

PNPS
RADIOLOGICAL ENVIRONMENTAL
TECHNICAL SPECIFICATIONS
SUBMITTAL

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1.0 DEFINITIONS (Continued)

U. SURVEILLANCE FREQUENCY

Unless otherwise stated in these specifications, periodic surveillance tests, checks, calibrations, and examinations shall be performed, within the specified surveillance intervals. These intervals may be adjusted plus 25 percent. The total maximum combined interval time for any three consecutive tests shall not exceed 3.25 times the specified interval. The operating cycle interval is considered to be 18 mo and the tolerances stated above are applicable.

V. SURVEILLANCE INTERVAL

The SURVEILLANCE INTERVAL is the calendar time between surveillance tests, checks, calibrations, and examinations to be performed upon an instrument or component when it is required to be operable. These tests may be waived when the instrument, component, or system is not required to be operable, but the instrument, component, or system shall be tested prior to being declared operable.

W. FIRE SUPPRESSION WATER SYSTEM

A FIRE SUPPRESSION WATER SYSTEM shall consist of: a water source(s); gravity tank(s) or pump(s); and distribution piping with associated sectionalizing control or isolation valves. Such valves shall include hydrant post indicator valves and the first valve ahead of the water flow alarm device on each sprinkler, hose standpipe or spray system riser.

X. STAGGERED TEST BASIS

A STAGGERED TEST BASIS shall consist of: (a) a test schedule for n systems, subsystems, trains, or other designated components obtained by dividing the specified test interval into n equal subintervals; (b) the testing of one system, subsystem, train or other designated components at the beginning of each subinterval.

Y. SOURCE CHECK

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

Z. OFFSITE DOSE CALCULATION MANUAL (ODCM)

AN OFFSITE DOSE CALCULATION MANUAL (ODCM) shall be a manual containing the current methodology and parameters to be used in the calculation of offsite doses due to radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring instrumentation alarm/trip setpoints, and in the conduct of the Radiological Environmental Monitoring Program.

AA. ACTION

ACTION shall be that part of a Specification which prescribes remedial measures required under designated conditions.

BB. 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. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the site.

CC. SITE BOUNDARY*

The SITE BOUNDARY shall be that line beyond which the land is not owned, leased, or otherwise controlled by the licensee.

DD. 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 and the Pilgrim Station shorefront area used for recreational purposes.

EE. RADWASTE TREATMENT SYSTEM

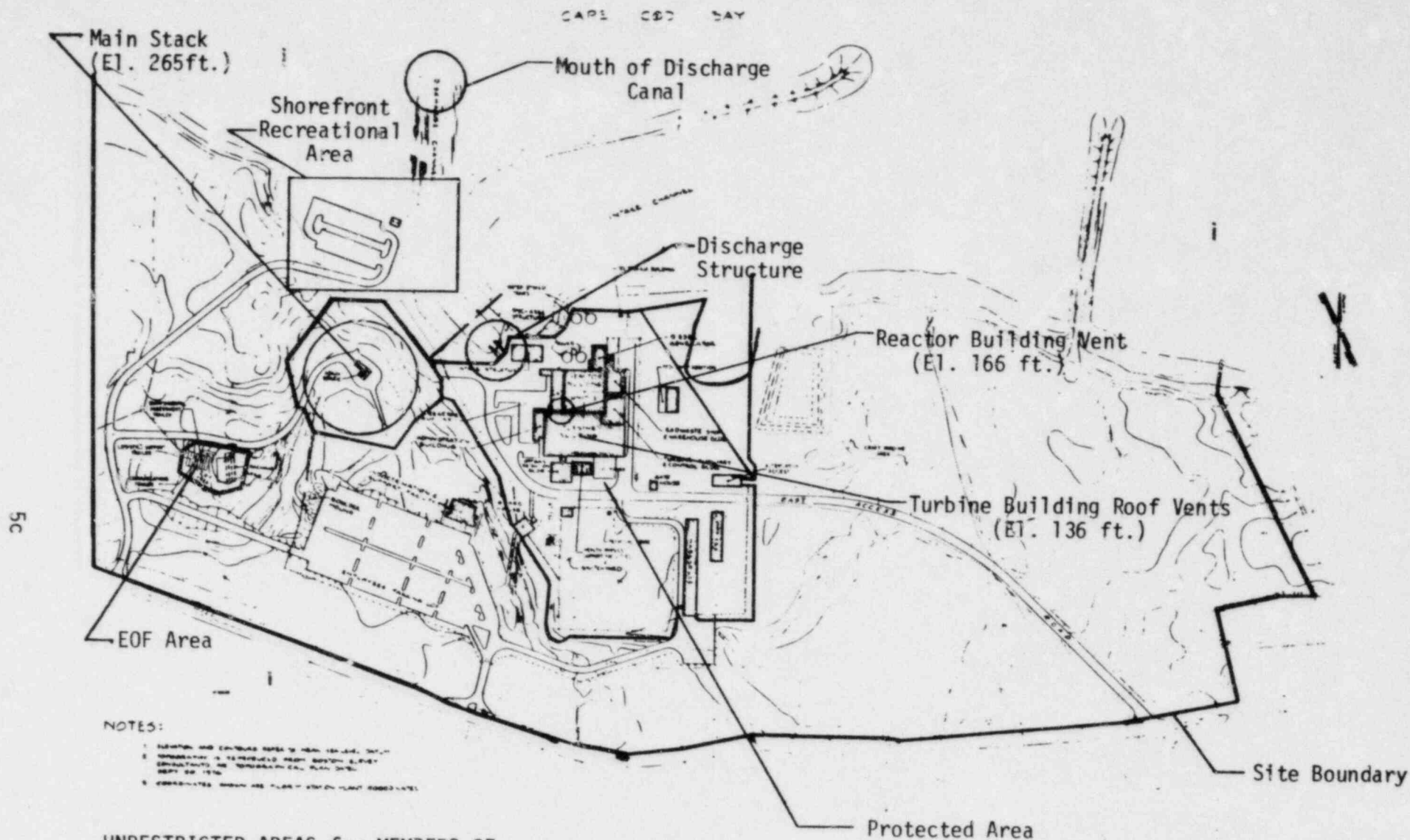
1. GASEOUS RADWASTE TREATMENT SYSTEM

The GASEOUS RADWASTE TREATMENT SYSTEM is that system identified in Figure 4.8.F.1.

2. LIQUID RADWASTE TREATMENT SYSTEM

The LIQUID RADWASTE TREATMENT SYSTEM is that system identified in Figure 4.8.C.1.

*Information regarding radioactive gaseous and liquid effluents, which allows identification of structures and release points as well as definition of UNRESTRICTED AREAS within the SITE BOUNDARY that are accessible to MEMBER OF THE PUBLIC, is as shown in Figure 1.1.



UNRESTRICTED AREAS for MEMBERS OF THE PUBLIC are the access road to and the Shorefront Recreational Area

Figure 1.1. Pilgrim Nuclear Power Station Unrestricted Areas for Liquid and Gaseous Effluents

LIMITING CONDITIONS FOR OPERATION

3.8 RADIOACTIVE EFFLUENTS

A. Liquid Effluents Concentration

Applicability

At all times.

1. The concentration of radioactive material released at any time from the site to the UNRESTRICTED AREAS 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 of individual isotopes shall be limited to 2×10^{-4} uCi/ml.

Action

With the concentration of radioactive material released from the site to UNRESTRICTED AREAS exceeding the above limits, without delay restore concentration within the above limits and provide notification to the Commission pursuant to Specification 6.9.B.1.J.

SURVEILLANCE REQUIREMENTS

4.8 RADIOACTIVE EFFLUENTS

A. Liquid Effluents Concentration

1. The radioactivity content of each batch of radioactive liquid waste to be discharged shall be determined prior to release by sampling and analysis in accordance with Table 4.8.A-1.
2. The results of pre-release analyses shall be used with calculational methods in the ODCM to assure that the concentration at the point of release is limited to the values in Specification 3.8.A.1.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

INSTRUMENTATION

3.8.B Radioactive Liquid Effluent Instrumentation

Applicability

As shown in Table 3.8.B-1.

1. The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.8.B-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.8.A.1 are not exceeded during periods when liquid wastes are being discharged.

Action

- a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than a value which will ensure that the limits of 3.8.A.1 are met, without delay suspend the release of radioactive liquid effluents monitored by the affected channel and declare the channel inoperable.
- b. With one or more radioactive liquid effluent monitoring instrumentation channels inoperable, take the ACTION shown in Table 3.8.B-1.

4.8.B Radioactive Liquid Effluent Instrumentation

1. The setpoints for monitoring instrumentation shall be determined in accordance with the ODCM.
2. Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE at the frequencies shown in Table 4.8.3-2.

TABLE 3.8.B-1

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

<u>Instrument</u>	<u>Minimum Channels Operable</u>	<u>Applicability</u>	<u>Action</u>
1. Gross Radioactivity Monitors Providing Automatic Termination of Release			
a. Liquid Radwaste Effluent Line	(1)	During actual discharge of liquid wastes	1
2. Flow Rate Measurement Devices			
a. Liquid Radwaste Effluent Line	(1)	During actual discharge of liquid wastes	2
b. Discharge Canal*	NA	During actual discharge of liquid wastes	

*Flow will be estimated based on the design flow rate of the operating Circulating Water Pumps and/or the operating Salt Service Water Pumps.

TABLE NOTATION

- ACTION 1 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may be resumed provided that prior to initiating a release:
1. At least two independent samples are analyzed in accordance with Specification 4.8.A.1, and:
 2. An independent verification of the release rate calculations is performed and,
 3. An independent verification of the discharge valving is performed.
- ACTION 2 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the minimum flow rate is verified at least once per 4 hrs during actual releases.

TABLE 4.8.A-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD) (uCi/ml)(a)
A. Batch Waste Release Tanks(e)	Each Batch	Prior to Release Each Batch	Principal Gamma Emitters(f)	$5 \times 10^{-7}(b)$
1. Neutralizer Sumps			I-131	1×10^{-6}
and			Dissolved and Entrain- ed Gases	1×10^{-5}
2. Radwaste Tanks	Composite from Each Batch	Monthly Composite(c)	H-3	$1 \times 10^{(-5)}$
			Gross alpha	1×10^{-7}
	Composite from Each Batch	Quarterly Composite(c)	Sr-89, Sr-90	$5 \times 10^{(-8)}$
			Fe-55	1×10^{-6}
B. Continuous Releases(d)				
1. Discharge Canal	Continuous Composited sample	Monthly Composite	Principal Gamma Emitters I-131 Dissolved and Entrain- ed Gases (Gamma Emitters)	5×10^{-7} 1×10^{-6} 1×10^{-5}
	Continuous Composited Sample	Quarterly Composite	H-3	5×10^{-8} 1×10^{-6}
2. Salt Service Water	Weekly grab sample	Weekly	Principal Gamma Emitters	5×10^{-7b}

4.8.A-1 (Continued)

TABLE NOTATION

- a. Refer to ODCM for LLD definition.
- b. Refer to ODCM for LLD exceptions.
- c. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.
- d. To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be collected continuously. 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.
- e. A batch release is the discharge of liquid wastes of a discrete volume.
- f. Refer to ODCM for the principal gamma emitters for which the LLD specification applies.

TABLE 4.8.B-2

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>Instrument</u>	<u>Instrument Check</u>	<u>Source Check</u>	<u>Channel Calibration</u>	<u>Channel Functional Test</u>
1. Gross Beta or Gamma Radioactivity Monitors Providing Alarm and Automatic Isolation				
a. Liquid Radwaste Effluents Line	*	N.A.	Once per operating cycle	Quarterly
2. Flow Rate Measurement Devices				
a. Liquid Radwaste Effluent Line	*	N.A.	Once per operating cycle	Quarterly

*During or prior to release via this pathway.

RADIOACTIVE EFFLUENTS3.8.C Liquid Waste TreatmentApplicability

At all times

1. The liquid radwaste treatment system shall be maintained and used to reduce the radioactive materials in liquid wastes prior to their discharge when the dose due to liquid effluent releases to UNRESTRICTED AREAS when averaged in a 31 day period would exceed 0.06 mrem to the total body or 0.20 mrem to any organ.

Action

- a. With radioactive liquid waste being discharged without treatment and in excess of the above limits, in lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, 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 reason for the inoperability.
 2. Action(s) taken to restore the inoperable equipment to OPERABLE status.
 3. Summary description of action(s) taken to prevent a recurrence.

4.8.C Liquid Waste Treatment

1. Doses due to liquid releases to UNRESTRICTED AREA shall be projected at least once per 31 day period in accordance with the ODCM.
2. The liquid radwaste treatment system schematic is shown in Figure 4.8.C.1.

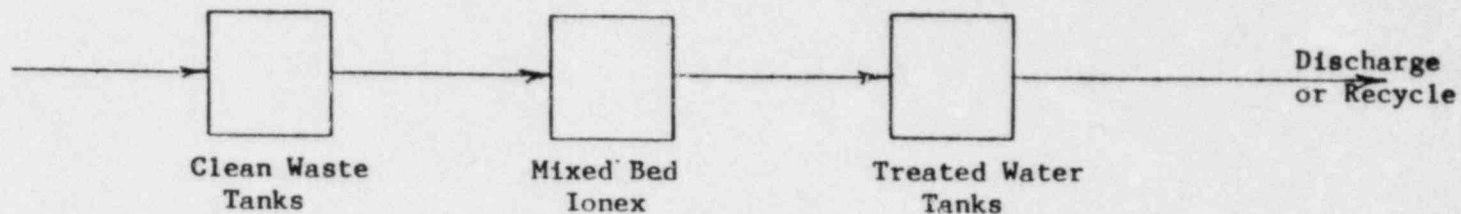
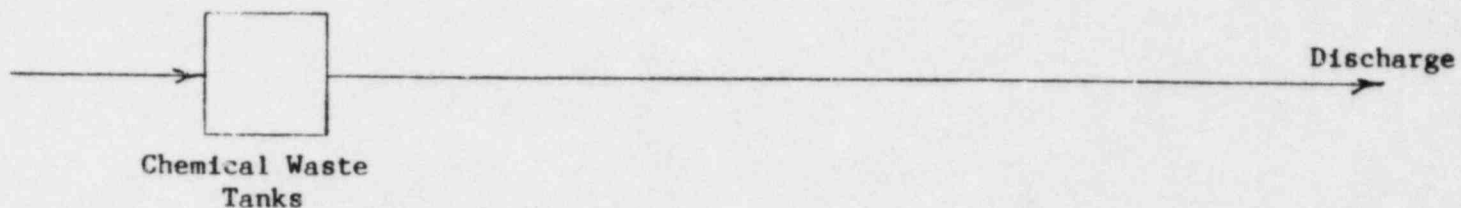
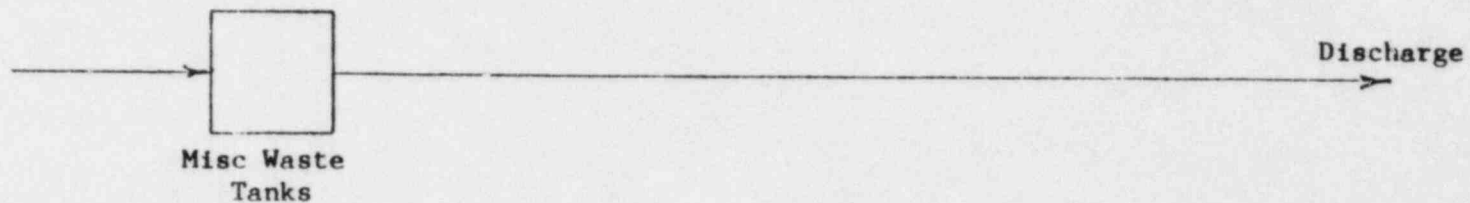
**HIGH PURITY
WASTE SYSTEM****LOW PURITY
WASTE SYSTEM****DETERGENT
WASTE SYSTEM
(Decon Areas)**

Figure 4.8.C.1. Liquid Effluent Treatment System Schematic

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

RADIOACTIVE EFFLUENTS

3.8.D Gaseous Effluents Dose Rate

Applicability

At all times.

1. The instantaneous dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY (see Figure 1.1 page 5c) shall be limited to the following:
 - a. For noble gases: Less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin, and
 - b. For iodine-131, for tritium, and for all radionuclides in particulate form with half lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

Action

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

4.8.D Gaseous Effluents Dose Rate

1. The instantaneous dose rate due to noble gases in gaseous effluents shall be determined continuously* to be within the limits of 3.8.D.1.a in accordance with the ODCM.
2. The instantaneous dose rate due to iodine-131, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 4.8.E-1.

*By utilizing the Noble Gas Activity Monitors and their appropriate setpoints.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

INSTRUMENTATION

3.8.E Radioactive Gaseous Effluent Instrumentation

Applicability

As shown in Table 3.8.E-1.

1. The radioactive gaseous process and effluent monitoring instrumentation channels shown in Table 3.8.E-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.8.D.1 are not exceeded.

Action

- a. With a radioactive gaseous process or effluent monitoring instrumentation channel alarm/trip setpoints less conservative than a value which will ensure that the limits of 3.8.D.1 are met, declare the channel inoperable.
- b. With one or more radioactive gaseous process or effluent monitoring instrumentation channels inoperable, take the ACTION shown in Table 3.8.E-1.

4.8.E Radioactive Gaseous Effluent Instrumentation

1. The setpoints shall be determined in accordance with ODCM.
2. Each radioactive gaseous process or effluent monitoring instrumentation channel shall be demonstrated OPERABLE at the frequencies shown in Table 4.8.E-2.

TABLE 3.8.E-1

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>Instrument</u>	<u>Minimum Channels Operable</u>	<u>Applicability</u>	<u>Parameter</u>	<u>Action</u>
1. Main Stack Effluent Monitoring System				
a. Noble Gas Activity Monitor	(1)	*	Radioactivity Rate Measurement	3
b. Iodine Sampler Cartridge	(1)	*	Collect Halogen Sample	4
c. Particulate Sampler Filter	(1)	*	Collect Particulate Sample	4
d. Effluent System Flow Rate Measuring Device	(1)	*	System Flow Rate Measurement	2
e. Sampler Flow Rate Measuring Device	(1)	*	Sampler Flow Rate Measurement	2
2. Reactor Building Ventilation Effluent Monitoring System				
a. Noble Gas Activity Monitor	(1)	*	Radioactivity Rate Measurement	3
b. Iodine Sampler Cartridge	(1)	*	Collect Halogen Sample	4
c. Particulate Sampler Filter	(1)	*	Collect Particulate Sample	4

TABLE 3.8.E-1 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

<u>Instrument</u>	<u>Minimum Channels Operable</u>	<u>Applicability</u>	<u>Parameter</u>	<u>Action</u>
2. Reactor Building Ventilation Effluent Monitoring System (Continued)				
d. Effluent System Flow Rate Measurement Device	(1)	*	System Flow Rate Measurement	2
e. Sampler Flow Rate Measurement Device	(1)	*	Sampler Flow Rate Measurement	2
3. Steam Jet Air Ejector Radioactivity Monitor				
a. Noble Gas Activity Monitor (Providing alarm and auto- isolation of stack)	(1)	***	Noble Gas Radio- activity Rate Measurement	1
4. Augmented Offgas Treatment System Explosive Gas Monitoring				
a. Hydrogen Monitor	(1)	**	Hydrogen Concentration Measurement	5

TABLE 3.8.E-1
(Continued)

TABLE NOTATION

*During releases via this pathway.

**During augmented offgas treatment system operation.

***During operation of the steam jet air ejector.

- | | |
|----------|--|
| ACTION 1 | With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, gases from the steam jet air ejector may be released to the offgas system for up to 72 hours provided: <ul style="list-style-type: none">a. The augmented offgas treatment system is not bypassed, andb. The offgas delay system noble gas activity effluent (downstream) monitor is OPERABLE; otherwise, be in at least HOT STANDBY within 12 hours. |
| ACTION 2 | With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided the flow rate is estimated at least once per 4 hours. |
| ACTION 3 | With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days provided grab samples are taken at least once per 12 hours and these samples are analyzed for activity within 24 hours. |
| ACTION 4 | With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue for up to 30 days, provided samples are continuously collected with auxiliary sampling equipment as required in Table 4.8.E-1. |
| ACTION 5 | With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, operation of this waste gas holdup system may continue provided grab samples are collected at least once per 24 hours and analyzed within the following 4 hours and proper function of the recombiner is assured by monitoring recombiner temperature. |

TABLE 4.8.E-1

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	(a) (LLD) (uCi/ml)
Main Stack and Rx Bldg. Vent	Monthly Grab Sample	Monthly	Principal Gamma Emitters (b)	1×10^{-4}
			H-3	1×10^{-6}
	Continuous(d)	Weekly Charcoal(c) Sample	I-131	1×10^{-12}
	Continuous(d)	Weekly Particulate(c) Sample	Principal Gamma Emitters(b) (I-131, others)	1×10^{-11}
	Continuous(d)	Monthly Particulate Sample	gross alpha	1×10^{-11}
	Continuous(d)	Quarterly Particulate Sample	Sr-89, Sr-90	1×10^{-11}
	Continuous(d)	Continuous Noble Gas Monitor	Noble Gases Gross Gamma	(e) 1×10^{-6}

TABLE NOTATION (4.8.E-1)

- a. Refer to ODCM for LLD definition.
- b. Refer to ODCM for LLD exceptions.
- c. When the average daily gross radioactivity release rate increases by 50 percent (after factoring out power level changes) over the previous day, the iodine and particulate filters shall be analyzed to determine the release rate for iodines and particulates.
- d. 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.D.
- e. For the Xe-133 isotope as determined by using a solid source equivalent to a volume gaseous source.

TABLE 4.8.E-2

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>Instrument</u>	<u>Instrument Check</u>	<u>Source Check</u>	<u>Instrument Calibration</u>	<u>Instrument Functional Test</u>
1. Main Stack Effluent Monitoring System				
a. Noble Gas Activity Monitor (Two channels)	Daily*	Monthly	Once per operating cycle	Quarterly
b. Iodine Sampler Cartridge	N.A.	N.A.	N.A.	N.A.
c. Particulate Sampler Filter	N.A.	N.A.	N.A.	N.A.
d. Effluent System Flow Rate Measuring Device	Daily*	N.A.	Once per operating cycle	Quarterly
e. Sampler Flow Rate Measuring Device	Daily*	N.A.	Once per operating cycle	Quarterly
2. Reactor Building Ventilation Effluent Monitoring System				
a. Noble Gas Activity Monitor	Daily*	Monthly	Once per operating cycle	Quarterly
b. Iodine Sampler Cartridge	N.A.	N.A.	N.A.	N.A.
c. Particulate Sampler Filter	N.A.	N.A.	N.A.	N.A.
d. Effluent System Flow Rate Measuring Device	Daily*	N.A.	Once per operating cycle	Quarterly

TABLE 4 3.E-2 (Continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

<u>Instrument</u>	<u>Instrument Check</u>	<u>Source Check</u>	<u>Instrument Calibration</u>	<u>Instrument Functional Test</u>
e. Sampler Flow Rate Measuring Device	Daily*	N.A.	Once per Operating cycle	Quarterly
3. Steam Jet Air Ejector Radioactivity Monitor				
a. Noble Gas Activity Monitor	Daily***	N.A.	Once per operating cycle	Quarterly
4. Augmented Offgas Treatment System Explosive Gas Monitoring System				
a. Hydrogen Monitor	Daily**	N.A.	Quarterly	Monthly

*During releases via this pathway.

**During augmented offgas treatment system operation.

***During operation of the Steam Jet Air Ejector.

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

RADIOACTIVE EFFLUENTS

3.8.F Gaseous Effluent Treatment*

Applicability

Within 4 hrs after placing the Reactor Mode Switch to "Run" position.

1. The gaseous effluent treatment system shall be maintained and used to reduce radioactive materials in gaseous wastes prior to their discharge when the estimated gaseous effluent air doses due to gaseous effluent releases to UNRESTRICTED AREAS when averaged over 31 days would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation.

Action

- a. With gaseous effluents being discharged for more than 31 days without treatment and in excess of the above limits, in lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, a Special Report which includes the following information:
 1. Explanation of why gaseous radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability.

4.8.F Gaseous Effluent Treatment*

1. Doses due to gaseous releases from the site shall be projected at least once per 31 day period in accordance with the ODCM.

*The gaseous effluent treatment schematic is shown in Figure 4.8.F.1.

RADIOACTIVE EFFLUENTS

3.8.F (Continued)

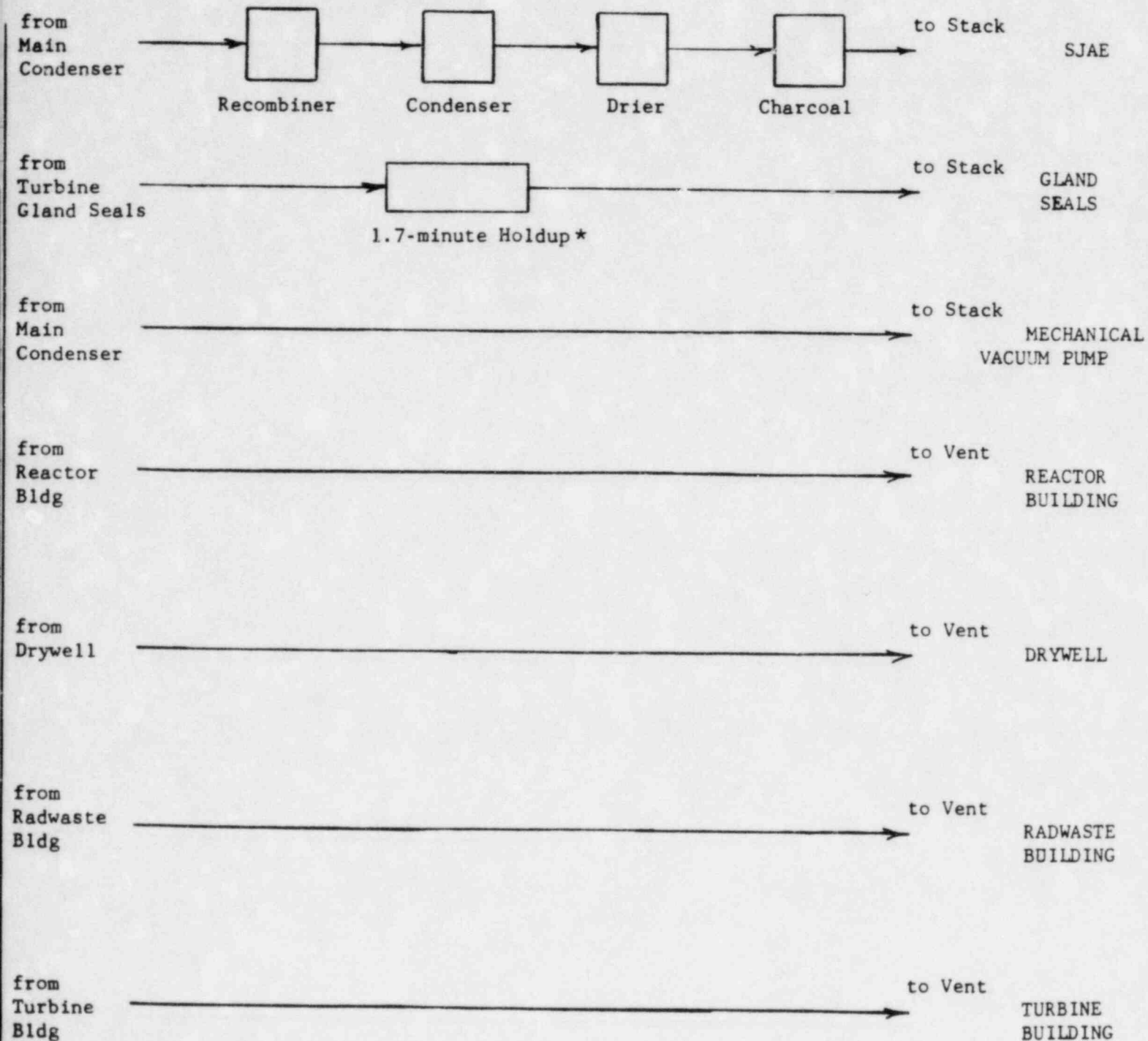
2. Action(s) taken to restore the non-operable equipment to OPERABLE STATUS, and
 3. Summary description of action(s) taken to prevent a recurrence.
2. The concentration of hydrogen in the augmented offgas treatment system shall be limited to less than or equal to 2 percent by volume at the outlet of the recombiner.

Action

- a. With the concentration of hydrogen in the augmented offgas treatment system greater than 2 percent by volume but less than or equal to 4 percent by volume, restore the concentration of hydrogen to within the limit within 48 hr or be in a cold shutdown condition within 24 hrs.
3. Whenever the augmented offgas treatment system is bypassed, minimum dilution air flow to the stack shall be maintained.

4.8.F (Continued)

2. The concentration of hydrogen in the augmented offgas treatment system shall be determined to be within the above limits by continuously monitoring the waste gases in the augmented offgas treatment system with the hydrogen monitor required OPERABLE by Table 3.8.E-1.



* No significant effect in reducing offsite doses when compared to transit time required for releases to reach site Boundary.

Figure 4.8.F.1. Gaseous Effluent Treatment System Schematic

RADIOACTIVE EFFLUENTS3.8.G Main CondenserApplicability

At all times when steam is available to the air ejectors.

1. The gross radioactivity (beta and/or gamma) release rate of noble gases measured at the steam jet air ejector shall be limited to 500,000 uCi/sec (referenced to a 30 minute holdup).

Action

With the gross radioactivity (beta and/or gamma) rate of noble gases at the steam jet air ejector exceeding 500,000 uCi/sec (referenced to a 30 minute holdup), restore the gross radioactivity rate to within its limit within 72 hours or be in at least HOT STANDBY within the next 12 hours.

4.8.G Main Condenser

1. The gross radioactivity (beta and/or gamma) rate of noble gases from the steam jet air ejector shall be determined to be within the limit of 3.8.G.1 at the following frequencies by performing an isotopic analysis of a representative sample of gases taken at the discharge (prior to dilution and/or discharge) of the steam jet air ejector:
 - a. At least once per 31 days.
 - b. When the average daily gross activity release rate increases by 50 percent over the previous day.

LIMITING CONDITIONS FOR OPERATION

3.8.H Mechanical Vacuum Pump

1. The mechanical vacuum pump shall be capable of being isolated and secured on a signal of high radioactivity in the steam lines whenever the main steam isolation valves are open.
2. If the limits of 3.8.H are not met, the vacuum pump shall be isolated.

SURVEILLANCE REQUIREMENTS

4.8.H Mechanical Vacuum Pump

At least once during each operating cycle verify automatic securing and isolation of the mechanical vacuum pump.

BASES

3.8.A

and

4.8.A

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. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will not 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.

BASES

3.8.B
and
4.8.B

RADIOACTIVE LIQUID EFFLUENT INSTRUMENTATION

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

BASES

3.8.C
and
4.8.C

LIQUID EFFLUENT TREATMENT

The requirements that the appropriate portions of this system be used when specified, provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criteria 60 of Appendix A to 10 CFR Part 50 and design objective Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the guide set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

BASES

3.8.D

and

4.8.D

GASEOUS EFFLUENTS DOSE RATE

This specification is provided to ensure that the dose rate at anytime 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. The annual dose limits are the doses associated with the concentration of 10 CFR Part 20, Appendix B, Table II. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC 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 the individual will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. 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 < 500 mrem/year to the total body or to < 3000 mrem/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to an infant via the cow-milk-infant pathway to < 1500 mrem/year for the nearest cow to the plant.

BASES

3.8.E
and
4.C.E

RADIOACTIVE GASEOUS PROCESS AND 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 setpoints for these instruments shall be calculated in accordance with NRC approved methods in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The process monitoring instrumentation includes provisions for monitoring (and controlling) the concentrations of potentially explosive gas mixtures in the main condenser offgas treatment system. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63 and 64 of Appendix A to 10 CFR Part 50.

BASES

3.8.F
and
4.8.F

GASEOUS EFFLUENT TREATMENT

The requirement that the appropriate portions of these systems be used when specified provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and design objective Section IID of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the guide set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

Maintaining the concentration of hydrogen below its flammability limits provides assurance that the releases of radioactive materials will be controlled in conformance with the requirements of General Design Criteria 60 of Appendix A to 10 CFR Part 50.

BASES

3.8.G
and
4.8.G

MAIN CONDENSER

Restricting the gross radioactivity rate of noble gases from the main condenser provides reasonable assurance that the total body exposure to a MEMBER OF THE PUBLIC at and beyond the SITE BOUNDARY will not exceed a small fraction of the limits of 10 CFR Part 100 in the event this effluent is inadvertently discharged directly to the environment without treatment. This specification implements the requirements of General Design Criteria 60 and 64 of Appendix A to 10 CFR Part 50.

BASES

† 3.8.H MECHANICAL VACUUM PUMP
and

† 4.8.H The purpose of isolating the mechanical vacuum pump line is to limit the release of activity from the main condenser. During an accident, fission products would be transported from the reactor through the main steam lines to the condenser. The fission product radioactivity would be sensed by the main steam line radioactivity monitors which initiate isolation.

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- f. Review of facility operations to detect potential safety hazards.
- g. Performance of special reviews and investigations and reports thereon as requested by the NSRAC Chairman.
- h. Review of the Station Security Plan and implementing procedures and changes to the plan and procedures.
- i. Review of the Emergency Plan and implementing procedures and changes to the plan and procedures.
- j. Review of changes to the OFFSITE DOSE CALCULATION MANUAL (ODCM).
- k. Review of every unplanned onsite release of radioactive material to the environs including the reports covering evaluation, recommendations and disposition of the corrective action to prevent recurrence to the Vice President - Nuclear and to the Nuclear Safety Review and Audit Committee (NSRAC).

7. AUTHORITY

The ORC shall:

- a. Inform the Nuclear Operations Manager in writing their approval or disapproval of items considered under 6.5.A.6(a) through (d) above.
- b. Render determinations in writing with regard to whether or not each item considered under 6.5.A.6(a) through (e) above constitutes an unreviewed safety question.
- c. Provide immediate written notification to the Nuclear Operations Manager and the Nuclear Safety Review and Audit Committee of disagreement between the ORC members and the ORC Chairman. The Nuclear Operations Manager shall have responsibility for resolution for such disagreements pursuant to 6.1 above.

8. RECORDS

The ORC shall maintain written minutes of each meeting and copies shall be provided to the Nuclear Operations Manager and NSRAC Chairman.

B. NUCLEAR SAFETY REVIEW AND AUDIT COMMITTEE (NSRAC)

1. FUNCTION

The NSRAC shall function to provide independent review and audit of designated activities in the areas of:

1. nuclear power plant operations;
2. nuclear engineering;
3. chemistry and radiochemistry;
4. metallurgy;
5. instrumentation and control;
6. radiological safety;
7. mechanical and electrical engineering;
8. quality assurance practices;
9. fire protection.

2. COMPOSITION

The NSRAC Chairman and other members shall be appointed by the Vice President - Nuclear, or such other person as he shall designate. NSRAC members shall collectively possess experience and competence required to review and audit the designated areas noted in 6.5.B.1.

- g. All events which are required by regulation or Technical Specifications to be reported to the NRC in writing within 24 hrs.
- h. Any other matter involving safe operation of the nuclear plant which NSRAC deems appropriate for consideration or which is referred to NSRAC by the onsite operating organization or by other functional organizational units within Boston Edison.
- i. Reports and meeting minutes of the Operations Review Committee.

8. AUDITS

Audits of facility activities shall be performed under the cognizance of the NSRAC. These audits shall encompass:

- a. The conformance of facility operation to provisions contained within the Technical Specifications and applicable license conditions at least once per year.
- b. The training and qualifications of the entire facility staff at least once per year.
- c. The results of all actions required by deficiencies occurring in facility equipment, structures, systems or method of operation that affect nuclear safety at least once per six months.
- d. The performance of all activities required by the Quality Assurance Program to meet the criteria of Appendix B, 10 CFR 50, at least once per two years.
- e. The Emergency Plan and implementing procedures at least once per two years.
- f. The Station Security Plan and implementing procedures at least once per two years.
- g. Any other area of facility operation considered appropriate by NSRAC or the Vice President - Nuclear.
- h. The Fire Protection Program and implementing procedures at least once per two years.
- i. The Radiological Environmental Monitoring Program and the results thereof at least once every 12 months.
- j. The OFFSITE DOSE CALCULATION MANUAL and implementing procedures at least once per 24 months.

9. AUTHORITY

The NSRAC shall report to and advise the Vice President - Nuclear on those areas of responsibility specified in Section 6.5.B.7 and 6.5.B.8.

10. RECORDS

Records of NSRAC activities shall be prepared, approved and distributed as indicated below:

- a. Minutes of NSRAC meeting shall be prepared, approved and forwarded to the Vice President - Nuclear, NSRAC members, and others the Chairman may designate, within 14 days following each meeting.

Note: Item i is intended to provide for reporting of potentially generic problems.

- j. Offsite releases of radioactive materials in liquid and gaseous effluents that exceed the limits of Specification 3.8.A and 3.8.D.

2. THIRTY DAY WRITTEN REPORTS

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

- a. Reactor protection system or engineered safety feature instrument settings which are found to be less conservative than those established by the technical specifications but which do not prevent the fulfillment of the functional requirements of affected systems.
- b. Conditions leading to operation in a degraded mode permitted by a limiting condition for operation or plant shutdown required by a limiting condition for operation.

Note: Routine surveillance testing, instrument calibration, or preventative maintenance which require system configurations as described in items 6.9.B.2.a and 6.9.B.2.b need not be reported except where test results themselves reveal a degraded mode as described above.

- c. Observed inadequacies in the implementation of administrative or procedural controls which threaten to cause reduction of degree of redundancy provided in reactor protection systems or engineered safety feature systems.
- d. Abnormal degradation of systems other than those specified in item 6.9.B.1.c above designed to contain radioactive material resulting from the fission process.

Note: Sealed sources or calibration sources are not included under this item. Leakage of valve packing or gaskets within the limits for identified leakage set forth in technical specifications need not be reported under this item.

- e. Any changes in corporate or station organization as described in Section 6.2.

C. UNIQUE REPORTING REQUIREMENTS

1. RADIOACTIVE EFFLUENT RELEASE REPORT

A report shall be submitted to the Commission within 60 days after January, 1 and July, 1 of each year specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and gaseous effluents during the previous 6 months. The format and content of the report shall be in accordance with Regulatory Guide 1.21 (Revision 1) dated June, 1974.

2. ENVIRONMENTAL PROGRAM DATA

Annual Radiological Environmental Monitoring Report. A report on the radiological environmental surveillance program for the previous calendar year of operation shall be submitted to the Director of the NRC Regional Office with a copy to the Director, Office of Nuclear Reactor Regulation) as a separate document prior to May 1 of the year. The reports shall include summaries, interpretations, and statistical evaluation of the results of the radiological environmental surveillance activities for the report period, including a comparison (as appropriate) with preoperational studies, operational controls 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 any land use surveys which affect the choice of sample locations. If harmful effects or evidence of irreversible damage are detected by the monitoring, the licensee shall provide an analysis of the problem and a proposed course of action to alleviate the problem.

The Annual Radiological Environmental Monitoring Reports shall include a summary of the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the Table and Figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979.

In the event that some results are not available prior to May 1 of the year, 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 report shall also include the following: a summary description of the radiological environmental monitoring program; at least two legible maps* covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor;

*One map shall cover stations near the site boundary; a second shall include the more distant stations.

the results of licensee participation in the Interlaboratory Comparison Program, required by Specification 7.1.C discussion of all deviations from the sampling schedule of Table 8.1.A-1 and discussion of all analyses in which the LLD required by Table 8.1.A-4 was not achievable.

OFFSITE DOSE CALCULATION MANUAL (ODCM)

3. Any changes to the ODCM shall be submitted to the Commission within 90 days from which the change(s) was made effective.

OPERATIONAL OBJECTIVES

SURVEILLANCE REQUIREMENTS

7.0 Radiological Environmental Monitoring Program

Applicability:

At all times.

7.1 Monitoring Program

A. An environmental monitoring program shall be conducted to evaluate the effects of station operation on the environs and to verify the effectiveness of the source controls on radioactive materials.

The radiological environmental monitoring program shall be conducted as specified in Table 8.1.A-1

Action:

1. With the radiological environmental monitoring program not being conducted as specified in Table 8.1.A-1, in lieu of a Licensee Event Report, prepare and submit to the Commission, in the Annual Radiological Environmental Monitoring Report required by Specification 6.9.C.2, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.
2. 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 7.1.A when averaged over any calendar quarter, in

8.0 Radiological Environmental Monitoring Program

8.1 Monitoring Program

A. The radiological environmental monitoring samples shall be collected pursuant to Table 8.1.A-1 from the specific locations given in the table and figure(s) in the ODCM and shall be analyzed pursuant to the requirements of Table 8.1.A-1, and the detection capabilities required by Table 8.1.A-4.

- (1) Cumulative dose contributions for the current calendar year from radionuclides detected in environmental samples shall be determined in accordance with the methodology and parameters in the ODCM. These results will be reported in the Annual Radiological Environmental Monitoring Report.

7.1 (Continued)

lieu of a Licensee Event Report, 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 so that the potential annual dose to a MEMBER OF THE PUBLIC is less than the calendar year limits of Specifications 7.2.A, 7.3.A and 7.4.A. When more than one of the radionuclides in Table 7.1.A are detected in the sampling medium, this report shall be submitted if:

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

When radionuclides other than those in Table 7.1.A 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 7.2.A, 7.3.A, and 7.4.A. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Monitoring Report.

7.1 (Continued)

3. With milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 8.1.A-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.

In lieu of a Licensee Event Report and Pursuant to Specification 6.9.C.2, identify the cause of the unavailability of samples and identify the new location(s) obtaining replacement samples in the next Annual Environmental Radiation Monitoring Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

TABLE 7.1.A

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)	Vegetables (pCi/Kg, wet)
H-3	2×10^4				
Mn-54	1×10^3		3×10^4		
Fe-59	4×10^2		1×10^4		
Co-58	1×10^3		3×10^4		
Co-60	3×10^2		1×10^4		
Zn-65	3×10^2		2×10^4		
Zr-95	4×10^2				
I-131	2	0.9		3	1×10^2
Cs-134	30	10	1×10^3	60	1×10^3
Cs-137	50	20	2×10^3	70	2×10^3
Ba-140	2×10^2			3×10^2	

TABLE 8.1.A-1

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway or Sample Type</u>	<u>Locations (Direction-Distance) from Reactor</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
AIRBORNE			
Particulates	11 (See Table 8.1.A-2)	Continuous sampling over one week	Gross beta radioactivity at least 24 hours after filter change. (a) Quarterly composite (by location) for gamma isotopic. (b)
Radioiodine	11 (See Table 8.1.A-2)	Continuous sampling with canister collection weekly	Analyze weekly for I-131.
DIRECT			
	40 (See Table 8.1.A-3) Plymouth Beach and Priscilla/White Horse Beach	Quarterly Annually (Spring)	Gamma exposure quarterly. (i) Gamma exposure survey (i)
WATERBORNE (Surface Water)			
	Discharge Canal	Continuous Composite Sample	Gamma isotopic (b) monthly; and composite for H-3 analysis quarterly, (c).
	Bartlett Pond (SE-1.7 mi.) Powder Point (NNW-7.8 mi.) (d)	Weekly grab sample Weekly grab sample	
AQUATIC			
Shellfish (clams, mussels or quahogs as available)	Discharge outfall Duxbury Bay Manomet Pt. Plymouth or Kingston Harbor Marshfield (d)	Quarterly (at approximate 3 month intervals)	Gamma isotopic (b); also see note (f).

TABLE 8.1.A-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway or Sample Type</u>	<u>Locations (Direction-Distance) from Reactor</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
Lobster	Vicinity of discharge point Offshore (d)	Four times per season Once per season	Gamma isotopic (b) on edible portions
Fish	Vicinity of discharge point Offshore (d)	Quarterly (when particular species available), Groups I and II (e) In season, Groups III and IV (e) Annually, each group	Gamma isotopic (b) on edible portions (e)
Sediments	Rocky Point Plymouth Harbor Duxbury Bay Plymouth Beach Manomet Pt. Marshfield	Semi-annually	Gamma isotopic (b) (c), see also note (g)
INGESTION (Terrestrial)			
Milk	Plymouth County Farm* (W-3.5 mi) (h) Whitman Farm (NW-21 mi.) (d)	Semi-monthly during periods when animals are on pasture, otherwise monthly	Gamma isotopic (b); radio-iodine analysis all samples.
Cranberries	Manomet Pt. Bog (SE-2.6 mi.) Bartlett Rd. Bog (SSE/S-2.8 mi.) Pine St. Bog (WNW-17 mi.) (d)	At time of harvest	Gamma isotopic (b) on edible portions.

*When available.

TABLE 8.1.A-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway or Sample Type</u>	<u>Locations (Direction-Distance) from Reactor</u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
Tuberous and green leafy vegetables	Plymouth County Farm (W-3.5 mi.) (h) Bridgewater Farm (W-20 mi.) (d)	At time of harvest	Gamma isotopic (b) on edible portions.
Beef Forage	Plymouth County Farm (W-3.5 mi.) (h) Whitman Farm (NW-21 mi) (d).	Annually	Gamma isotopic (b)

TABLE 8.1.A-1
(Continued)

NOTES

- (a) If gross beta radioactivity is greater than 10 times the control value, gamma isotopic will be performed on the sample.
- (b) Gamma isotopic means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
- (c) If integrated gamma activity (less K-40) is greater than 10 times the control value (less K-40), strontium-90 analysis will be performed on the sample.
- (d) Indicates control location.
- (e) Fish analyses will be performed on a minimum of 2 sub-samples, consisting of approximately 400 grams each from each of the following groups:

I. Bottom Oriented	II. Near Bottom Distribution	III. Anadromous	IV. Coastal Migratory
Winter flounder	Tautog	Alewife	Bluefish
Yellowtail flounder	Cunner	Rainbow smelt	Atlantic herring
	Atlantic cod	Striped bass	Atlantic menhaden
	Pollock		Atlantic mackerel
	Hakes		

- (f) Mussel samples from four locations (immediate vicinity of discharge outfall, Manomet Pt., Plymouth or Kingston Harbor, and Green Harbor in Marshfield) will be analyzed quarterly as follows:

One Kilogram wet weight of mussel bodies, including fluid within shells will be collected. Bodies will be reduced in volume by drying at about 100°C. Sample will be compacted and analyzed by Ge(Li) gamma spectrometry or alternate technique, if necessary, to achieve a sensitivity** of 5 pCi/kg for Cs-134, Cs-137, Co-60, Zn-65 and Zr-95 and 15 pCi/kg for Ce-144.

The mussel shell sample from one location will be analyzed each quarter. One additional mussel shell sample will be analyzed semi-annually. Unscrubbed shells to be analyzed will be dried, processed, and analyzed similarly to the mussel bodies.

** Sensitivity values are to be determined in accordance with a 95% confidence level on K_{α} ; 50% confidence level on K_{β} (See HASL-300 for definitions).

TABLE 8.1.A-1
(Continued)

NOTES

Because of the small volume reduction in pre-processing of shells, sensitivities attained will be less than that for mussel bodies. The equipment and counting times to be employed for analyses of shells will be the same or comparable to that employed for mussel bodies so that the reduction in sensitivities (relative to those for mussel bodies) will be strictly limited to the effects of poorer geometry related to lower sample volume reduction. Shell samples not scheduled for analysis will be reserved (unscrubbed) for possible later analysis.

If radiocesium (Cs-134 and Cs-137) activity exceeds 200 pCi/kg (wet) in mussel bodies, these samples will be analyzed by radiochemical separation, electrodeposition, and alpha spectrometry for radioisotopes of plutonium, with a sensitivity of 0.4 pCi/kg.

- (g) Sediment samples from four locations (Manomet Pt., Rocky Pt., Plymouth Harbor, and head of Duxbury Bay) will be analyzed once per year (preferably early summer) as follows:

Cores will be taken to depths of 30-cm, minimum depth wherever sediment conditions permit by a hand-coring sampling device. If sediment conditions do not permit 30-cm deep cores, the deepest cores achievable with a hand-coring device will be taken. In any case, core depths will not be less than 14-cm. Core samples will be sectioned into 2-cm increments, and surface and alternate increments analyzed, other reserved. Sediment sample volumes (determined by core diameter and/or number of individual cores taken from any single location) and counting technique will be sufficient to achieve sensitivities of 50 pCi/kg dry sediment for Cs-134, Cs-137, Co-60, Zn-65, and Zr-95 and 150 pCi/kg for Ce-144. In any case individual core diameters will not be less than 2 inches.

The top 2-cm section from each core will be analyzed for Pu isotopes (Pu-238, Pu-239, 240) using radiochemical separations, electrodeposition, and alpha spectrometry with target sensitivity of 25 pCi/kg dry sediment. Two additional core slices per year (mid-depth slice from two core samples) will be similarly analyzed.

- (h) These locations may be altered in accordance with results of surveys discussed in paragraphs 8.1.A-3 and 8.1.A-4.
- (i) Minimum sensitivities for gamma exposure measurements are as follows:

Gamma exposure - 1 R/hr average exposure rate.
Gamma exposure survey - 1 R/hr exposure rate.

TABLE 8.1.A-2

AIR PARTICULATES, GASEOUS RADIOIODINE AND SOIL SURVEILLANCE STATIONS

<u>Sampling Location (Sample Designation)</u>	<u>Distance and Direction from Reactor</u>
Offsite Stations	
East Weymouth (EW)*	21 miles NW*
Plymouth Center (PC)	4.0 miles W-WNW
Monomet Substation (MS)	2.5 miles SE
Cleft Rock Area (CR)	0.9 miles S
Onsite Stations	
Rocky Hill Road (ER)	0.8 miles SE
Rocky Hill Road (WR)	0.3 miles W-WNW
Overlook Area (OA)	0.03 miles W
Property Line (PL)	0.34 miles NW
Pedestrian Bridge (PB)	0.14 miles N
East Breakwater (EB)	0.35 miles ESE
Warehouse (WS)	0.03 miles SSE

*Control Station

TABLE 8.1.A-2

EXTERNAL GAMMA EXPOSURE SURVEILLANCE STATIONS (TLD)

<u>Dosimeter Location (Designation)</u>	<u>Distance and Direction from Station</u>
ONSITE STATIONS	
Property Line (D)	0.17 miles NNW
Property Line (F)	0.12 miles NW
Property Line (I)	0.14 miles W
Property Line (G)	0.20 miles WSW
Rocky Hill Road (A)	0.12 miles SW
Property Line (H)	0.21 miles SSW
Public Parking Area (PA)	0.07 miles N-NNE
Pedestrian Bridge (PB)	0.1 miles NE
Overlook Area (OA)	0.03 miles W
East Breakwater (EB)	0.26 miles ESE
Property Line (C)	3.3 miles ESE-SE
Property Line (HB)	0.34 miles SE
Rocky Hill Road (B)	0.26 miles SSE
Microwave Tower (MT)	0.38 miles S
Emerson Road (EM)	0.68 miles SE-SSE
White Horse Road (WH)	0.89 miles SE-SSE
Property Line (E)	0.75 miles SSE-S
Rocky Hill Road (WR)	0.3 miles W-WNW
Property Line (J)	1.36 miles SSE-S
Property Line (K)	1.42 miles SSE-S
Rocky Hill Road (ER)	0.8 miles SE
Property Line (L)	0.40 miles E

TABLE 8.1.A-2 (Continued)

EXTERNAL GAMMA EXPOSURE SURVEILLANCE STATIONS (TLD)

<u>Dosimeter Location (Designation)</u>	<u>Distance and Direction from Station</u>
ONSITE STATIONS (Continued)	
Warehouse (WS)	0.1 miles SE
Property Line (PL)	0.3 miles W
OFFSITE STATIONS	
Duxbury (SS)	6.25 miles SSW-SW
Kingston (KS)	10 miles WNW
North Plymouth (NP)	5.5 miles WNW
Plymouth Center (PC)	4.0 miles W-WNW
South Plymouth (SP)	3 miles WSW
Bayshore Drive (BD)	0.7 miles W-WNW
Cleft Rock Area (CR)	0.9 miles S
Manomet (MP)	2.25 miles ESE-S
Manomet (ME)	2.5 miles SE
Manomet (MS)	2.5 miles SSE
Manomet (MB)	3.5 miles SE-SSE
College Pond (CP)	6.5 miles SSW-SW
Sagamore (CS)	10 miles SSE-S
Plymouth Airport (SA)	8 miles WSW
East Weymouth (EW)*	21 miles NW
Saquish Neck (SN)**	4.6 miles NNW

*Control Station

**TLD's for this location will be provided to a third party and will be analyzed for gamma exposure whenever returned to BECo.

TABLE 8.1.A-4

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

Analysis	Water (pCi/kg)	Airborne Particulate or Gas (pCi/m ³)	Wet Solids (pCi/kg,wet)	Milk (pCi/kg)	Food Products (pCi/kg,wet)	Dry Solids (pCi/kg, dry)
gross beta	4 ^b	1 x 10 ⁻²				
³ H	2000					
⁵⁴ Mn	15		130			
⁵⁹ Fe	30		260			
^{58,60} Co	15		130			50
⁶⁵ Zn	30		260			50
⁹⁵ Zr	15					50
¹³¹ I	1 ^b	7 x 10 ⁻²		1	60 ^c	
^{134,137} Cs	15, 18	1 x 10 ⁻²	130	15	60	50
¹⁴⁰ Ba	15 ^d			15 ^d		
¹⁴⁴ Ce						150

TABLE NOTATION

- Refer to ODCM for LLD definition.
- LLD for surface water.
- LLD for leafy vegetables.

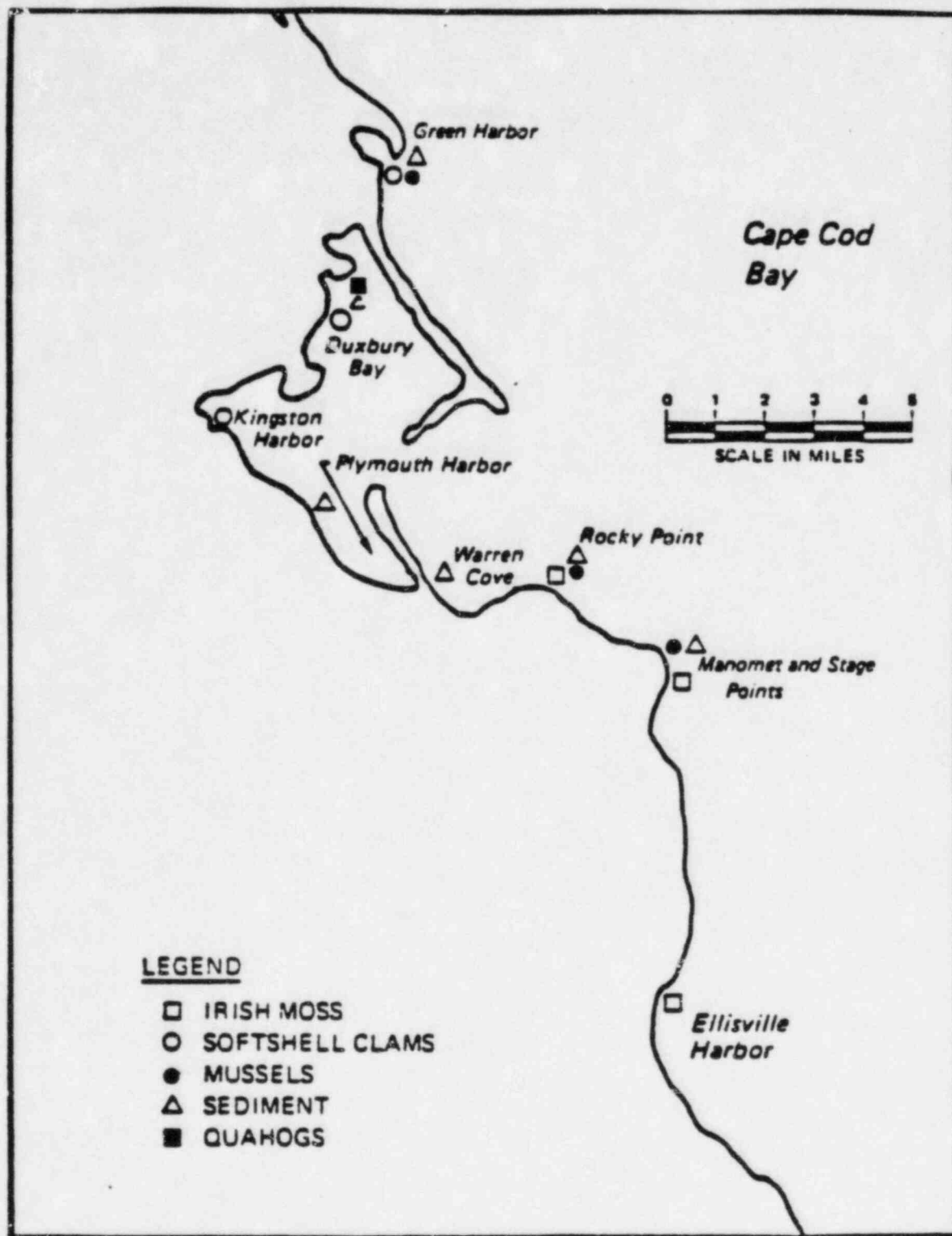
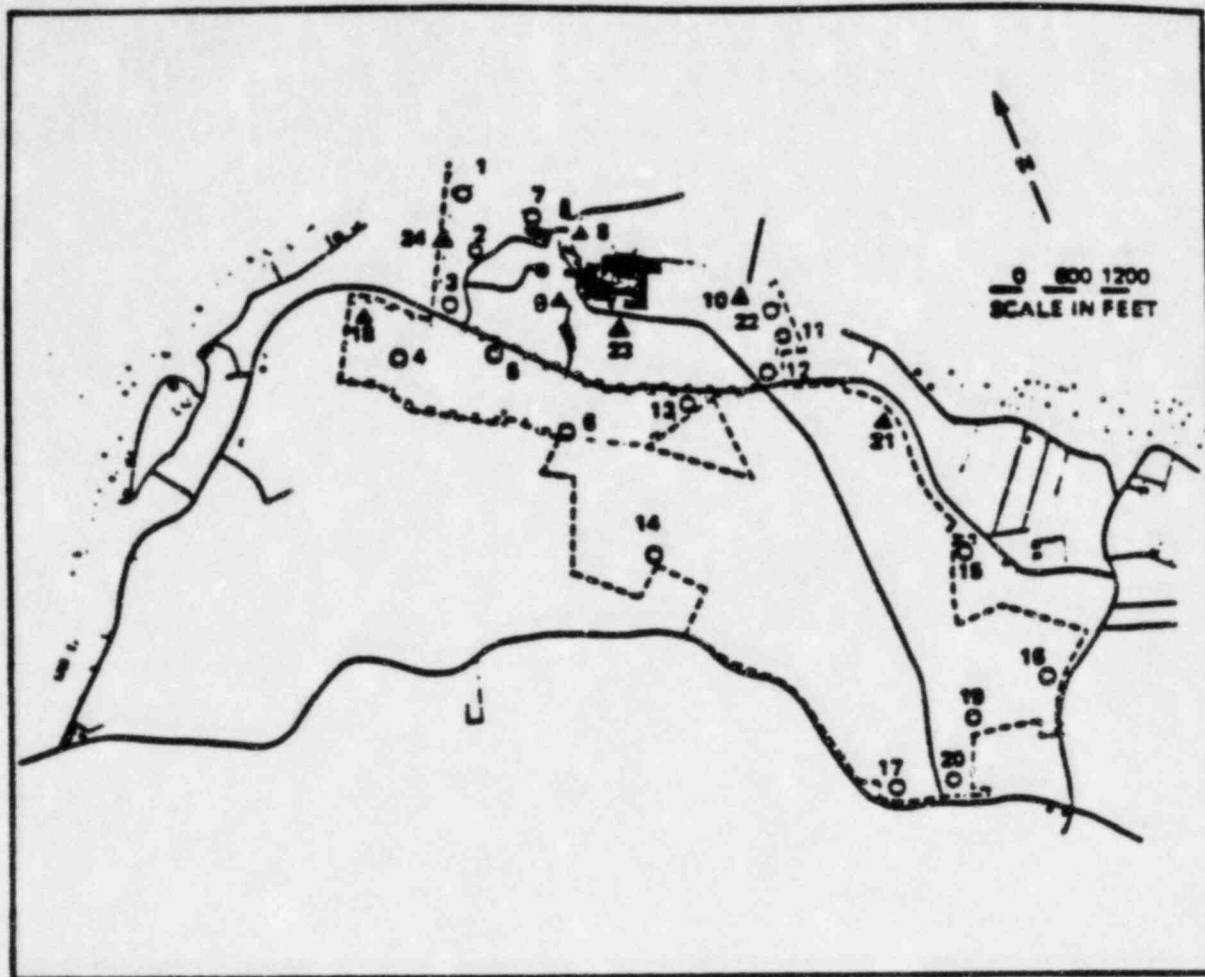


Figure 8.1.A-1 Typical Mollusc, Algae and Sediment Sampling Stations

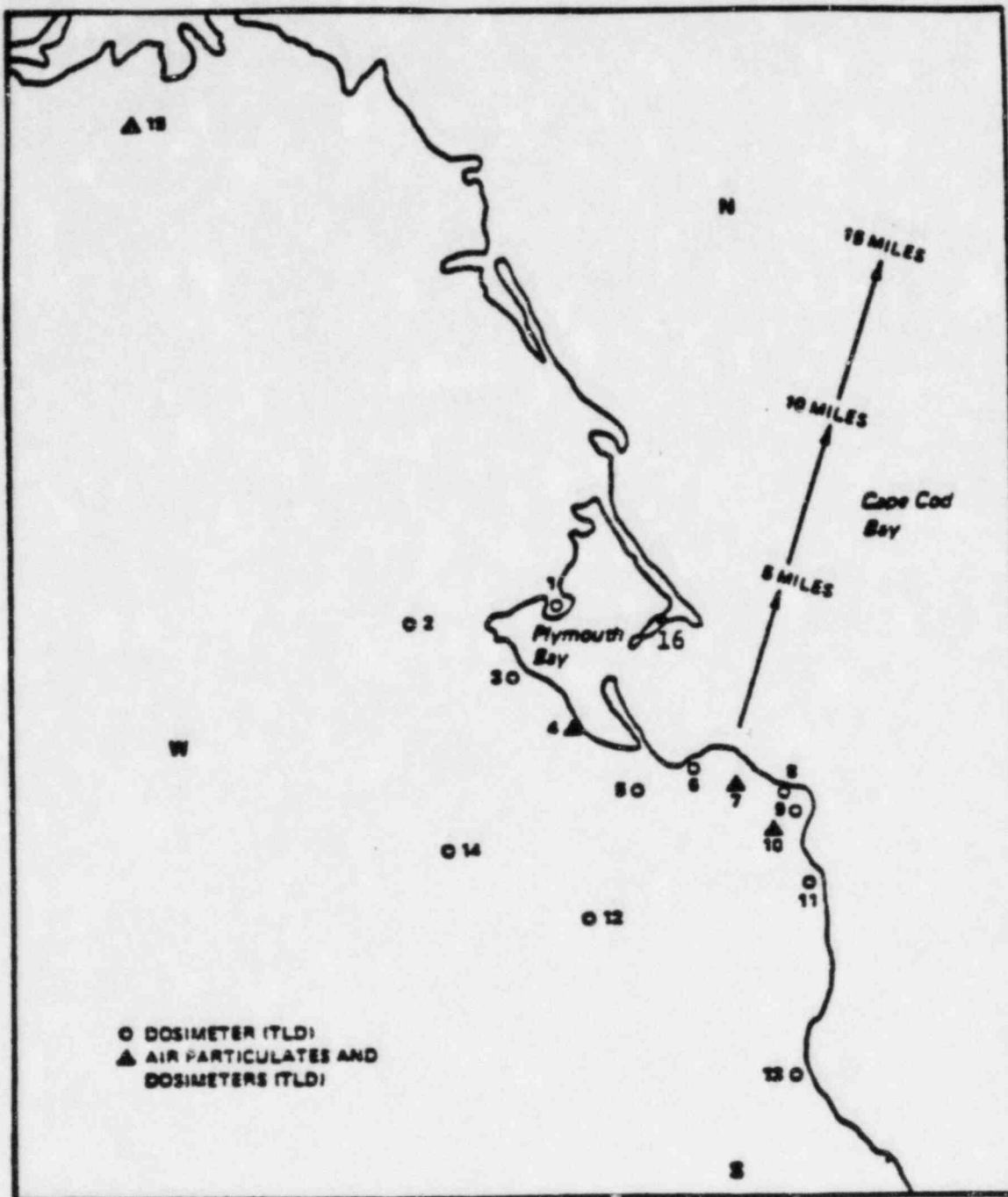


LEGEND

- | | | | |
|----|--------------------------|----|-----------------------|
| 1 | PROPERTY LINE (D) | 13 | ROCKY HILL ROAD (B) |
| 2 | PROPERTY LINE (F) | 14 | MICROWAVE TOWER (MT) |
| 3 | PROPERTY LINE (I) | 15 | EMERSON ROAD (EM) |
| 4 | PROPERTY LINE (G) | 16 | WHITE HORSE ROAD (WH) |
| 5 | ROCKY HILL ROAD (A) | 17 | PROPERTY LINE (E) |
| 6 | PROPERTY LINE (H) | 18 | ROCKY HILL ROAD (WR) |
| 7 | PUBLIC PARKING AREA (PA) | 19 | PROPERTY LINE (J) |
| 8 | PEDESTRIAN BRIDGE (PB) | 20 | PROPERTY LINE (K) |
| 9 | OVERLOOK AREA (OA) | 21 | ROCKY HILL ROAD (ER) |
| 10 | EAST BREAKWATER (EB) | 22 | PROPERTY LINE (L) |
| 11 | PROPERTY LINE (C) | 23 | WAREHOUSE (WS) |
| 12 | PROPERTY LINE (HB) | 24 | PROPERTY LINE (PL) |

- O DOSIMETER (TLD)
 Δ AIR PARTICULATES AND DOSIMETERS (TLD)

Figure 8.1.A-2 Location of Onsite Monitoring Stations



LEGEND

- | | |
|------------------------|--------------------------|
| 1 DUXBURY (SS) | 9 MANOMET (ME) |
| 2 KINGSTON (KS) | 10 MANOMET (MS) |
| 3 NORTH PLYMOUTH (NP) | 11 MANOMET (MB) |
| 4 PLYMOUTH CENTER (PC) | 12 COLLEGE POND (CP) |
| 5 SOUTH PLYMOUTH (SP) | 13 SAGAMORE (CS) |
| 6 BAYSHORE DRIVE (BD) | 14 PLYMOUTH AIRPORT (SA) |
| 7 CLEFT ROCK AREA (CR) | 15 EAST WEYMOUTH (EW) |
| 8 MANOMET (MP) | 16 SAQUISH NECK (SN) |

Figure 8.1.A-3 Location of Offsite Monitoring Stations

OPERATIONAL OBJECTIVES

7.1 (Continued)

B. Land Use Census

A land use census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden* of greater than 50 m² (500 ft²) producing broad leaf vegetation. (For elevated releases as defined in Regulatory Guide 1.111, Revision 1, July 1977, the land use census shall also identify within a distance of 5 km (3 miles) the locations in each of the 16 meteorological sectors of all milk animals and all gardens of greater than 50 m² producing broad leaf vegetation.

Action

- (1) With a land use census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Specification 8.4.A, in lieu of a Licensee Event Report, identify the new location(s) in the next Annual Environmental Radiological Monitoring Report.
- (2) With a land use census identifying a location(s) that yields a calculated

SURVEILLANCE REQUIREMENTS

8.1 (Continued)

B. Land Use Census

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 Monitoring Report.

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 8.1.A-1 shall be followed, including analysis of control samples.

OPERATIONAL OBJECTIVES

SURVEILLANCE REQUIREMENTS

7.1 (Continued)

dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Specification 7.1, add the new location(s) to the Radiological Environmental Monitoring Program within 30 days. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after (October 31) of the year in which this land use census was conducted. In lieu of a Licensee Event Report, identify the new location(s) in the next Annual Environmental Radiological Monitoring Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

OPERATIONAL OBJECTIVES

7.1 (Continued)

C. Interlaboratory Comparison Program

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

Action

- (1) With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Monitoring Report.

SURVEILLANCE REQUIREMENTS

8.1 (Continued)

C. Interlaboratory Comparison Program

A summary of the results obtained as part of the above required Interlaboratory Comparison Program and in accordance with the methodology and parameters in the ODCM shall be included in the Annual Radiological Environmental Monitoring Report.

OPERATIONAL OBJECTIVES

7.2 Dose - Liquids

Applicability

At all times.

- A. The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released to UNRESTRICTED AREAS shall be limited:
1. During any calendar quarter to < 1.5 mrem to the total body and to < 5 mrem to any organ, and
 2. During any calendar year to < 3 mrem to the total body and to < 10 mrem to any organ.

Action

- (1) With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, in lieu of a License Event Report, prepare and submit to the Commission within 30 days, a Special Report that identifies the cause(s), corrective actions taken, and corrective actions to be taken.

SURVEILLANCE REQUIREMENTS

8.2 Dose - Liquids

- A. Dose Calculations - Cumulative dose contributions from liquid effluents shall be determined in accordance with the Offsite Dose Calculation Manual (ODCM) for each calendar month during which releases occurred.

OPERATIONAL OBJECTIVES

7.3 Dose-Noble Gases

Applicability

At all times

- A. The air dose in areas at and beyond the SITE BOUNDARY due to noble gases released in gaseous effluents shall be limited to the following:
1. During any calendar quarter, to < 5 mrad for gamma radiation and < 10 mrad for beta radiation; and
 2. During any calendar year, to < 10 mrad for gamma radiation and < 20 mrad for beta radiation.

Action

- (1) With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, in lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, a Special Report which identifies the cause(s), the corrective actions taken, and corrective actions to be taken.

SURVEILLANCE REQUIREMENTS

8.3 Dose-Noble Gases

- A. Dose Calculations - Cumulative dose contributions for the total time period shall be determined in accordance with the Offsite Dose Calculation Manual (ODCM) for each calendar month during which releases occurred.

OPERATIONAL OBJECTIVES

7.4 Dose-Iodine 131, Radioactive Material in Particulate Form, and Tritium

Applicability

At all times

- A. The dose to a MEMBER OF THE PUBLIC from iodine-131, radioactive materials in particulate form, with half-lives greater than 8 days, and tritium in gaseous effluents released to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- (1) During any calendar quarter to < 7.5 mrem to any organ; and,
- (2) During any calendar year to < 15 mrem to any organ.

Action

- (1) With the calculated dose from the release of iodine-131, radioactive materials in particulate form, or tritium in gaseous effluents exceeding any of the above limits, in lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, a Special Report which identifies the cause(s), corrective actions taken, and the corrective actions to be taken.

SURVEILLANCE REQUIREMENTS

8.4 Dose-Iodine-131, Radioactive Material in Particulate Form, and Tritium

- A. Dose Calculations - Cumulative dose contributions for the total time period shall be determined for iodine-131, radioactive material in particulate form, with half-lives greater than eight (8) days, and tritium in accordance with the ODCM for each calendar month during which releases occurred.

OPERATIONAL OBJECTIVES

SURVEILLANCE REQUIREMENTS

7.5 Total Dose

Applicability

At all times

- A. The dose or dose commitment to any MEMBER OF THE PUBLIC from Pilgrim Station sources is limited to < 25 mrem to the total body or any organ (except the thyroid, which is limited to < 75 (mrem) over a period of 12 consecutive months.

Action

- (1) With the calculated dose from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Specifications 7.2.A.1, 7.2.A.2, 7.3.A.1, 7.3.A.2, 7.4.A.1 or 7.4.A.2 in lieu of a Licensee Event Report, prepare and submit a Special Report to the Commission and limit the subsequent releases such that the dose or dose commitment to any MEMBER OF THE PUBLIC from all uranium fuel cycle sources is limited to < 25 mrem to the total body or any organ (except thyroid, which is limited to < 75 mrem) over 12 consecutive months. This Special Report shall include an analysis which demonstrates that radiation exposures to all MEMBERS OF THE

8.5 Total Dose

- A. Dose Calculations - Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Specifications 7.2.A.1, 7.2.A.2, 7.3.A.1, 7.3.A.2, 7.4.A.1, and 7.4.A.2 and in accordance with the Offsite Dose Calculation Manual (ODCM).

OPERATIONAL OBJECTIVES

SURVEILLANCE REQUIREMENTS

7.5 (Continued)

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

BASES

7.1.A ENVIRONMENTAL MONITORING PROGRAM

and

8.1.A

An Environmental radiological monitoring program is conducted to verify the adequacy of in-plant controls on the release of radioactive materials. The program is designed to detect radioactivity concentrations which could result in radiation doses to individuals not exceeding the levels set forth in 10 CFR 50, Appendix I.

A supplemental monitoring program for sediments and mussels has been incorporated into the basic program (see notes f and g to Table 8.1.A-1) as a result of an agreement with the Massachusetts Wildlife Federation. This supplemental program is designed to provide information on radioactivity levels at substantially higher sensitivity levels in selected samples to verify the adequacy (or, alternatively, to provide a basis for later modifications) of the long-term marine sampling schedules. As part of the supplemental program, analysis of mussels for isotopes of plutonium will be performed if radiocesium activity should exceed 200 pCi/Kgm in the edible portions.

The 200 pCi/Kgm radiocesium "action level" is based on calculations which showed that if radiocesium from plant releases reached this level, plutonium could possibly appear at levels of potential interest.* The calculations also showed that the dose delivered from these levels of plutonium would not be a significant portion of the total dose attributable to liquid effluents.

The program was also designed to be consistent, wherever applicable with NUREG 0473.

Groundwater flow at the plant site is into Cape Cod Bay; therefore, terrestrial monitoring of groundwater is not included in this program.

Detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs in Table 8.1.A-4 are considered optimum for routine environmental measurements in industrial laboratories. 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.

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).

*In measurable quantities having a potential dose (human food chain) significance comparable to other nuclides if present at their detection limits.

BASES

7.1.B and 8.1.B LAND USE CENSUS

This section 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 the 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 50 m² provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: 1) 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of 2 kg/m².

7.1.C and 8.1.C INTERLABORATORY COMPARISON PROGRAM

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 reasonably valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

BASES

7.2
and
8.2

DOSE - LIQUID

This section is provided to implement the requirements of Sections II.A, III.A and IV.A of Appendix I, 10 CFR Part 50, to assure that the releases of radioactive material in liquid effluents will be kept "as low as is reasonably achievable." Alternatively, Pilgrim is not a site where plant operations can conceivably affect drinking water so that none of these requirements are intended to assure compliance with 40 CFR 141. The dose calculations 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 will be consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977. NUREG-0133 provides methods for dose calculations consistent with Regulatory Guides 1.109 and 1.113.

BASES

7.3
and
8.3

DOSE-NOBLE GASES

This section is provided to implement the requirements of Sections II.B, III.A and IV.A of Appendix I, 10 CFR Part 50, to assure that the releases of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable." The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I is to be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through the appropriate pathways is unlikely to be substantially underestimated. The dose calculations established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents will be consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "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 will be based upon the historical average atmospheric conditions. NUREG-0133 provides methods for dose calculations consistent with Regulatory Guides 1.109 and 1.111.

BASES

7.4
and
8.4

DOSE-IODINE-131, RADIOACTIVE MATERIAL IN PARTICULATE FORM AND TRITIUM

This section is provided to implement the requirements of Sections II.C, III.A and IV.A of Appendix I, 10 CFR Part 50, to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." The ODCM calculational methods specified in the surveillance requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methods approved by NRC for calculating the doses due to the actual release rates of the subject materials are required to be consistent with the methodology provided in Regulatory Guide 1.109, "Calculating of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from LightWater-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, radioactive material in particulate form with half-lives greater than 8 days and radionuclides other than noble gases are dependent on the existing radionuclide pathways to man, in areas at and beyond the SITE BOUNDARY. The pathways which are examined in the development of these calculations are: 1) individual inhalation of airborne radionuclides, 2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, 3) deposition onto grassy areas where milk animals and meat producing animals graze with consumption of the milk and meat by man, and 4) deposition on the ground with subsequent exposure of man.

BASES

7.5
and
8.5

TOTAL DOSE

This section is provided to meet the dose limitations of 40 CFR Part 190 that have now been incorporated into 10 CFR Part 30 by 46 FR 18525. The specification requires the preparation and submittal of a Special 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 40 CFR 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 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. 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.