

VYNPS

- BB. Source Check - The qualitative assessment of channel response when the channel sensor is exposed to a radioactive source.
- CC. Dose Equivalent I-131 - The dose equivalent I-131 shall be that concentration of I-131 (microcurie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in NRC Regulatory Guide 1.109, Revision 1, October 1977.
- DD. Solidification - Solidification shall be the conversion of wet wastes into a form that meets shipping and burial ground requirements. Suitable forms include dewatered resins and filter sludges.
- EE. Member(s) of the Public - Members of the public means an individual in a Controlled or Unrestricted Area. However, an individual is not a member of the public during any period in which the individual receives an occupational dose. Casual visitors, delivery people, vendors, and Vermont Yankee employees who are in Unrestricted or Controlled Areas, but not subject to occupational exposures are considered members of the public.
- FF. Site Boundary - The site boundary is shown in Figure 2.2-5 in the FSAR.
- GG. Deleted.
- HH. Unrestricted Area - An Unrestricted Area shall be any area, access to which is neither limited nor controlled by the licensee. FSAR Figure 2.2-5 indicates the unrestricted area boundaries.
- II. Off-Site Dose Calculation Manual (ODCM) - A manual containing the current methodology and parameters used in the calculation of off-site doses due to radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints, and in the conduction of the environmental radiological monitoring program.
- JJ. Restricted Area - A Restricted Area means an area, access to which is limited by Vermont Yankee, for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. A Restricted Area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a Restricted Area.
- KK. Controlled Area - A Controlled Area means an area, outside of a Restricted Area but inside the site boundary, access to which can be limited by the licensee for any reason. FSAR Figure 2.2-5 indicates the Controlled Area boundaries.

3.2 (Continued)

High radiation monitors in the main steam line tunnel have been provided to detect gross fuel failure resulting from a control rod drop accident. This instrumentation causes closure of Group 1 valves, the only valves required to close for this accident. With the established setting of 3 times normal background and main steam line isolation valve closure, fission product release is limited so that 10CFR100 limits are not exceeded for the control rod drop accident. With an alarm setting of 1.5 times normal background, the operator is alerted to possible gross fuel failure or abnormal fission product releases from failed fuel due to transient reactor operation.

Pressure instrumentation is provided which trips when main steam line pressure drops below 800 psig. A trip of this instrumentation results in closure of Group 1 isolation valves. In the refuel, shutdown, and startup modes, this trip function is provided when main steam line flow exceeds 40% of rated capacity. This function is provided primarily to provide protection against a pressure regulator malfunction which would cause the control and/or bypass valves to open, resulting in a rapid depressurization and cooldown of the reactor vessel. The 800 psig trip setpoint limits the depressurization such that no excessive vessel thermal stress occurs as a result of a pressure regulator malfunction. This setpoint was selected far enough below normal main steam line pressures to avoid spurious primary containment isolations.

Low condenser vacuum has been added as a trip of the Group 1 isolation valves to prevent release of radioactive gases from the primary coolant through condenser. The setpoint of 12 inches of mercury absolute was selected to provide sufficient margin to assure retention capability of the condenser when gas flow is stopped and sufficient margin below normal operating values.

The HPCI and/or RCIC high flow, steam supply pressure, and temperature instrumentation is provided to detect a break in the HPCI and/or RCIC piping. Tripping of this instrumentation results in actuation of HPCI and/or RCIC isolation valves, i.e., Group 6 valves. A time delay has been incorporated into the RCIC steam flow trip logic to prevent the system from inadvertently isolating due to pressure spikes which may occur on startup. The trip settings are such that core uncovering is prevented and fission product release is within limits.

The instrumentation which initiates ECCS action is arranged in a dual channel system. Permanently installed circuits and equipment may be used to trip instrument channels. In the nonfail safe systems which require energizing the circuitry, tripping an instrument channel may take the form of providing the required relay function by use of permanently installed circuits. This is accomplished in some cases by closing logic circuits with the aid of the permanently installed test jacks or other circuitry which would be installed for this purpose.

3.8 LIMITING CONDITIONS FOR OPERATION

3.8 RADIOACTIVE EFFLUENTSApplicability

Applies to the release of all radioactive effluents from the plant.

Objective

To assure that radioactive effluents are kept "as low as is reasonably achievable" in accordance with 10CFR50, Appendix I and, in any event, are within the dose limits for Member(s) of the Public specified in 10CFR20.

SpecificationA. Liquid Effluents: Concentration

1. The concentration of radioactive material in liquid effluents released to Unrestricted Areas shall be limited to 10 times the concentrations specified in Appendix B, to 10CFR Part 20.1001 - 20.2401, Table 2, Column 2, for radionuclides other than noble gases, and 2×10^{-4} uCi/ml total activity concentration for all dissolved or entrained noble gases.

4.8 SURVEILLANCE REQUIREMENTS

4.8 RADIOACTIVE EFFLUENTSApplicability

Applies to the required surveillance of all radioactive effluents released from the plant.

Objective

To ascertain that all radioactive effluents released from the plant are kept "as low as is reasonably achievable" in accordance with 10CFR50, Appendix I and, in any event, are within the dose limits for Member(s) of the Public specified in 10CFR20.

SpecificationsA. Liquid Effluents: Concentration

1. Radioactive material in liquid waste shall be sampled and analyzed in accordance with requirements of Table 4.8.1. The results of the analyses shall be used in accordance with the methods in the ODCM to assure that the concentrations at the point of release to Unrestricted Areas are limited to the values in Specification 3.8.A.1.

3.8 LIMITING CONDITIONS FOR OPERATION

2. With the concentration of radioactive material in liquid effluents released to Unrestricted Areas exceeding the limits of Specification 3.8.A.1, immediately take action to decrease the release rate of radioactive materials and/or increase the dilution flow rate to restore the concentration to within the above limits.

B. Liquid Effluents: Dose

1. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to Unrestricted Areas shall be limited to the following:
 - a. During any calendar quarter:
 - less than or equal to 1.5 mrem to the total body, and
 - less than or equal to 5 mrem to any organ, and
 - b. During any calendar year:
 - less than or equal to 3 mrem to the total body, and
 - less than or equal to 10 mrem to any organ.

4.8 SURVEILLANCE REQUIREMENTS

B. Liquid Effluents: Dose

1. Cumulative dose contributions shall be determined in accordance with the methods in the ODCM at least once per month if releases during the period have occurred.

3.8 LIMITING CONDITIONS FOR OPERATION

C. Liquid Radwaste Treatment

1. The liquid radwaste treatment system shall be used in its designed modes of operation to reduce the radioactive materials in the liquid waste prior to its discharge when the estimated doses due to the liquid effluent released to Unrestricted Areas, when averaged with all other liquid releases over the last month, would exceed 0.06 mrem to the total body, or 0.2 mrem to any organ.

D. Liquid Holdup Tanks

1. The quantity of radioactive material contained in any outside tank* shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.

4.8 SURVEILLANCE REQUIREMENTS

C. Liquid Radwaste Treatment

1. See Specification 4.8.B.1.

D. Liquid Holdup Tanks

1. The quantity of radioactive material contained in each of the liquid holdup tanks* shall be determined to be within the limits of Specification 3.8.D.1 by analyzing a representative sample of the tank's contents within one week following the addition of radioactive materials to the tank. One sample may cover multiple additions.

*NOTE: Tanks included in this Specification are only those outdoor tanks that are not surrounded by liners, dikes, or walls capable of holding the tank's contents, or that do not have tank overflows and surrounding area drains connected to the liquid radwaste treatment system.

3.8 LIMITING CONDITIONS FOR OPERATION

3. With the gross radioactivity release rate at the SJAE greater than or equal to 1.5 Ci/sec (after 30-minute decay), restore the gross radioactivity release rate to less than 1.5 Ci/sec (after 30-minute decay), or be in Hot Standby within 12 hours.

L. Primary Containment

1. If the primary containment is to be Vented/Purged, it shall be Vented/Purged through the Standby Gas Treatment System whenever the airborne radioactivity levels in containment of Iodine-131, Iodine-133 or radionuclides in particulate form with half-lives greater than 8 days exceed the levels specified in Appendix B to 10CFR20.1001 - 20.2401, Table 1, Column 3.
2. With the requirements of Specification 3.8.L.1 not satisfied, immediately suspend all Venting/Purging of the containment.
3. During normal refueling and maintenance outages when primary containment is no longer required, then Specification 3.8.G shall supersede Specifications 3.8.L.1 and 2.

4.8 SURVEILLANCE REQUIREMENTS

- b. Within 4 hours following an increase of 25% or 5000 microcuries/sec, whichever is greater, in steady-state activity levels during steady-state reactor operation, as indicated by the SJAE monitor.

L. Primary Containment

1. The primary containment shall be sampled prior to venting/purging per Table 4.8.2, and if the results indicate radioactivity levels in excess of the limits of Specification 3.8.L.1, the containment shall be aligned for venting/purging through the Standby Gas Treatment System. No sampling shall be required if the venting/purging is through the Standby Gas Treatment (SBGT) System.

3.8 LIMITING CONDITIONS FOR OPERATION

M. Total Dose (40CFR190)

1. The dose or dose commitment to a member of the public* in areas at and beyond the Site Boundary from all station sources is limited to less than or equal to 25 mrem to the total body or any organ (except the thyroid, which is limited to less than or equal to 75 mrem) over a calendar year.
2. With the calculated dose from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Specifications 3.8.B.1.a, 3.8.B.1.b, 3.8.F.1.a, 3.8.F.1.b, 3.8.G.1.a, or 3.8.G.1.b, calculations should be made, including direct radiation contributions from the station to determine whether the above limits of Specification 3.8.M.1 have been exceeded.

4.8 SURVEILLANCE REQUIREMENTS

M. Total Dose

1. Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Specifications 4.8.B.1, 4.8.F.1, and 4.8.G.1.
2. Cumulative dose contributions from direct radiation from plant sources shall be determined in accordance with the methods in the ODCM. This requirement is applicable only under conditions set forth in Specification 3.8.M.2.

*NOTE: For this Specification a Member of the Public may be taken as a real individual accounting for his actual activities.

TABLE 4.8.1
(continued)

TABLE NOTATION

Typical values of E, V, Y and At can be used in the calculation. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples.

Analysis shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally, background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unavailable.

It should be recognized that the LLD is defined as a "before the fact" limit representing the capability of a measurement system and not as an "after the fact" limit for a particular measurement. This does not preclude the calculation of an "after the fact" LLD for a particular measurement based upon the actual parameters for the sample in question and appropriate decay correction parameters such as decay while sampling and during analysis.

- b. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analysis, each batch shall be isolated and then thoroughly mixed to assure representative sampling.
- c. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.
- d. The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below the LLD for the analyses should not be reported as being present at the LLD level, but as "not detected". When unusual circumstances result in LLDs higher than required, the reasons shall be documented in the Annual Radioactive Effluent Release Report.

TABLE 4.8.2

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

<u>Gaseous Release Type</u>	<u>Sampling Frequency</u>	<u>Minimum Analysis Frequency</u>	<u>Type of Activity Analysis</u>	<u>Lower Limit of Detection (LLD) (uCi/ml)^a</u>
A. Steam Jet Air Ejector	Once per week Grab Sample	Once per week	Xe-138, Xe-135, Xe-133, Kr-88, Kr-87, Kr-85M	1×10^{-4}
B. Containment Purge	Prior to each release Each Purge Grab Sample	Prior to each release Each Purge Grab Sample for Particulates	Principal Gamma Emitters ^{d, g} and I-131	1×10^{-9} (g)
C. Main Plant Stack	Once per month ^c Grab Sample	Once per month ^c	Principal Gamma Emitters ^d	1×10^{-4}
			H-3	1×10^{-6}
	Continuous ^e	Once per week ^b Charcoal Sample	I-131 ^f	1×10^{-12}
	Continuous ^e	Once per week ^b Particulate Sample	Principal Gamma Emitters ^{d, g} and I-131	1×10^{-11}
	Continuous ^e	Once per month Composite Particulate Sample	Gross Alpha	1×10^{-11}

TABLE 4.8.2
(continued)

TABLE NOTATION

- a. See footnote a. of Table 4.8.1.
- b. Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours after removal from samplers. Sampling shall also be performed at least once per 24 hours for at least 7 days following each shutdown, startup, or thermal power change exceeding 25% of rated thermal power in one hour, and analyses shall be completed within 48 hours of changing the samples. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10. This requirement to sample at least once per 24 hours for 7 days applies only if: (1) analysis shows that the dose equivalent I-131 concentration in the primary coolant has increased more than a factor of 3 and the resultant concentration is at least 1×10^{-1} uCi/ml; and (2) the noble gas monitor shows that effluent activity has increased more than a factor of 3.
- c. Sampling and analyses shall also be performed following shutdown, startup, or a thermal power change exceeding 25% of rated thermal power per hour unless: (1) analysis shows that the dose equivalent I-131 concentration in the primary coolant has not increased more than a factor of 3 and the resultant concentration is at least 1×10^{-1} uCi/ml; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.
- d. The principal gamma emitters for which the LLD specification will apply are exclusively the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135 and Xe-138 for gaseous emissions, and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below LLD for the analyses should not be reported as being present at the LLD level for that nuclide, but as "not detected". When unusual circumstances result in LLDs higher than required, the reasons shall be documented in the Annual Radioactive Effluent Release Report.
- e. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Specifications 3.8.E.1, 3.8.F.1 and 3.8.G.1.

TABLE 4.8.2
(continued)

TABLE NOTATION

- f. The gaseous waste sampling and analysis program does not explicitly require sampling and analysis at a specified LLD to determine the I-133 release. Estimates of I-133 releases shall be determined by counting the weekly charcoal sample for I-133 (as well as I-131) and assume a constant release rate for the release period.
- g. Lower Limit of Detection (LLD) applies only to particulate form radionuclides identified in Table Notation d. above.

BASES:

3.8 RADIOACTIVE EFFLUENTS

A. Liquid Effluents: Concentration

This specification is provided to ensure that at any time the concentration of radioactive materials released in liquid waste effluents from the site above background (Unrestricted Area for liquids is at the point of discharge from the plant discharge into Connecticut River) will not exceed 10 times the concentration levels specified in 10CFR Part 20.1001-20.2401, Appendix B, Table 2, Column 2. These requirements provide operational flexibility, compatible with considerations of health and safety, which may temporarily result in releases higher than the absolute value of the concentration numbers in Appendix B, but still within the annual average limitation of the Regulation. Compliance with the design objective doses of Section II.A of Appendix I to 10CFR Part 50 assure that doses are maintained ALARA, and that annual concentration limits of Appendix B to 10CFR20.1001-20.2401 will not be exceeded.

The concentration limit for noble gases is based upon the assumption that Xe-135 is the controlling radionuclide and that an effluent concentration in air (submersion dose equal to 500 mrem/yr) was converted to an equivalent concentration in water.

B. Liquid Effluents: Dose

This specification is provided to implement the requirements of Sections II.A, III.A, and IV.A of Appendix I, 10CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.A of Appendix I. The requirements provide operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents will be kept "as low as is reasonably achievable". These Surveillance Requirements implement the requirements in Section III.A of Appendix I, i.e., that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. In addition,

3.8 (Continued)

there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in potable drinking water that are in excess of the requirements of 40CFR 141. No drinking water supplies drawn from the Connecticut River below the plant have been identified. The appropriate dose equations for implementation through requirements of the Specification are described in the Vermont Yankee Off-Site Dose Calculation Manual. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents were developed from the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR 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", Revision 1, April 1977.

C. Liquid Radwaste Treatment

The requirement that the appropriate portions of this system as indicated in the ODCM be used, when specified, provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable". The specification implements the requirements of 10CFR Part 50.36a and the design objective given in Section II.D of Appendix I to 10CFR Part 50. The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10CFR Part 50, for liquid effluents.

D. Liquid Holdup Tanks

The tanks listed in this Specification include all outdoor tanks that contain radioactivity that are not surrounded by liners, dikes, or walls capable of holding the tank contents, or that do not have tank overflows and surrounding area drains connected to the liquid radwaste treatment system.

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting concentrations would be less than 10 times the limits of 10CFR Part 20.1001-20.2401, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an Unrestricted Area.

3.8 (Continued)

E. Gaseous Effluents: Dose Rate

The specified limits as determined by the methodology in the ODCM, 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 (500) mrem/year to the total body or to (3,000) mrem/year to the skin. This instantaneous dose rate limit allows for operational flexibility when off normal occurrences may temporarily increase gaseous effluent release rates from the plant, while still providing controls to ensure that licensee meets the dose objectives of Appendix I to 10CFR50.

Specification 3.8.E.b also restricts, at all times, comparable with the length of the sampling periods of Table 4.8.2, the corresponding thyroid dose rate above background to an infant via the cow-milk-infant pathway to 1500 mrem/year for the highest impacted cow to the plant.

F. Gaseous Effluents: Dose from Noble Gases

This specification is provided to implement the requirements of Sections II.B, III.A, and IV.A of Appendix I, 10CFR Part 50. The Limiting Conditions for Operation implements the guides set forth in Section II.B of Appendix I. the requirements provide operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable". The Surveillance Requirements implement the requirements in Section III.A of Appendix I, i.e., that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of any member of the public through appropriate pathways is unlikely to be substantially underestimated. The appropriate dose equations are specified in the ODCM for calculating the doses due to the actual releases of radioactive noble gases in gaseous effluents. The ODCM also provides for determining the air doses at the site boundary based upon the historical average atmospheric conditions.

3.8 (Continued)

L. Primary Containment (MARK I)

This specification provides reasonable assurance that releases from containment purging/venting operations will be filtered through the Standby Gas Treatment System (SBGT) so that the annual dose limits of 10CFR Part 20 for members of the public in areas at and beyond the Site Boundary will not be exceeded. The dose objectives of Specification 3.8.G restrict purge/venting operations when the Standby Gas Treatment System is not in use and gives reasonable assurance that all releases from the plant will be kept "as low as is reasonably achievable". The specification requires the use of SBGT only when Iodine-131, Iodine-133 or radionuclides in particulate form with half-lives greater than 8 days in containment exceeds the levels in Table 1, Column 3, to Appendix B of 10CFR 20.1001-20.2401 since the filter system is not considered effective in reducing noble gas radioactivity from gas streams.

M. Total Dose (40CFR190)

This specification is provided to meet the dose limitations of 40CFR Part 190 to Member(s) of the Public in areas at and beyond the Site Boundary. The specification requires the preparation and submittal of a Specific Report whenever the calculated doses from plant radioactive effluents exceed twice the design objective doses of Appendix I. For sites containing up to 4 reactors, it is highly unlikely that the resultant dose to a member of the public will exceed the dose limits of 40CFR Part 190 if the individual reactors remain within the reporting requirement level. The Special Report will describe a course of action that should result in the limitation of the annual dose to a member of the public to within the 40CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the member of the public is estimated to exceed the requirements of 40CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40CFR Part 190 have not already been corrected), in accordance with the provisions of 40CFR Part 190.11 and 10CFR Part 20.2203(a)(4), is considered to be a timely request and fulfills the requirements of 40CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40CFR Part 190, and does not apply in any way to the other requirements or dose limitations of 10CFR Part 20. 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 subjects them to occupational exposures. For individuals in controlled areas who are considered Members of the Public per 10CFR20, the dose limits of 10CFR20.1301 apply since the licensee has the authority to control and limit access to these areas.

N. Solid Radioactive Waste

This specification implements the requirements of 10CFR Part 50.36a with respect to the handling of solid radioactive waste (spent resin and filter sludges only). The establishment and implementation of a Process Control Program (PCP), provides the operational guidelines by which proper dewatering of filter media and spent resins in preparation for off-site disposal is assured.

TABLE 3.9.1
(continued)

TABLE NOTATION

- NOTE 1 - With the number of channels operable less than required by the minimum channels operable requirement, effluent releases may continue provided that prior to initiating a release:
- At least two independent samples are analyzed in accordance with Specification 4.8.A.1, and
 - At least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge line venting.
- Otherwise, suspend release of radioactive effluents via this pathway.
- NOTE 2 - 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.
- NOTE 3 - 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 may be used to estimate flow.
- NOTE 4 - With the number of channels operable less than required by the minimum channels operable requirement, exert reasonable efforts to return the instrument(s) to operable status prior to the next release.
- NOTE 5 - The alarm setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in the Off-Site Dose Calculation Manual (ODCM). With a radioactive liquid effluent monitoring instrumentation channel alarm setpoint less conservative than a value which will ensure that the limits of 3.8.A.1 are met during periods of release, immediately take action to suspend the release of radioactive liquid effluents monitored by the affected channel or declare the channel inoperable; or change the setpoint so it is acceptably conservative.

TABLE 3.9.3
(continued)

TABLE NOTATION

- a Specific parameters of distance and direction sector from the centerline of the reactor and additional descriptions where pertinent, shall be provided for each and every sample location in Table 3.9.3 in a table and figure(s) in the ODCM. 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 reasonable 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 Surveillance Report pursuant to Specification 6.7.C.3. 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. In lieu of a Licensee Event Report and pursuant to Specification 6.7.C.1, identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining replacement samples in the next Annual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).
- 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 in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation. The 40 stations is not an absolute number. The frequency of analysis or readout for TLD systems will depend upon the characteristics of the specific system used and should be selected to obtain optimum dose information with minimal fading.
- c 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.

TABLE 4.9.1
(continued)

TABLE NOTATION

- (1) The Instrument Calibration for radioactivity measurement instrumentation shall include the use of a known (traceable to National Institute for Standards and Technology) liquid radioactive source positioned in a reproducible geometry with respect to the sensor. These standards shall permit calibrating the system over its normal operating range of energy and rate.
- (2) The Instrument Functional Test shall also demonstrate the Control Room alarm annunciation occurs if any of the following conditions exists:
 - (a) Instrument indicate measured levels above the alarm setpoint.
 - (b) Circuit failure.
 - (c) Instrument indicates a downscale failure.
 - (d) Instrument controls not set in operate mode.
- (3) The alarm setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in the Off-Site Dose Calculation Manual (ODCM).

TABLE 4.9.2
(continued)

TABLE NOTATION

- (1) The Instrument Functional Test shall also demonstrate the automatic isolation of this pathway and the Control Room alarm annunciation occurs if any of the following conditions exists:
 - (a) Instrument indicate measured levels above the alarm setpoint.
 - (b) Circuit failure.
 - (c) Instrument indicates a downscale failure.
 - (d) Instrument controls not set in operate mode.
- (2) The Instrument Functional Test shall also demonstrate that Control Room alarm annunciation occurs when any of the following conditions exist:
 - (a) Instrument indicate measured levels above the alarm setpoint.
 - (b) Circuit failure.
 - (c) Instrument indicates a downscale failure.
 - (d) Instrument controls are not set in operate mode.
- (3) The Instrument Calibration for radioactivity measurement instrumentation shall include the use of a known (traceable to National Institute for Standards and Technology) radioactive source positioned in a reproducible geometry with respect to the sensor. These standards should permit calibrating the system over its normal operating range of rate capabilities.
- (4) The Instrument Calibration shall include the use of standard gas samples (high range and low range) containing suitable concentrations, hydrogen balance nitrogen, for the detection range of interest per Specification 3.8.J.1.

BASES:

3.9 RADIOACTIVE EFFLUENT MONITORING SYSTEMSA. Liquid Effluent Instrumentation

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm setpoints for these instruments are to ensure that the alarm will occur prior to exceeding 10 times the concentration limits of Appendix B to 10CFR20.1001 - 20.2401, Table 2, Column 2 values.

Automatic isolation function is not provided on the liquid radwaste discharge line due to the infrequent nature of batch, discrete volume, liquid discharges (on the order of once per year or less), and the administrative controls provided to ensure that conservative discharge flow rates/dilution flows are set such that the probability of exceeding the above concentration limits are low, and the potential off-site dose consequences are also low.

B. Gaseous Effluent Instrumentation

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments are provided to ensure that the alarm/trip will occur prior to exceeding design bases dose rates identified in 3.8.E.1. This instrumentation also includes provisions for monitoring (and controlling) the concentrations of potentially explosive gas mixtures in the waste gas holdup system.

5.0 DESIGN FEATURES5.1 Site

The station is located on the property on the west bank of the Connecticut River in the Town of Vernon, Vermont, which the Vermont Yankee Nuclear Power Corporation either owns or to which it has perpetual rights and easements. The site plan showing the exclusion area boundary, boundary for gaseous effluents, and boundary for liquid effluents, as well as areas defined per 10CFR20 as "controlled areas" and "unrestricted areas" are on Figure 2.2-5 of the FSAR. The minimum distance to the boundary of the exclusion area as defined in 10CFR100.3 is 910 feet.

No part of the site shall be sold or leased and no structure shall be located on the site except structures owned by the Vermont Yankee Nuclear Power Corporation or related utility companies and used in conjunction with normal utility operations.

5.2 Reactor

- A. The core shall consist of not more than 368 fuel assemblies.
- B. The reactor core shall contain 89 cruciform-shaped control rods. The control material shall be boron carbide powder (B_4C) or hafnium, or a combination of the two.

5.3 Reactor Vessel

The reactor vessel shall be as described in Table 4.2-3 of the FSAR. The applicable design codes shall be as described in subsection 4.2 of the FSAR.

5.4 Containment

- A. The principal design parameters and applicable design codes for the primary containment shall be as given in Table 5.2.1 of the FSAR.
- B. The secondary containment shall be as described in subsection 5.3 of the FSAR and the applicable codes shall be as described in Section 12.0 of the FSAR.
- C. Penetrations to the primary containment and piping passing through such penetrations shall be designed in accordance with standards set forth in subsection 5.2 of the FSAR.

- B. Radiation control standards and procedures shall be prepared, approved and maintained and made available to all station personnel. These procedures shall show permissible radiation exposure, and shall be consistent with the requirements of 10 CFR Part 20. This radiation protection program shall be organized to meet the requirements of 10 CFR Part 20.
1. Paragraph 20.1601, "Control of Access to High Radiation Areas". In lieu of the "control device" or "alarm signal" required by Paragraph 20.1601(a)(1), each high radiation area in which the intensity of radiation is greater than 100 mrem/hr at 30 cm, but less than 1000 mrem/hr at 30 cm, shall be barricaded and conspicuously posted as a high radiation area, and entrance thereto shall be controlled by requiring issuance of a Radiation Work Permit.* Any individual or group of individuals permitted to enter such areas shall be provided with one or more of the following:
- a. A radiation monitoring device which continuously indicates the radiation dose rate in the area.
 - b. A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate levels in the area have been established and personnel have been made knowledgeable of them.
 - c. A Health Physics qualified individual (i.e., qualified in radiation protection procedures) with a radiation dose rate monitoring device who is responsible for providing positive control over the activities within the area and who will perform periodic radiation surveillance at the frequency specified in the RWP. The surveillance frequency will be established by the Plant Health Physicist.

The above procedure shall also apply to each high radiation area in which the intensity of radiation is greater than 1000 mrem/hr at 30 cm, but less than 500 rad/hr at 1 meter. In addition, locked doors shall be provided to prevent unauthorized entry into such areas and the keys shall be maintained under the administrative control of the Shift Supervisor on duty and/or the Radiation Protection Manager.

*Health Physics personnel shall be exempt from the RWP issuance requirement during the performance of their assigned radiation protection duties, providing they are following plant radiation protection procedures for entry into high radiation areas.

6.6 PLANT OPERATING RECORDS

- A. Records and/or logs relative to the following items shall be kept in a manner convenient for review and shall be retained for at least five years:
1. Records of normal plant operation, including power levels and periods of operation at each power level.
 2. Records of principal maintenance activities, including inspection and repair or principal items of equipment pertaining to nuclear safety.
 3. Records of reportable occurrences.
 4. Records of periodic checks, inspection and/or calibrations performed to verify that surveillance requirements are being met.
 5. Records of any special reactor test or experiments.
 6. Records of changes made in the Operating Procedures.
 7. Test results, in units of microcuries, for leak tests performed on licensed sealed sources.
 8. Results of annual physical inventory verifying accountability of licensed sources on record.
- B. Records and/or logs relative to the following items shall be recorded in a manner convenient for review and shall be retained for the life of the plant:
1. Records of substitution or replacement of principal items of equipment pertaining to nuclear safety.
 2. Records of changes and drawing changes made to the plant as it is described in the Safety Analysis Report.
 3. Records of plant radiation and contamination surveys.
 4. Records of new and spent fuel inventory, transfers of fuel, and assembly histories.
 5. Records of radioactivity in liquid and gaseous wastes released to the environment.
 6. Records of radiation exposure for all plant personnel, including all contractors and visitors to the plant for whom monitoring was required in accordance with 10 CFR 20.

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7. Records of transient or operational cycling for those plant components that have been designed to operate safely for a limited number of transients or operational cycles.
8. Records of inservice inspections of the reactor coolant system.
9. Minutes of meetings of the Plant Operation Review Committee and the Nuclear Safety Audit and Review Board.
10. Records for Environmental Qualification which are covered under the provisions of paragraph 6.9.
11. Records of analysis required by the Radiological Environmental Monitoring Program.
12. Records of radioactive shipments.

2. Annual Report

An annual report covering the previous calendar year shall be submitted prior to March 1 of each year. The annual report shall include a tabulation on an annual basis of the number of station, utility and other personnel (including contractors) receiving exposures greater than 100 mrem/yr and their associated man-rem exposure according to work and job functions, ^{1/} e.g., reactor operations and surveillance, inservice inspection, routine maintenance, special maintenance (describe maintenance), waste processing, and refueling. The dose assignment to various duty functions may be estimates based on Self-Reading Dosimeter (SRD), TLD or film badge measurement. Small exposures totaling less than 20% of the individual total dose need not be accounted for. In the aggregate, at least 80% of the total whole body dose received from external sources shall be assigned to specific major work functions.

3. Monthly Statistical Report

Routine reports of operating statistics and shutdown experience shall be submitted on a monthly basis to the Office of Management Information and Program Control, U.S. Nuclear Regulatory Commission, Washington, D.C. 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. These reports shall include a narrative summary of operating experience during the report period which describes the operation of the facility.

4. Core Operating Limits Report

The core operating limits shall be established and documented in the Core Operating Limits Report (COLR) before each reload cycle or any remaining part of a reload cycle for the following: (a) The Average Planar Linear Heat Generation Rates (APLHGR) for Specifications 3.11.A and 3.6.G.1a, (b) The K_{eff} core flow adjustment factor for Specification 3.11.C., (c) The Minimum Critical Power Ratio (MCPR) for Specifications 3.11.C and 3.6.G.1a, and (d) The Linear Heat Generation Rates (LHGR) for Specifications 2.1.A.1a, 2.1.B.1, and 3.11.B. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC in:

Report, E. E. Pilat, "Methods for the Analysis of Boiling Water Reactors Lattice Physics," YAE-1232, December 1980 (Approved by NRC SER, dated September 15, 1982).

Report, D. M. VerPlanck, "Methods for the Analysis of Boiling Water Reactors Steady State Core Physics," YAE-1238, March 1981 (Approved by NRC, SER, dated September 15, 1982).

^{1/} This tabulation supplements the requirements of 20.2206 of 10CFR Part 20.

C. Unique Reporting Requirements1. Annual Radioactive Effluent Release Report

- a. Within 90 days after January 1 of each year, a report shall be submitted covering the radioactive content of effluents released to unrestricted areas during the previous calendar year of operation.
- b. The Annual Radioactive Effluent Release Report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, Revision 1, June 1974, "Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants", with data summarized on a quarterly basis following the format of Appendix B thereof. For solid wastes the format for Table 3 in Appendix B of Regulatory Guide 1.21 shall be supplemented with three additional categories: class of solid wastes (as defined by 10CFR Part 61), type of container (e.g., LSA, Type A, Type B, Large Quantity), and solidification agent or absorbent, if any.

In addition, the Annual Radioactive Effluent Release Report shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.* This same report (or a supplement to it to be submitted within 180 days of January 1 each year) shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit during the previous calendar year. The Annual Radioactive Effluent Release Report (or supplemental dose report) shall also include an assessment of the radiation doses from radioactive effluents to

*In lieu of submission with the Annual Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data in a file that shall be provided to the NRC upon request.

member(s) of the public due to any allowed recreational activities inside the site boundary during the previous calendar year. All assumptions used in making these assessments (e.g., specific activity, exposure time and location) shall be included in these reports. For any batch or discrete gas volume releases, the meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents (as determined by sampling frequency and measurement) shall be used for determining the gaseous pathway doses. For radioactive materials released in continuous effluent streams, quarterly average meteorological conditions concurrent with the quarterly release period shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the Off-Site Dose Calculation Manual (ODCM).

With the limits of Specification 3.8.M.1 being exceeded during the calendar year, the Annual Radioactive Effluent Release Report (or supplemental dose report) shall also include an assessment of radiation doses to the likely most exposed real member(s) of the public from reactor releases (including doses from primary effluent pathways and direct radiation) for the previous calendar year to show conformance with 40CFR190, Environmental Radiation Protection Standards for Nuclear Power Operation.

The Annual Radioactive Effluent Release Report shall include a list and description of unplanned releases from the site to site boundary of radioactive materials in gaseous and liquid effluents made during the reporting period.

With the quantity of radioactive material in any outside tank exceeding the limit of Specification 3.8.D.1, describe the events leading to this condition in the next Annual Radioactive Effluent Release Report.

If inoperable radioactive liquid effluent monitoring instrumentation is not returned to operable status prior to the next release pursuant to Note 4 of Table 3.9.1, explain in the next Annual Radioactive Effluent Release Report the reason(s) for delay in correcting the inoperability.

If inoperable gaseous effluent monitoring instrumentation is not returned to operable status within 30 days pursuant to Note 5 of Table 3.9.2, explain in the next Annual Radioactive Effluent Release Report the reason(s) for delay in correcting the inoperability.

With milk samples no longer available from one or more of the sample locations required by Table 3.9.3, identify the cause(s) of the sample(s) no longer being available, identify the new location(s) for obtaining available replacement samples, and include revised ODCM figure(s) and table(s) reflecting the new location(s) in the next Annual Radioactive Effluent Release Report.

With a land use census identifying one or more locations which yield at least a 20 percent greater dose or dose commitment than the values currently being calculated in Specification 4.8.G.1, identify the new location(s) in the next Annual Radioactive Effluent Release Report.

Changes made during the reporting period to the Process Control Program (PCP) and to the Off-Site Dose Calculation Manual (ODCM), shall be identified in the next Annual Radioactive Effluent Release Report.

2. Special Reports

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

a. Liquid Effluents, Specifications 3.8.B and 3.8.C.

With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the limits of Specification 3.8.B.1, prepare and submit to the Commission within 30 days a special report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions taken to assure that subsequent releases will be in compliance with the limits of Specification 3.8.B.1.

With liquid radwaste being discharged without processing through appropriate treatment systems and estimated doses in excess of Specification 3.8.C.1, prepare and submit to the Commission within 30 days a special report which includes the following information:

- (1) explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reasons for the inoperability;

c. Total Dose, Specification 3.8.M.

With the calculated dose from the release of radioactive materials in liquid or gaseous effluents exceeding the limits of Specification 3.8.M, prepare and submit to the Commission within 30 days a special report which defines the corrective action(s) to be taken to reduce subsequent releases to prevent recurrence of exceeding the limits of Specification 3.8.M and includes the schedule for achieving conformance with these limits. This special report, required by 10CFR Part 20.2203(a)(4), shall include an analysis that estimates the radiation exposure (dose) to a member of the public from station 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 doses exceed any of the limits of Specification 3.8.M, and if the release condition resulting in violation of 40CFR Part 190 has not already been corrected, the special report shall include a request for a variance in accordance with the provisions of 40CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

d. Radiological Environmental Monitoring, Specification 3.9.C.

With the level of radioactivity as the result of plant effluents in an environmental sampling media at one or more of the locations specified in Table 3.9.3 exceeding the reporting levels of Table 3.9.4, prepare and submit to the Commission within 30 days from the receipt of the Laboratory Analyses a special report which includes an evaluation of any release conditions, environmental factors or other factors which caused the limits of Table 3.9.4 to be exceeded. This report is not required if the measured level of radioactivity was not the result of plant effluents, however, in such an event, the condition shall be reported and described in the annual Radiological Environmental Surveillance Report.

e. Land Use Census, Specification 3.9.D.

With a land use census not being conducted as required by Specification 3.9.D, prepare and submit to the Commission within 30 days a special report which identifies the reasons why the survey was not conducted, and what steps are being taken to correct the situation.

1. Shall be submitted to the Commission in the Annual Radioactive Effluent Release Report for the period in which the change(s) was made. This submittal shall contain:
 - a. Sufficiently detailed information to 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 dewatered spent resins/filter media waste product to existing criteria for solid waste shipments and disposal.
 - c. Documentation of the fact that the change has been reviewed by PORC and approved by the Manager of Operations (MOO).
2. Shall become effective upon review by PORC and approval by the Manager of Operations (MOO).

6.13 OFF-SITE DOSE CALCULATION MANUAL (ODCM)

An Off-Site Dose Calculation Manual shall contain the current methodology and parameters used in the calculation of off-site doses due to radioactive gaseous and liquid effluents for the purposes of demonstrating compliance with 10CFR50, Appendix I, in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints, and in the conduct of the environmental radiological monitoring program.

A. Licensee initiated changes to the ODCM:

1. Shall be submitted to the Commission in the Annual Radioactive Effluent Release Report for the period in which the change(s) was made effective. This submittal shall contain:
 - a. Sufficient information to support the change, together with appropriate analyses or evaluations justifying the change(s), and
 - b. A determination that the change will maintain the level of radioactive effluent control required by 10CFR20.1302, 40CFR190, 10CFR50.36a, and Appendix I to 10CFR Part 50, and not adversely impact the accuracy or reliability of effluent dose, or setpoint calculations.

2. Shall become effective upon review by PORC and approved by the Manager of Operations (MOO).
3. Shall be submitted to the Commission in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Annual Radioactive Effluent Release Report for the period of the report in which any change to the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (e.g., month/year) the change was implemented.

6.14 MAJOR CHANGES TO RADIOACTIVE LIQUID, GASEOUS, AND SOLID WASTE TREATMENT SYSTEMS*

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

- A. Shall be reported to the Commission in the Annual Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the PORC. The discussion of each change shall contain:
 1. A summary of the evaluation that led to the determination that the change could be made in accordance with 10CFR Part 50.59;
 2. Sufficient detailed information to support the reason for the change without benefit of additional or supplemental information;
 3. A detailed description of the equipment, components, and processes involved and the interfaces with other plant systems;
 4. An evaluation of the change, which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the license application and amendments thereto;
 5. An evaluation of the change, which shows the expected maximum exposures to member(s) of the public at the site boundary and to the general population that differ from those previously estimated in the license application and amendments thereto;
 6. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be made;

* Licensees may choose to submit the information called for in this Specification as part of the annual FSAR update.