existing normal range monitors to provide noble gas monitoring in accordance with TMI Action Plan Item II.F.1.1. Proposed technical specifications were submitted that are consistent with the guidelines provided in Generic Letter 83-37. The staff concludes that the technical specifications for Item II.F.1.1 are acceptable.

Sampling and Analysis of Plant Effluents (II.F.1.2)

The licensee has proposed to include plant effluent sampling monitor with other process monitoring instrumentation at the Palisades Plant. The licensee has proposed the limiting conditions for operation, and the surveillance requirements which are consistent with other effluent monitors. The staff finds the proposed technical specifications to be acceptable as it meets the intent of the guidance contained in Generic Letter 83-37.

Containment High-Range Radiation Monitor (II.F.1.3)

The licensee has installed two in-containment monitors in the Palisades Plant that are consistent with the guidance of TMI Action Plan Item II.F.1.3. Generic Letter 83-37 provided guidance for limiting conditions for operation and surveillance requirements for these monitors. The licensee proposed technical specifications that are consistent with the guidance provided in Generic Letter 83-37. The staff concludes that the proposed technical specifications for Item II.F.1.3 are acceptable.

3.3 Reporting Requirements Technical Specifications

Generic Letter 83-43, dated December 19, 1983, povided all licensees with the model technical specifcations, in Standard Technical Specification format, needed to implement the changes to 10 CFR 50.72 and 50.73. The model specifications were for the "Administrative Control" and "Definitions" sections of the technical specifications. The generic letter also indicated that other portions of the technical specifications would require changes to reflect the revised reporting requirements.

By letter dated July 30, 1984, the licensee submitted the requested technical specification change. The staff has reviewed the licensee's submittal and finds that it conforms to the model technical specifications and to the guidance provided in Generic Letter 83-43. Therefore, the staff concludes that the proposed technical specifications are acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

5.0 CONCLUSION

The staff has concluded, based on the consideration discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ACKNOWLEDGEMENT

W. Meinke, F. Congel, C. Willis, C. Patel, and J. Lyons contributed to this evaluation.

Dated: November 9, 1984

Table 1. Relation Between Provisions of the Regulations and the Standard Radiological Effluent Technical Specifications for Pressurized Water Reactors and Boiling Water Reactors

● Indicate the specifications that are needed to assure compliance with the identified provision of the regulations.

Provisions of Title 10 Code of Federal Regulations	Instrumentation: Rad. Liquid Effl. Monitoring	Instrumentation: Rad. Gas. Effl. Monitoring	Radioactive Effluents, Liquid: Effluent Concentration	Liquid: Dose	Liquid: Liquid Radwaste Treatment	Liquid: Liquid Holdup Tanks	Gaseous PWR/BWR: Dose Rate	Gaseous PWR/BWR: Dose Noble Gases	Gaseous PWR/BWR: Dose I-131, Trit. and Part.	Gaseous PWR/BWR: Explosive Gas Mixture	Gaseous PWR: Gaseous Radwaste Treatment	Gaseous PWR: Gas Storage Tanks	Gaseous BWR: Gaseous Radwaste Treatment	Gaseous BWR: Ventilation Exhaust Treatment	Gaseous BWR: Main Condenser	Gaseous BWR: Mark I or II Containment	Solid Radioactive Waste	Total Dose	Rad. Envir. Monitoring: Rad. Env. Monitoring Program	Rad. Envir. Monitoring: Land Use Census	Rad. Envir. Monitoring: Interlab. Comparison Program	Design Features: Site Boundaries*	Administrative Control: Review and Audits	Administrative Control: Procedures	Administrative Control: Reports	Administrative Control: Record Retention	Administrative Control: Process Control Program	Administrative Control: Offsite Dose Calc. Manual	Administrative Control: Major Changes to Rad. Systems
§ 50.36a Technical specifications on effluents from nuclear power reactors																													
Remain within limits of § 20.106			●			●	●					●				●												●	
Establish and follow procedures to control effluents			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							●				●	
Maintain and use radioactive waste system equipment				●	●			●	●		●		●	●														●	
Submit reports, semi-annual and other	●	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●									●	●	●
§§ 20.105(c), 20.106(g), 20.405(c) Compliance with 40 CFR 190																		●	●	●	●							●	
Part 50 Appendix A - General Design Criteria																													
Criterion 60 - Control of releases of radioactive materials to the environment	●	●			●	●				●	●	●	●	●	●	●	●							●			●	●	
Criterion 61 - Fuel storage and handling and radioactivity control	●	●																											
Criterion 63 - Monitoring fuel and waste storage	●	●																											
Criterion 64 - Monitoring radioactivity releases	●	●													●				●									●	
Part 50 Appendix B - Quality Assurance Criteria	●	●																			●		●	●			●		
Part 50 Appendix I - Guides to Meet "As Low As Is Reasonably Achievable (ALARA)"																													
Maintain releases within design objectives				●	●			●	●		●			●														●	
Establish surveillance & monitoring program to provide data on:																													
(1) quantities of rad. matls. in effluents	●	●																											
(2) radiation & rad. matls. in the environment																			●						●	●			
(3) changes in use of unrestricted areas																				●									
Exert best efforts to keep releases "ALARA"				●	●			●	●		●		●	●															●
Submit report if calculated doses exceed the design objective				●				●	●		●			●											●				
Demonstrate conform. to des. obj. by calc. proced.				●				●	●		●			●														●	
Part 100															●														

*Note: Needed to fully implement other specifications.

TECHNICAL EVALUATION REPORT

RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATION IMPLEMENTATION (A-2)

CONSUMERS POWER COMPANY

PALISADES PLANT

NRC DOCKET NO. 50-255

NRC TAC NO. 8148

NRC CONTRACT NO. NRC-03-81-130

FRC PROJECT C5506

FRC ASSIGNMENT 4

FRC TASK 107

Prepared by

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Prepared for

Nuclear Regulatory Commission
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Author: S. Chen

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Lead NRC Engineer: F. Congel
C. Willis

September 18, 1984

FRANKLIN RESEARCH CENTER
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ARVIN/CALSPAN
20th and Race Streets
Philadelphia, PA 19103

8409210151 XA

TECHNICAL EVALUATION REPORT

RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATION IMPLEMENTATION (A-2)

CONSUMERS POWER COMPANY

PALISADES PLANT

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September 18, 1984

Prepared by:	Reviewed by:	Approved by:
S. Chen	S. Pandey	[illegible]
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Date: 9/18/84	Date: 9/18/84	Date: 9-18-84

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FOREWORD

This Technical Evaluation Report was prepared by Franklin Research Center under a contract with the U.S. Nuclear Regulatory Commission (Office of Nuclear Reactor Regulation, Division of Operating Reactors) for technical assistance in support of NRC operating reactor licensing actions. The technical evaluation was conducted in accordance with criteria established by the NRC.

1. INTRODUCTION

1.1 PURPOSE OF REVIEW

The purpose of this technical evaluation report (TER) is to review and evaluate the proposed changes in the Technical Specifications of Palisades Plant with regard to Radiological Effluent Technical Specifications (RETS), the Offsite Dose Calculation Manual (ODCM), and the Process Control Program (PCP).

The evaluation uses criteria proposed by the NRC staff in the Model Technical Specifications for pressurized water reactors (PWRs), NUREG-0472 [1]. This effort is directed toward the NRC objective of implementing RETS which comply principally with the regulatory requirements of the Code of Federal Regulations, Title 10, Part 50 (10CFR50), "Domestic Licensing of Production and Utilization Facilities," Appendix I [2]. Other regulations pertinent to the control of effluent releases are also included within the scope of compliance.

1.2 GENERIC BACKGROUND

Since 1970, 10CFR50, Section 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors," has required licensees to provide technical specifications which ensure that radioactive releases will be kept as low as reasonably achievable (ALARA). In 1975, numerical guidance for the ALARA requirement was issued in 10CFR50, Appendix I. The licensees of all operating reactors were required [3] to submit, no later than June 4, 1976, their proposed ALARA Technical Specifications and information for evaluation in accordance with 10CFR50, Appendix I.

However, in February 1976, the NRC staff recommended that proposals to modify Technical Specifications be deferred until the NRC completed the model RETS. The model RETS deals with radioactive waste management systems and environmental monitoring. Although the model RETS closely parallels 10CFR50, Appendix I requirements, it also includes provisions for addressing other issues.

These other issues are specifically stipulated by the following regulations:

- o 10CFR20 [4], "Standards for Protection Against Radiation," Paragraphs 20.105(c), 20.106(g), and 20.405(c) require that nuclear power plants and other licensees comply with 40CFR190 [5], "Environmental Radiation Protection Standards for Nuclear Power Operations," and submit reports to the NRC when the 40CFR190 limits have been or may be exceeded.

- o 10CFR50, Appendix A [6], "General Design Criteria for Nuclear Power Plants," contains Criterion 60 - Control of releases of radioactive materials to the environment; Criterion 63 - Monitoring fuel and waste storage; and Criterion 64 - Monitoring radioactivity releases.

- o 10CFR50, Appendix B [7], establishes the quality assurance required for nuclear power plants.

The NRC position on the model RETS was established in May 1978 when the NRC's Regulatory Requirements Review Committee approved the model RETS: NUREG-0472 [1] for pressurized water reactors (PWRs) and NUREG-0473 [8] for boiling water reactors (BWRs). Copies were sent to licensees in July 1978 with a request to submit proposed site-specific RETS on a staggered schedule over a 6-month period. Licensees responded with requests for clarifications and extensions.

The Atomic Industrial Forum (AIF) formed a task force to comment on the model RETS. NRC staff members first met with the AIF task force on June 17, 1978. The model RETS was subsequently revised to reflect comments from the AIF and others. A principal change was the transfer of much of the material concerning dose calculations from the model RETS to a separate ODCM.

The revised model RETS was sent to licensees on November 15 and 16, 1978 with guidance (NUREG-0133 [9]) for preparation of the RETS and the ODCM and a new schedule for responses, again staggered over a 6-month period.

Four regional seminars on the RETS were conducted by the NRC staff during November and December 1978. Subsequently, Revision 2 of the model RETS and additional guidance on the ODCM and the PCP were issued in February 1979 to each utility at individual meetings. In response to the NRC's request, operating reactor licensees have subsequently submitted initial proposals on plant RETS and the ODCM. Review leading to ultimate implementation of these documents was initiated by the NRC in 1981 using subcontracted independent teams as reviewers.

As the RETS review process has progressed since September 1981, feedback from the licensees has led the NRC to believe that modification to some of the guidelines in the current version of Revision 2 is needed to clarify specific concerns of the licensees and thus expedite the entire review process. Starting in April 1982, NRC distributed revised versions of RETS in draft form to the licensees during the site visits. The new guidance on these changes was presented in the AIF meeting on May 19, 1982 [10]. Some interim changes regarding the Radiological Environmental Monitoring Section were issued in 1982 [11]. With the incorporation of these new changes, NRC issued, in September 1982, a draft version of NUREG-0472, Revision 3 [12], to serve as new guidance for the review teams.

1.3 PLANT-SPECIFIC BACKGROUND

Due to lack of a complete formal submittal from the Licensee, Consumers Power Company, the Licensee's original RETS submittal consisted only of scattered information on technical specification changes [13, 14, 15] and the Licensee's responses [16] to NRC comments. These pieces of information therefore formed the basis for an initial RETS evaluation [17, 18] conducted by an independent review team at the Franklin Research Center (FRC) and for a site visit.

The site visit was conducted on January 5-7, 1982 by the reviewers with the participation of plant personnel and the NRC staff. Discussion focused on the initial review of the proposed changes to the RETS and on the technical approaches for an ODCM. The technical deficiencies in the Licensee's proposed RETS were considered, and deviations from NRC guidelines were pointed out. In order to incorporate the new information provided by the Licensee at the site, it was determined [19] that an updated comparison review was necessary. This new update was reflected in the RETS comparison copy issued by FRC in April 1982 [20].

Subsequent to the site visit, the Licensee submitted to NRC the proposed technical specification changes and clarifications [21, 22, 23, 24, 25], which did not, however, include a complete formal RETS submittal.

In view of the lack of Licensee action in submitting a formal RETS, on July 29, 1983 [26], the NRC staff requested the review team at FRC to re-open the RETS evaluation, using the Licensee's existing technical specification and partial submittals pertinent to RETS.

In this evaluation, the Licensee's submittals were evaluated against NUREG-0472, Draft Revision 3 [12]. A RETS comparision report [27] dated September 16, 1983, was prepared as a result of the evaluation. The evaluation also included preparation of reports on the ODCM and PCP. The ODCM evaluation was based on the submittal of Reference 24, and the PCP evalaution was based on Reference 15.

These FRC evaluation reports and copies of current NRC guidance were forwarded to the Licensee by the NRC staff, along with a request for a meeting at the plant site to discuss differences. On April 5 and 6, 1984, staff members of the Licensee and NRC met at the Palisades plant. Discussion focused on the differences between NRC guidance and a draft submittal received from the Licensee a few days before the meeting, and resolution was achieved on all problems and open items.

Under a cover letter dated July 31, 1984 [28], Consumer Power Company delivered its final submittals on RETS, ODCM, and PCP to the NRC. Copies of these submittals were transmitted to FRC for review. The Licensee's RETS submittal was again evaluated against NUREG-0472, Draft Revision 3. The ODCM was also evaluated according to the existing guidelines specified by NUREG-0133. The PCP was reviewed against the NRC guidelines dated January 7, 1983 [29].

The review also incorporated the additional guidance that FRC received from the NRC staff on plant-specific issues [30]. Details of the draft RETS review were documented in the comparison copy [31].

2. REVIEW CRITERIA

Review criteria for the RETS and ODCM were provided by the NRC in three documents:

NUREG-0472, RETS for PWRs

NUREG-0473, RETS for BWRs

NUREG-0133, Preparation of RETS for Nuclear Power Plants.

Twelve essential criteria are given for the RETS and ODCM:

1. All significant releases of radioactivity shall be controlled and monitored.

2. Offsite concentrations of radioactivity shall not exceed the 10CFR20, Appendix B, Table II limits.

3. Offsite radiation doses of radioactivity shall be ALARA.

4. Equipment shall be maintained and used to keep offsite doses ALARA.

5. Radwaste tank inventories shall be limited so that failures will not cause offsite doses exceeding 10CFR20 limits.

6. Hydrogen and/or oxygen concentration in the waste gas system shall be controlled to prevent explosive mixtures.

7. Wastes shall be processed to shipping and burial ground criteria under a documented program, subject to quality assurance verification.

8. An environmental monitoring program, including a land-use census and an interlaboratory comparison program, shall be implemented.

9. The radwaste management program shall be subject to regular audits and reviews.

10. Procedures for control of liquid and gaseous effluents shall be maintained and followed.

11. Periodic and special reports on environmental monitoring and on releases shall be submitted.

12. Offsite dose calculations shall be performed using documented and approved methods consistent with NRC methodology.

Subsequent to the publication of NUREG-0472 and NUREG-0473, the NRC staff issued guidelines [32, 33], clarifications [34, 35], and branch positions [36, 37, 38, 39] establishing a policy that requires the licensees of operating reactors to meet the intent, if not the letter, of the model RETS provisions. The NRC branch positions issued since the RETS implementation review began have clarified the model RETS implementation for operating reactors.

Review of the ODCM was based on the following NRC guidelines: Branch Technical Position, "General Content of the Offsite Dose Calculation Manual" [40]; NUREG-0133 [9]; and Regulatory Guide 1.109 [41]. The ODCM format is left to the licensee and may be simplified by tables and grid printouts.

Review of the PCP was based on the guidance provided by the NRC staff [29].

3. TECHNICAL EVALUATION

3.1 GENERAL DESCRIPTION OF RADIOLOGICAL EFFLUENT SYSTEMS

This section briefly describes the liquid and gaseous radwaste effluent systems, release paths, and control systems installed at Palisades Plant, a PWR.

3.1.1 Radioactive Liquid Effluent

The liquid radwaste system for Palisades Plant is shown in Figure 1. The liquid radioactive waste system is divided into three sections: (a) the clean waste section which processes high-activity, high-purity liquid waste; (b) the dirty waste section which processes low-activity, low-purity liquid waste; and (c) the laundry waste section. Effluent releases from these waste systems are processed and combined into the liquid radwaste effluent line which leads to the mixing basin at the discharge canal for dilution and release to Lake Michigan.

Other effluent streams also connected to the discharge canal for release are steam generator blowdown, service water, and turbine building drains.

3.1.2 Radioactive Gaseous Effluent

The gaseous radwaste system for Palisades Plant is shown in Figure 2. The gaseous radioactive waste system is divided into two sections: (a) the gas collection header which collects low-activity gas from liquid having been previously degassed and/or vented in other waste handling steps and (b) the gas processing section which collects gases from potentially high-activity sources.

The waste gases are processed by filtration, adsorption, or decay holdup before releasing through the ventilation stack to the atmosphere.

Also released to the ventilation stack are the following effluent streams: auxiliary radwaste area, fuel handling area, radwaste area addition, fuel area addition, containment building, and condenser offgas. The steam generator blowdown tank vent discharges directly to the atmosphere.

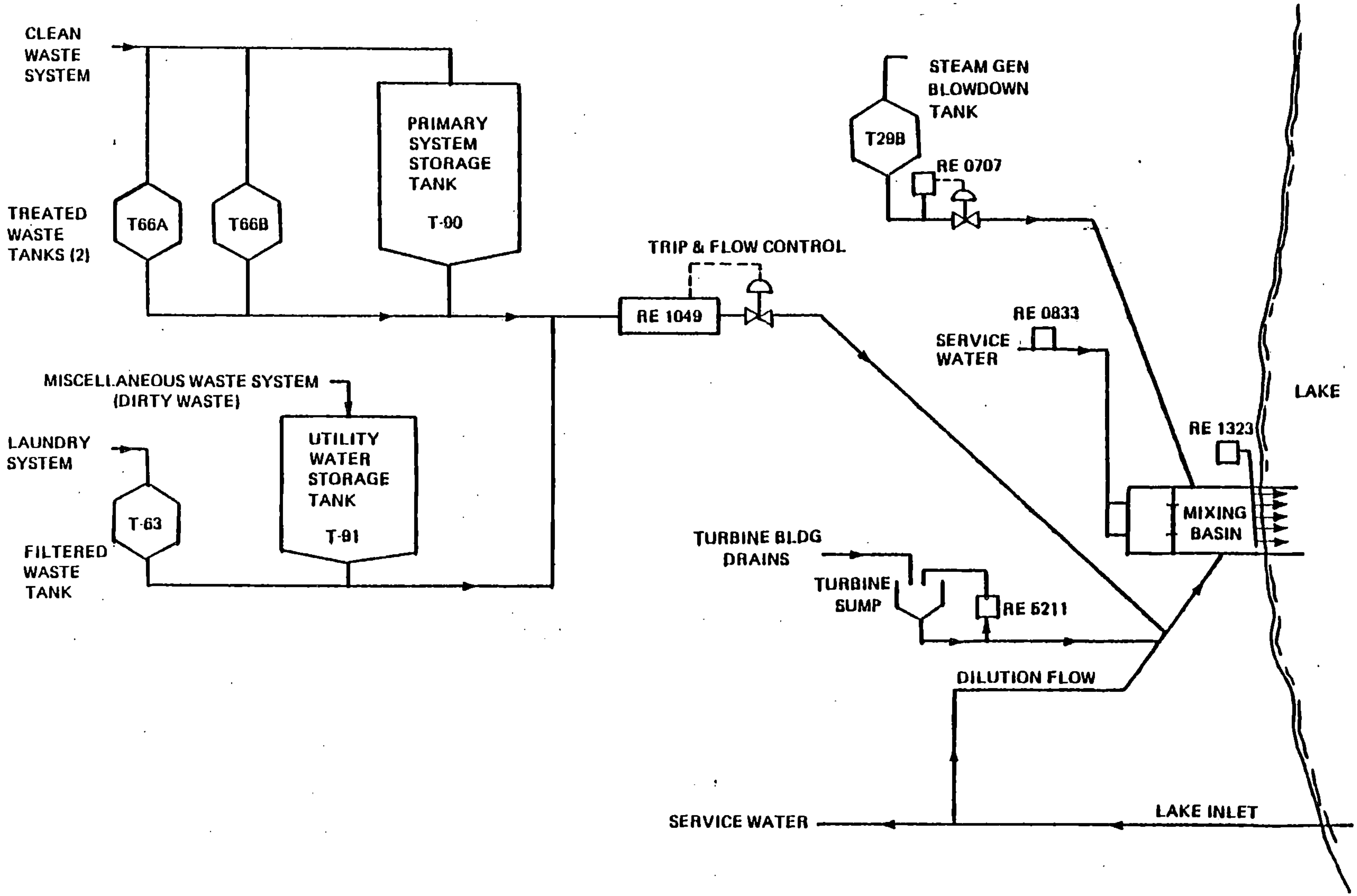

Figure 1. Liquid Radwaste Treatment Systems, Effluent Paths, and Controls, Palisades Plant (Taken from Figure 2-1 of Licensee's ODCM Submittal)

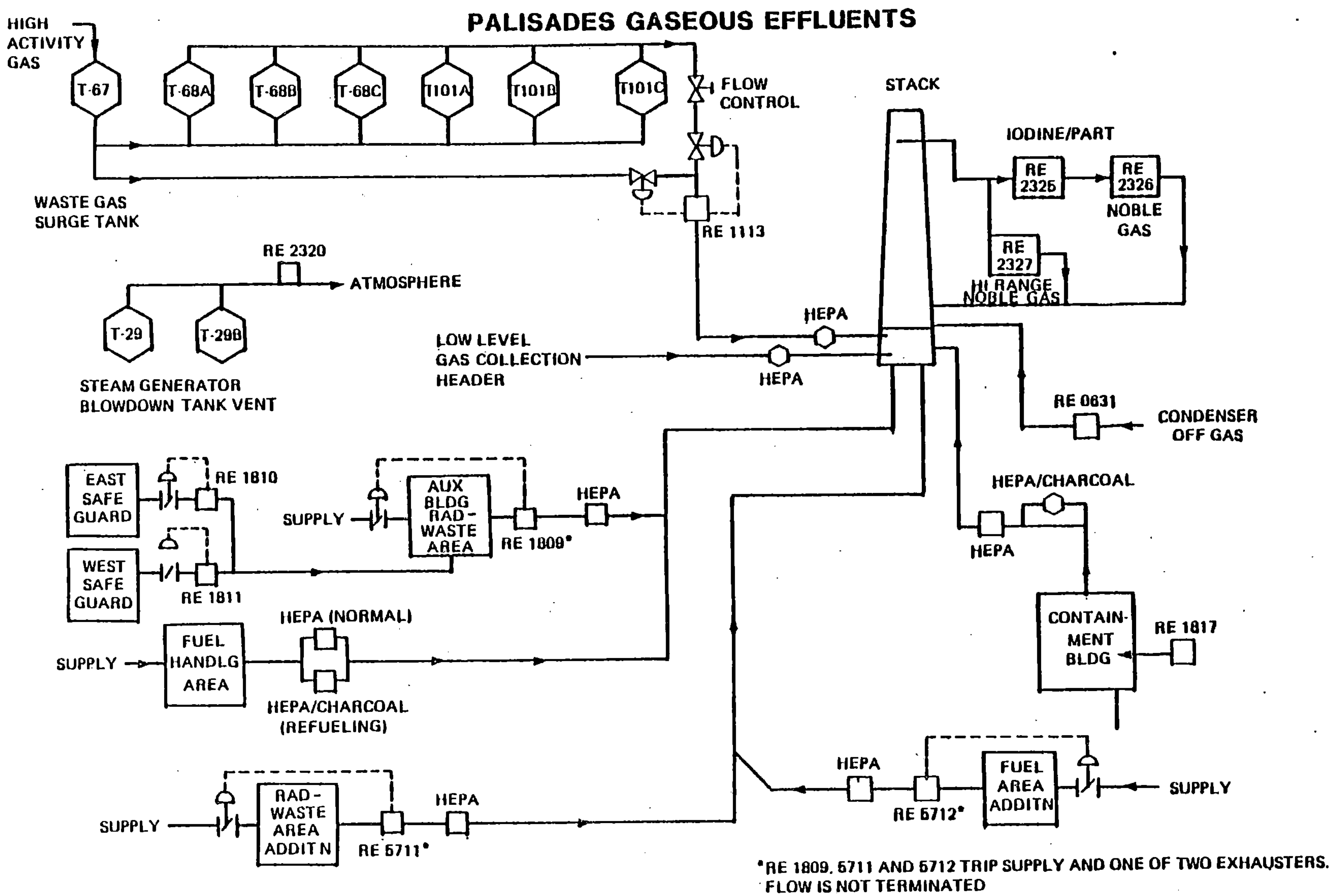

Figure 2. Gaseous Radwaste Treatment Systems, Effluents Paths, and Controls, Palisades Plant (Taken from Figure 1-1 of Licensee's ODCM Submittal)

3.2 RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS

The present evaluation of the Licensee's proposed RETS against the provisions of NUREG-0472 included the following: (1) a review of RETS information provided by the Licensee between 1979 and 1983 [13-16; 21-25], (2) a discussion of problem areas in that submittal by means of a site visit [19], and (3) a review of the Licensee's July 31, 1984 final RETS, ODCM, and PCP submittals [28].

3.2.1 Effluent Instrumentation

The objective of the RETS with regard to effluent instrumentation is to ensure that all significant releases of radioactivity are monitored. The RETS specify that all effluent monitors be operable and that alarm/trip setpoints be determined to ensure that radioactivity levels do not exceed the maximum permissible concentration (MPC) set by 10CFR20. To further ensure that the instrumentation functions properly, surveillance requirements are also needed in the specifications.

3.2.1.1 Radioactive Liquid Effluent Monitoring Instrumentation

A radiation monitor (RE 1049) has been installed for the liquid effluent line (Figure 1) which receives effluent releases from the clean waste system, the dirty waste system, and the laundry system. The monitor also has automatic isolation capabilities. The Licensee also has a radiation monitor (RE 5211) for the turbine building drain, a monitor (RE 0707) for the steam generator blowdown tank, and a monitor (RE 0833) for the service water system. A process monitor (RE 1323) is also installed at the mixing basin to monitor the releases from the overall combined discharges.

These existing monitoring capabilities provide adequate assurance that the provisions of NUREG-0472 for the radioactive liquid effluent monitoring instrumentation are met.

3.2.1.2 Radioactive Gaseous Effluent Monitoring Instrumentation

The station ventilation stack is provided with a monitoring system (monitors RE 2325, RE 2326, and RE 2327) capable of monitoring noble gases, iodines, and particulates.

A noble gas monitor (RE 1113) equipped with automatic termination capability is installed at the waste gas holdup system. Other monitors proposed by the Licensee in the RETS submittal are a noble gas monitor (RE 2320) for the steam generator blowdown system, gross gamma monitors (RE 2323 and 2324) for the main steam safety and dump valve discharge line, and noble gas monitors (RE 1810 and RE 1811) for the engineered safeguards room vent system.

Systems equipped with process monitors are the auxiliary building radwaste area (RE 1809), radwaste area addition (RE 5711), fuel area addition (RE 5712), condenser offgas system (RE 0631), and containment building (RE 1817).

These existing gaseous monitoring capabilities provided by the Licensee meet the intent of NUREG-0472 for radioactive gaseous effluent monitoring instrumentation.

3.2.2 <u>Concentration and Dose Rates of Effluents</u>

3.2.2.1 Liquid Effluent Concentration

In Section 3.24.3.1 of the Licensee's submittal, a commitment is made to maintain the concentration of radioactive liquid effluents released to the unrestricted areas to within 10CFR20 limits, and if the concentration of liquid effluents exceeds these limits, the concentration will be restored without delay to a value equal to or less than the MPC values specified in 10CFR20. Both batch and continuous radioactive liquid effluent releases are sampled and analyzed periodically in accordance with a sampling and analysis program (Table 4.24-3 of the Licensee's submittal), which meets the intent of NUREG-0472.

It was determined that the Licensee-proposed specification meets the intent of NUREG-0472.

3.2.2.2 Gaseous Effluent Dose Rate

In Section 3.24.5.1 of the Licensee's submittal, a commitment is made to maintain the offsite gaseous dose rate from radioactive gaseous effluents to areas at and beyond the site boundary to within 10CFR20 limits, or the equivalent dose rate values prescribed by Section 3.11.1.2.1 of NUREG-0472. If the dose rate of gaseous effluents exceeds these limits, it will be restored without delay to a value equal to or less than these limits. This commitment satisfies the provisions of NUREG-0472.

The radioactive gaseous waste sampling and analysis program (Table 4.24-5 of the Licensee's submittal) provides adequate sampling and analysis of the vent discharges, including the substreams, and therefore meets the intent of NUREG-0472.

3.2.3 Offsite Doses from Effluents

The objective of the RETS with regard to offsite doses from effluents is to ensure that offsite doses are kept ALARA and are in accordance with 10CFR50, Appendix I, and 40CFR190. The Licensee has made a commitment to (1) meet the quarterly and yearly dose limitations for liquid effluents, per Section II.A of Appendix I, 10CFR50; (2) restrict the air doses for beta and gamma radiation from the site to areas at and beyond the site boundary as specified in 10CFR50, Appendix I, Section II.B; (3) maintain the dose level at and beyond the site boundary from releases of iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days within the design objectives of 10CFR50, Appendix I, Section II.C; and (4) limit the annual dose from all uranium fuel cycle sources of the plant to any member of the public to within the requirements of 40CFR190. In each pertinent section, the Licensee has made a commitment to perform dose calculations in accordance with methods given in the ODCM. This satisfies the intent of NUREG-0472.

3.2.4 Effluent Treatment

The objectives of the RETS with regard to effluent treatment are to ensure that wastes are treated to keep releases ALARA and to satisfy the provisions of technical specifications governing the maintenance and use of radwaste treatment equipment. The Licensee has not provided a section in the RETS submittal to address the liquid radwaste treatment system. For 13 years, the Licensee has operated under a special Technical Specification relative to liquid waste imposed by intervenors. This Technical Specification and the procedures developed to implement it are more conservative than NRC regulations. The Licensee commits to procedural control of liquid waste discharge as in the past and has placed a summary statement regarding operability of liquid radwaste treatment equipment in Section II-D of its ODCM. For the gaseous radwaste treatment system, the Licensee has maintained in the submittal as Specification 3.24.6 the Technical Specification relative to the gaseous waste treatment system in the current Palisades Technical Specification. Furthermore, the Licensee has placed a summary statement in Section I-E of the ODCM regarding the operability of the gaseous radwaste treatment system.

In view of the Licensee's commitments and the 13 years of experience of Palisades Plant under the special Technical Specifications that are more restrictive than NRC regulations, together with the Licensee's commitment to continue the procedural control of waste discharges, it is considered [30] that the Licensee meets the intent of NUREG-0472.

3.2.5 Radioactivity Inventory Limits

The objective of the RETS with regard to tank inventory limits is to ensure that the rupture of a radwaste tank would not cause offsite doses greater than the limits set in 10CFR20 for non-occupational exposure. The Licensee has stated in the cover letter of the submittal [28] that the radwaste system effluent storage tanks T90 and T91 have overflows to the liquid systems; thus a specification is not needed for tank inventory. This meets the intent of NUREG-0472. For gas storage tanks, the Licensee has demonstrated that the total gaseous activity in the primary coolant has been calculated as only a fraction (25.80%) of the design basis quantities, and thus a specification on the gas storage tank is not needed. According to the justification, the Licensee meets the intent of NUREG-0472.

3.2.6 Explosive Gas Mixtures

The objective of the RETS with regard to explosive gas mixtures is to prevent hydrogen explosions in the waste gas systems. The Licensee has stated that the waste gas holdup system is hydrogen-rich and is not designed to withstand a hydrogen/oxygen explosion.

The Licensee stated that because of the plant-specific design and maintenance program which uses oil reservoir cooling, diaphragm valves, and grounded tanks, an ignition of the gaseous mixture inside the waste gas system is highly unlikely to be triggered. In addition, the Licensee cited the 13 years of performance history during which the Palisades Plant operated successfully with mixtures within the explosive range.

It is determined [30] that the Licensee meets the intent of NUREG-0472 in the interim until NRC completes its study of the explosive gas problem.

3.2.7 Solid Radwaste System

The objective of the RETS with regard to the solid radwaste system is to ensure that radwaste will be properly processed and packaged before it is shipped to a burial site. Specification 3.11.3 of NUREG-0472 provides for the establishment of a PCP to show compliance with this objective. The Licensee has made a commitment (Specificiation 3.24.7 of the submittal) to implement such a program in accordance with a PCP and thus to ensure that radwaste is properly processed and packaged before it is shipped to the burial site. This meets the intent of NUREG-0472.

3.2.8 Radiological Environmental Monitoring Program

The objectives of the RETS with regard to environmental monitoring are to ensure that an adequate and full-area-coverage monitoring program exists and that the 10CFR50, Appendix I requirements for technical specifications on environmental monitoring are satisfied. In all cases, the Licensee has followed NUREG-0472 guidelines, including the Branch Technical Position dated November 1979 [37], and has provided an adequate number (21) of thermoluminescent dosimeter (TLD) sample locations,omitting lake sectors not applicable to land pathways. The Licensee's methods of analysis and maintenance of yearly records satisfy the NRC guidelines and meet the intent of 10CFR50, Appendix I. The Licensee has also made a commitment to document the environmental monitoring sample locations in the Annual Radiological Environmental Operating Report, which meets the intent of NUREG-0472. The specification for the land use census satisfies the provisions of Section 3.12.2 of NUREG-0472 by providing for an annual census in the specified areas. The Licensee participates in an interlaboratory comparison program approved by the NRC and reports the results in the Annual Radiological Environmental Operating Report, which also meets the intent of NUREG-0472.

3.2.9 Audits and Reviews

The objective of the RETS with regard to audits and reviews is to ensure that audits and reviews of the radwaste and environmental monitoring programs are properly conducted. The Licensee's administrative structure designates the Nuclear Safety Board (NSB) as the group responsible for review of the proposed changes in the operating license or Appendix "A" Technical Specifications. Audits of Nuclear Operations Department activities are performed under the cognizance of the NRB; these audits encompass the radiological environmental monitoring program, the offsite dose calculation manual, and the process control program. It was determined [30] that the Licensee-proposed administrative structure satisfactorily meets the intent of NUREG-0472.

3.2.10 Procedures and Records

The objective of the RETS with regard to procedures is to satisfy the provisions for written procedures specified in NUREG-0472 for implementing the ODCM, the PCP, and the quality assurance (QA) program. It is also an objective of RETS to properly retain the documented records related to the environmental monitoring program and certain QA procedures. The Licensee has made a commitment to establish, implement, and maintain written procedures for the applicable procedures recommended in Appendix "A" or Regulatory Guide 1.33 (November 1972). It was determined [30] that the Licensee meets the intent of NUREG-0472. The Licensee intends to retain the records of the gaseous and liquid radioactive materials released to the environs, as well as the records of quality assurance activities required for the QA manual for the plant operating license. It is thus determined that the Licensee has met the intent of NUREG-0472.

3.2.11 Reports

In addition to the reporting requirements of Title 10, Code of Federal Regulations (10CFR), the objective of the RETS with regard to administrative controls is to ensure that appropriate periodic and special reports are submitted to the NRC.

The Licensee has made a commitment to follow applicable reporting requirements stipulated by 10CFR regulations and also the following reports specified by NUREG-0472:

1. Annual radiological environmental operating report. In Section 6.9.3.1.B of the Licensee's submittal, a commitment is made to provide an annual radiological environmental surveillance report that includes summaries, interpretations, and statistical evaluation of the results of the environmental surveillance activities. The report also includes the results of land use censuses, and participation in an interlaboratory comparison program specified by Specification 4.11.5 of the submittal.

2. Semiannual radioactive effluent release reports. In Section 6.9.2.A of the Licensee's submittal, a commitment is made to provide semiannual radioactive effluent and solid waste release reports which include a summary of radioactive liquid and gaseous effluents and solid waste released and an assessment of offsite doses. Listings of new locations for dose calculations identified by the land use censusas well as any changes to ODCM, PCP, and major changes to radioactive waste treatment systems are also included in the report.

3. Special report. The Licensee has made a commitment to file a 30-day special report to the NRC under the following conditions as prescribed by the proposed specifications:

   - exceeding liquid effluent dose limits according to Specification 3.24.4.1

- o exceeding gaseous effluent dose limits according to Specification 3.24.5.2
- o exceeding total dose limits according to Specification 3.24.8.1
- o exceeding the reporting levels of Table 4.11-2 for the radioactivity measured in the environmental sampling medium.

These reporting commitments have satisfied the provisions of NUREG-0472.

3.2.12 Implementation of Major Programs

One objective of the administrative controls is to ensure that implementation of major programs such as the ODCM, the PCP, and major changes to the radioactive waste treatment system follow appropriate administrative procedures. The Licensee has made a commitment to review, report, and implement major programs such as the ODCM, the PCP, and major changes to the radioactive waste treatment system. These commitments meet the intent of NUREG-0472.

3.3 OFFSITE DOSE CALCULATION MANUAL (ODCM)

As specified in NUREG-0472, the ODCM is to be developed by the Licensee to document the methodology and approaches used to calculate offsite doses and maintain the operability of the effluent system. As a minimum, the ODCM should provide equations and methodology for the following topics:

- o alarm and trip setpoint on effluent instrumentation
- o liquid effluent concentration in unrestricted areas
- o gaseous effluent dose rate at or beyond the site boundary
- o liquid and gaseous effluent dose contributions
- o liquid and gaseous effluent dose projections.

In addition, the ODCM should contain flow diagrams, consistent with the systems being used at the station, defining the treatment paths and the components of the radioactive liquid, gaseous, and solid waste management systems. Of course, these diagrams should be consistent with the systems being used at the station. A description and the location of samples in support of the environmental monitoring program are also needed in the ODCM.

3.3.1 Evaluation

The Licensee has followed the methodology of NUREG-0133 [9] to determine the alarm and trip setpoints for the liquid and gaseous effluent monitors. There is a typographic error, however, in the Licensee's Equation (1.1) where the ratio $\left(\frac{C_i}{MPC_K}\right)$ should be summed over all radionuclides and should read $\left(\sum_i \frac{C_i}{MPC_i}\right)_k$.

The Licensee has demonstrated the method of calculating the radioactive liquid concentration by describing in the ODCM the means of collecting and analyzing representative samples prior to and after releasing liquid effluents into the circulating water discharge. The method provides added assurance of compliance with 10CFR20 for liquid releases.

Methods are also included for showing that the air maximum permissible concentration (MPC) at or beyond the unrestricted areas due to noble gases, tritium, iodines, and radionuclides in particulate form with half-lives greater than 8 days are in compliance with 10CFR20. In all cases, the Licensee has used the highest annual average values of relative concentration (X/Q) of 4.8×10^{-5} sec/m^3 to determine the controlling locations. The Licensee's approach of using the MPC values meets the dose rate design objectives per the Licensee's RETS 3.24.5.1 and the intent of NUREG-0133 on the requirement of 10CFR20.

Evaluation of the cumulative dose is to ensure that the quarterly and annual dose design objectives specified in RETS are not exceeded.

For liquid releases, the Licensee has identified drinking water and fish consumption as the two viable pathways. In the calculation, the Licensee has used a dispersion factor of 1000 specific to the plant; all other key parameters follow the suggested values given in Regulatory Guide 1.109. The Licensee has used the maximally exposed adult individual as the reference receptor. The Licensee's approach is to convert the annual dose design objective into the curie design objective against which the compliance with 10CRF50 requirement is assessed. This approach meets the guidelines of NUREG-0133. However, a typographic error was found in the Licensee's Equation (2.5) which should read $\sum_i \frac{A_i}{C_i} \leq 0.5$ instead of $\frac{A_i}{C_i} \leq 0.5$.

Evaluation of the cumulative dose from noble gas releases includes both beta and gamma and air doses at and beyond the site boundary. The critical organs under consideration are the total body and skin for gamma and beta radiation, respectively. Again, the Licensee has used the maximum (X/Q) values as discussed earlier and has followed the methodology and parameters of NUREG-0133 and Regulatory Guide 1.109.

For tritium, iodines, and particulates with half-lives greater than 8 days, the Licensee has provided a method to demonstrate that cumulative doses calculated from the release meet both quarterly and annual design objectives. The Licensee has demonstrated a method of calculating the dose using maximum annual average (X/Q) values for the inhalation pathway and has included (D/Q) values for the ground contamination pathway, for the leafy vegetable pathway and the grass-cow-milk pathway for ingestion, for which the Licensee considered thyroid to be the critical organ for all age groups. This approach is consistent with the methodology of NUREG-0133.

Due to plant-specific reasons, the Licensee has not provided methods for monthly liquid and gaseous dose projections. The Licensee's alternative and commitment have been determined [30] to meet the intent of NUREG-0472, as discussed in Section 3.2.4 of this report.

Adequate flow diagrams defining the effluent paths and components of the radioactive liquid and gaseous waste treatment systems have been provided by the Licensee. Radiation monitors specified in the Licensee-submitted RETS are also properly identified in the flow diagrams.

The Licensee has not provided a description of sampling locations in the ODCM. The Licensee instead will continue to include maps and detailed locations in its Annual Radiolodical Environmental Operating Report. This has been determined [30] to meet the intent of NUREG-0472.

In summary, the Licensee's ODCM uses documented and approved methods that are consistent with the methodology and guidance in NUREG-0133 and is therefore an acceptable reference.

3.4 PROCESS CONTROL PROGRAM (PCP)

NUREG-0472 specifies that the Licensee develop a PCP to ensure that the processing and packaging of solid radioactive wastes will be accomplished in compliance with 10CFR20, 10CFR71, and other federal and state regulations or requirements governing the offsite disposal of the low-level radioactive waste.

The PCP is not intended to contain a set of detailed procedures; rather, it is the source of basic criteria for the detailed procedures to be developed by the Licensee. The criteria used for the PCP are to address only current NRC guidance.

3.4.1 Evaluation

The Licensee has made a commitment to process all liquid wet wastes prior to shipment offsite; has made a commitment to comply with federal regulations on shipping and packaging; has made a commitment to comply with burial ground requirement has provided general descriptions for laboratory mixing for deriving process parameters, process, and sampling for solidification; and has made a commitment for the treatment of oily wastes.

In summary, it is concluded that the Licensee complies with the current NRC criteria for PCP implementation. The acceptability of this PCP is based on currently available guidelines, but a future revision should address compliance with 10CFR61 when revised guidance becomes available.

4. CONCLUSIONS

Table 1 summarizes the results of the final review and evaluation of the RETS submittal for Palisades Plant. The evaluation was based on the Licensee's final submittal of the RETS, ODCM, and PCP [28].

The following conclusions were reached:

1. The Licensee's proposed RETS, submitted July 31, 1984 [28], meets the intent of the NRC staff's "Standard Radiological Effluent Technical Specifications," NUREG-0472, for Palisades Plant.

2. The Licensee's ODCM, submitted July 31, 1984 [28], uses documented and approved methods that are applicable to Palisades Plant and are consistent with the criteria of NUREG-0133. It is thus an acceptable reference.

3. The Licensee's PCP, submitted July 31, 1984 [28], complies with the current NRC criteria for implementing the PCP and is therefore acceptable.

Table 1. Evaluation of Proposed Radiological Effluent Technical Specifications (RETS), Palisades Plant

	Technical Specifications: NRC Staff Std. RETS NUREG-0472 (Section)*	Technical Specifications: Licensee Proposal (Section)	Replaces or Updates Existing Tech. Specs. (Section)	Evaluation
Effluent Instrumentation	3/4.3.3.3.10 3/4.3.3.3.11	3.24.1.1 3.24.2.1	4.1	Meets the intent of NRC criteria
Radioactive Effluent Concentrations	3/4.11.1.1 3/4.11.2.1	3.24.3.1 3.24.5.1	To be added to Appendix A	Meets the intent of NRC criteria
Offsite Doses	3/4.11.1.2, 3/4.11.2.2, 3/4.11.2.3, 3/4.11.4	3.24.4.1 3.24.5.2 3.24.5.3 3.24.8.1	3.9	Meets the intent of NRC criteria
Effluent Treatment	3/4.11.1.3 3/4.11.2.4	NA 3.24.6	To be added to Appendix A	Meets the intent of NRC criteria
Radioactivity Inventory Limits	3/4.11.1.4 3/4.11.2.6	NA	NA	Meets the intent of NRC criteria
Explosive Gas Mixtures	3/4.11.2.5B	NA	NA	Meets the intent of NRC criteria on an interim basis
Solid Radioactive Waste	3/4.11.3	3.24.7.1	To be added to Appendix A	Meets the intent of NRC criteria
Environmental Monitoring	3/4.12.1	4.11.1	To be added to Appendix A	Meets the intent of NRC criteria
Audits and Reviews	6.5.1, 6.5.2	6.5.2.8.1 6.5.2.8.3	6.5.2.7 6.5.2.8	Meets the intent of NRC criteria
Procedures and Records	6.8, 6.10	6.8, 6.10	6.8, 6.10	Meets the intent of NRC criteria
Reports	6.9	6.9	6.9	Meets the intent of NRC criteria
Implementation of Major Programs	6.13, 6.14, 6.15	6.18, 6.19, 6.20	To be added to Appendix A	Meets the intent of NRC criteria

*Section number sequence is according to NUREG-0472, Rev. 3, Draft 7" [12].

5. REFERENCES

1. "Radiological Effluent Technical Specifications for Pressurized Water Reactors," Rev. 2
   NRC, July 1979
   NUREG-0472

2. Title 10, Code of Federal Regulations, Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion, 'As Low As Is Reasonably Achievable,' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents"

3. Title 10, Code of Federal Regulations, Part 50, Appendix I, Section V, "Effective Dates"

4. Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation"

5. Title 40, Code of Federal Regulations, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations"

6. Title 10, Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants"

7. Title 10, Code of Federal Regulations, Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"

8. "Radiological Effluent Technical Specifications for Boiling Water Reactors," Rev. 2
   NRC, July 1979
   NUREG-0473

9. "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, A Guidance Manual for Users of Standard Technical Specifications"
   NRC, October 1978
   NUREG-0133

10. C. Willis and F. Congel (NRC)
    "Summary of Draft Contractor Guidance of RETS"
    Presented at the AIF Environmental Subcommittee Meeting, Washington, DC
    May 19, 1982

11. F. Congel (NRC)
    Memo to RAB Staff (NRC)
    Subject: Interim Changes in the Model Radiological Effluent Technical Specifications (RETS)
    August 9, 1982

12. "Radiological Effluent Technical Specifications for Pressurized Water Reactors," Rev. 3, Draft 7", intended for contractor guidance in reviewing RETS proposals for operating reactors
NRC, September 1982
NUREG-0472

13. D. P. Hoffman (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Palisades Plant - Proposed Technical Specifications Changes Related to Radiological Effluents
March 12, 1979
NRC Docket No. 50-255

14. D. A. Bixel (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Big Rock Point and Palisades Plant - Compliance with 40CFR190
November 1, 1979
NRC Docket Nos. 50-155 and 50-255

15. D. P. Hoffman (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Big Rock Point and Palisades Plants - Response to Request for Added Information on Proposed Technical Specifications Changes Related to Radiological Effluents
December 3, 1979
NRC Docket Nos. 50-155 and 50-255

16. D. P. Hoffman (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Big Rock Point and Palisades Plants - Response to Request for Added Information on Proposed Technical Specifications Changes Related to Radiological Effluents
September 14, 1979
NRC Docket Nos. 50-155 and 50-255

17. "Comparison of Specification NUREG-0472, Radiological Effluent Technical Specifications for PWRs, vs. Licensee Submittal of Radiological Effluent Technical Specifications for Palisades Plant" (Draft)
Franklin Research Center, November 18, 1981

18. Technical Review of Offsite Dose Calculation Manual for Palisades Plant (Draft)
Franklin Research Center, November 18, 1981

19. Franklin Research Center
Letter of Transmittal to NRC
Subject: Trip report on site visit to Palisades Plant
January 12, 1982

20. "Comparison of Specification NUREG-0472, Radiological Effluent Technical Specification for PWRs, vs. Licensee Submittal of Radiological Effluent Technical Specifications for Palisades Plant" (Draft Revision)
Franklin Research Center, April 1982

21. J. Daiza (Consumers Power Company)
Letter of Transmittal to FRC
Subject: RETS Submittals--RAD Waste Flow Diagrams and LLD Charts
February 3, 1982

22. J. Daiza (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Additional Information Pertaining to Radiological Effluent Technical Specifications (RETS)
June 3, 1982

23. Consumers Power Company Comments and Mark-up of the April 1982 FRC Comparison Sheets (Reference 20)
August 6, 1982

24. D. J. VandeWalle (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Palisades Plant - Radiological Effluent Technical Specifications (RETS), and Draft Offsite Dose Calculation Manuals (ODCMs)
September 29, 1982
NRC Docket Nos. 50-155 and 50-255

25. D. J. VandeWalle (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Palisades Plant - Proposed Technical Specifications Change Request Section 6, Administrative Controls
December 20, 1982
NRC Docket Nos. 50-155 and 50-255

26. F. J. Congel (NRC/RAB)
Letter of Transmittal to FRC
Subject: Palisades Plant RETS Review
July 29, 1983

27. S. Pandey/S. Chen (FRC)
Letter of Transmittal to NRC
Subject: Comparison Reports on RETS, ODCM, and PCP Submittals from Palisades Plant
September 1983

28. D. J. VandeWalle (Consumers Power Company)
Letter of Transmittal to NRC
Subject: Palisades Plant - Radiological Effluent Technical Specifications (RETS), Offsite Dose Calculation Manual (ODCM), and Process Control Program (PCP)
July 31, 1984
NRC Docket No. 50-255

29. C. Willis (NRC)
Letter to S. Pandey (FRC)
Subject: Criteria for Process Control Program
January 7, 1983

30. W. Meinke (NRC)
Memo to S. Pandey (FRC)
Subject: Resolution of Discrepancies in RETS Submittal of July 31, 1984, for Palisades Plant
August 20, 1984

31. "Comparison of Specification NUREG-0472, Radiological Effluent Technical Specifications for PWRs, vs. Licensee Final Submittal, dated July 31, 1984, of Radiological Effluent Technical Specifications for Palisades Plant"
Franklin Research Center, August 17, 1984

32. C. Willis (NRC)
Letter to S. Pandey (FRC)
Subject: Changes to RETS requirements following meeting with Atomic Industrial Forum (AIF)
November 20, 1981

33. C. Willis (NRC)
Letter to S. Pandey (FRC)
Subject: Control of explosive gas mixture in PWRs
December 18, 1981

34. C. Willis and F. Congel (NRC)
"Status of NRC Radiological Effluent Technical Specification Activities"
Presented at the AIF Conference on NEPA and Nuclear Regulations, Washington, D.C.
October 4-7, 1981

35. C. Willis (NRC)
Memo to P. C. Wagner (NRC)
"Plan for Implementation of RETS for Operating Reactors"
November 4, 1981

36. W. P. Gammill (NRC)
Memo to P. C. Wagner (NRC)
"Current Position on Radiological Effluent Technical Specifications (RETS) Including Explosive Gas Controls"
October 7, 1981

37. "An Acceptable Radiological Environmental Monitoring Program"
Radiological Assessment Branch Technical Position, Revision 1
NRC, November 1979

38. W. P. Gammill and F. J. Congel (NRC)
Memo to ETSB/RAB (NRC)
"Radiological Effluent Technical Specifications (RETS) Provisions for I-133"
November 29, 1982

39. Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40CFR190)
NRC, February 1980
NUREG-0543

40. "General Contents of the Offsite Dose Calculation Manual," Revision 1
Branch Technical Position, Radiological Assessment Branch
NRC, February 8, 1979

41. "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I"
NRC, October 1977
Regulatory Guide 1.109, Rev. 1