

NEI 07-09 [Revision 0]

**GENERIC FSAR TEMPLATE
GUIDANCE FOR OFFSITE
DOSE CALCULATION
MANUAL (ODCM)
PROGRAM DESCRIPTION**

September 2007

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Nuclear Energy Institute

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EXECUTIVE SUMMARY

NEI 07-09, Generic FSAR Template Guidance for the Offsite Dose Calculation Manual (ODCM) Program Description, Revision 0, provides a complete generic program description for use in developing construction and operating license (COL) applications. The document reflects contemporary Nuclear Regulatory Commission (NRC) guidance, including Regulatory Guide 1.206 (Draft Guide DG-1145), “COL Applications for Nuclear Power Plants (LWR Edition),” and industry-NRC discussions regarding the applicable standard review plan section. A main objective of this program description is to assist in expediting NRC review and issuance of the combined license.

This generic template fully describes, at the functional level, elements of the process and effluent monitoring and sampling programs required by 10 CFR 50, Appendix I and 10 CFR 52.79 (a)(16). Consequently, applicants for combined licenses (COL) or design certifications may reference this generic template as an alternative to providing the full programs for the RETS, SREC, ODCM, and REMP at the time of the application, as requested in the Standard Review Plans for FSAR Chapter 11 and Regulatory Guide 1.206, C.I.134. If the programs are implemented as described in this generic template they do not require implementation of inspections, tests, analyses and acceptance criteria (ITAAC) in the COL application

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GENERIC FSAR TEMPLATE GUIDANCE FOR OFFSITE DOSE CALCULATION MANUAL (ODCM) PROGRAM DESCRIPTION, REVISION 0

1 INTRODUCTION

The Offsite Dose Calculation Manual (ODCM) describes the methodology and parameters used in the calculation of offsite doses from radioactive liquid and gaseous effluents, in the calculation of liquid and gaseous effluent monitoring instrumentation alarm/ trip setpoints, and in the conduct of the radiological environmental monitoring program (REMP). The ODCM also describe the radioactive effluent controls program, environmental monitoring activities, and includes the Standard Radiological Effluent Controls (SREC) . Requirements are established for the Annual Radiological Environmental Operating Report and the Annual Radioactive Effluent Release Report required by station Technical Specifications.

This ODCM generic template contains the methodology and generic parameters to demonstrate the calculation of offsite dose utilizing guidance based on NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, 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 50, Appendix I and Generic Letter 89-01 "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications (RETS) in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose calculation Manual or to the Process Control Program"

The ODCM program description documents how a licensee controls, monitor, perform radiological evaluations of all releases, document and report all radiological effluents discharged to the environment. This ODCM template will be modified prior to fuel load by providing an ODCM that address the following list of site-specific information. This modification will be handled as described in section 7.3 of the ODCM template is submittal information to meet DCD Section 11.5 will be updated prior to fuel load by the power reactor licensee with site specific information on the following:

- Installed radiological instrumentation and their alarm and actuation functions used to monitor and control effluent release,
- Atmospheric dispersion and location of dose receptors,
- The administrative and operational procedures associated with the implementation of the ODCM.

The above information will result in site specific dose projections and updating of the site specific instrumentation and processes used for surveillance and monitoring .The methodology used by power reactor licensees and the program for surveillance and monitoring effluent discharges are well established.

2 LIQUID EFFLUENTS

2.1 LIMITS OF OPERATION

The following sections implement recommended Effluent Controls and Surveillances defined by NUREG-1301 for PWR's (Reference 10) and NUREG-1302 for BWR's (Reference 11) for liquid radioactive waste effluents.

The Controls, Surveillances and Bases are to be implemented consistent with sections 3.0 Controls, 4.0 Surveillances and B Bases of the above NUREGS (Reference 10 and 11) identified below:

2.1.1 Liquid Effluent Monitoring Instrument Operability

2.1.1.1 Controls – Section 3.3.3.10

The radioactive liquid effluent monitoring instrumentation channels shall be OPERABLE with their Alarm/Trip Set points set to ensure that the limits of Control 3.11.1.1 are not exceeded.

2.1.1.2 Surveillance – Section 4.3.3.10

Each radioactive liquid effluent monitoring instrumentation channel shall be operable by performance of CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, AND CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 4.3-8

2.1.1.3 Bases – Section 3/4.3.3.10

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The Alarm/Trip Set points for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR 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.

2.1.2 Liquid Effluent Concentration

2.1.2.1 Controls – Section 3.11.1.1

The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS shall be limited to ten times the concentrations specified in 10 CFR 20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained

noble gases, the concentration shall be limited to $2E-4$ 10^{-4} $\mu\text{Ci/ml}$ total activity.

2.1.2.2 Surveillance – Section 4.11.1.1

The radioactivity content of each batch of radioactive liquid waste shall be determined by sampling and analysis in accordance with Table 4.11-1 [Reference 10 and 11] 2-3. The results of radioactive analyses shall be used with the calculational methods in the ODCM to assure that the concentration at the point of release is maintained within the limits of Section 2.1.2.1.

2.1.2.3 Bases – 3/4.11.1.1

The radioactivity content of each batch of radioactive liquid waste shall be determined by sampling and analysis. The results of radioactive analyses shall be used with the calculational methods in the ODCM to assure that the concentration at the point of release is maintained within the limits of Section 2.1.2.1 This ODCM control is provided to ensure that the concentration of radioactive materials released in liquid waste effluents to UNRESTRICTED AREAS will be less than ten times the concentration levels specified in 10 CFR 20, Appendix B, Table 2, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within (1) the Section II.A design objectives of Appendix 10 CFR 50, to a MEMBER OF THE PUBLIC, and (2) the limits of 10 CFR 20.1301 to the population.

2.1.3 Liquid Effluent Dose

2.1.3.1 Controls – Section 3.11.1.2

In accordance with Technical Specifications Section 5 Administrative Controls, the dose or dose rate to a MEMBER OF THE PUBLIC from radioactive material in liquid effluents released, from each unit, to UNRESTRICTED AREAS shall be limited:

- During any calendar quarter to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ,
- During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

2.1.3.2 Surveillances – Section 4.11.1.2

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

2.1.3.3 Bases – Section 3/4.11.1.2

This ODCM control is provided to implement the requirements of Sections II.A, III.A and IV.A of Appendix 1, 10 CFR Part 50. The limits stated in section 2.1.3.1 implement the guides set forth in Section II.A of Appendix I. For fresh water sites with drinking water supplies that can be potentially affected by plant operations, the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40 CFR Part 141. The dose calculations in the ODCM implement the requirements in Section III.A of Appendix I, which state that conformance with the guides of Appendix I, be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109 (Reference 2) and Regulatory Guide 1.113 (Reference 6).

2.1.4 Liquid Waste Management System

2.1.4.1 Controls – Section 3.11.1.3

In accordance with Technical Specification Section 5 Administrative Controls, the liquid radwaste treatment system shall be OPERABLE and appropriate portions of the system shall be used to reduce releases of radioactivity when the projected doses due to the liquid effluent, from each unit, would exceed 0.06 mrem to the whole body or 0.2 mrem to any organ in a 31 day period.

2.1.4.2 Surveillance – Section 4.11.1.3

Doses due to liquid releases from each unit to UNRESTRICTED AREAS shall be projected at least once per 31 days in accordance with the methodology and parameters in the ODCM during periods when the Liquid Waste Management System is not being fully utilized.

2.1.4.3 Bases – Sections 3/4.11.1.3

The OPERABILITY of the Liquid Waste Management System ensures that this system ensures will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept ALARA. This ODCM control implement the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the

Liquid Waste Management System were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50 for liquid effluents.

2.2 LIQUID WASTE MANAGEMENT SYSTEM

Liquid waste concentrations discharged from the station will not exceed the control of section 2.1.2.1.

2.3 LIQUID EFFLUENT MONITOR SET POINTS

2.3.1 General Provisions

Liquid monitor set points calculated in accordance with the methodology presented in the Addendum to NUREG -0133 (Reference 1) will be regarded as upper bounds for the actual high alarm set points. That is, a lower value for the high alarm set point may be established or retained on the monitor, if desired. Intermediate level set points should be established at an appropriate level to give sufficient warning prior to reaching the high alarm set point. If no release is planned for a particular pathway, or if there is no detectable activity in the planned release, the monitor set point should be established as close to background as practical to prevent spurious alarms, and yet alarm should an inadvertent release occur. The monitor set point will be determined consistent with the bases in section 2.1.2.3 for liquid effluents.

2.3.2 Overview of Method

Liquid Waste Management System effluent line radioactivity monitors are intended to provide alarm and automatic termination of release prior to exceeding the limits specified in Section 2.1. at the point of release of the diluted effluent into the UNRESTRICTED AREA. Therefore, their alarm/trip set points are established for compliance calculated using site specific parameters with the equations from NUREG-0133 reference 1.

2.4 LIQUID EFFLUENT DOSE CALCULATIONS

The Offsite Dose Calculation Manual methodology and parameters used in the calculation of alarm/trip set points utilize guidance based on NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants (Reference 1) and 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 50, Appendix I (Reference 2).

The methodology in Regulatory Guide 1.113, “Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I,” April 1977 using LADTAD is an acceptable method to calculate dose.

3 GASEOUS EFFLUENTS

3.1 LIMITS OF OPERATION

The following Limits of Operation implement requirements established by the licensee’s Technical Specifications Section 5 Administrative Controls The Controls Surveillances and Bases are to be implemented consistent with sections 3.0 Controls, 4.0 Surveillances and B Bases of NUREG-1301 for PWR’s (Reference 10) and NUREG-1302 for BWR’s (Reference 11) for gaseous radioactive waste effluents as follow:

3.1.1 Gaseous Effluent Monitoring Instrumentation

3.1.1.1 Controls – Section 3.3.3.11

The radioactive gaseous effluent monitoring instrumentation channels shall be OPERABLE with their Alarm/Trip Set points set to ensure that the limits of Control 3.11.2.1 are not exceeded.

3.1.1.2 Surveillances – Section 4.11.2

Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL Check, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST at the frequencies shown in Table 4.3-9.

3.1.1.3 Bases – Section 3/4.11.2

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

3.1.2 Gaseous Effluent Dose Rate

3.1.2.1 Controls – Section 3.11.2.1

In accordance with Technical Specifications Section 5 Administrative Controls, the dose rate due to radioactive material in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY shall be limited:

- For noble gases: Less than or equal to 500 mrem/yr to the whole body and less than or equal to 3000 mrem/yr to the skin, and
- For Iodine-131, Iodine-133, tritium, and all radioactive nuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

3.1.2.2 Surveillance –Section 4.11.2.1

The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with methodology and parameters in the ODCM. By obtaining representative samples and performing analysis in accordance with the sampling and analysis program in Table 4.11-2.

3.1.2.3 Bases – Section 3/4.11.2.1

This ODCM control is provided to ensure that the dose at any time at and beyond the SITE BOUNDARY from gaseous effluents from all units on the site will not result to a dose to a MEMBER OF THE PUBLIC in an UNRESTRICTED AREA exceeding the limits specified in Appendix I of 10 CFR Part 50. For MEMBERS OF THE PUBLIC who may at times be within the SITE BOUNDARY, the occupancy of that MEMBER OF THE PUBLIC will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY.

The dose rate limit for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days specifically applies to a child via the inhalation pathway.

3.1.3 Gaseous Effluent Dose Noble Gas

3.1.3.1 Controls – Section 3.11.2.2

In accordance with Technical Specifications Section 5 Administrative Controls, the air dose due to noble gases released in gaseous effluents, from each unit to areas at and beyond the SITE BOUNDARY shall be limited:

- During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation, and
- During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

3.1.3.2 Surveillances – Section 4.11.2.2

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

3.1.3.3 Bases – Section 3/4.11.2.2

This ODCM control is provided to implement the requirements of Sections II.B.1 of Appendix I, 10 CFR Part 50. Section 3.1.3.1 implements the guides set forth in Section II.B.1 of Appendix I. The Surveillance requirements in Section 3.1.3.2 implement the requirements in Section III.A of Appendix I, which require that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual Exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculations established in Section 3.4.2 for calculating the doses due to the actual releases of noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109 (Reference 2), and Regulatory Guide 1.111 (Reference 5). The equations in Section 3.4.2 provided for determining the air doses at the SITE BOUNDARY are based upon the historical annual average atmospheric conditions.

3.1.4 Gaseous Effluent Dose, I-131, I-133, Tritium and All Particulates

3.1.4.1 Controls – Section 3.11.2.3

In accordance with Technical Specifications Section 5 Administrative Controls, the dose to a MEMBER OF THE PUBLIC FROM Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released, from each unit to areas at and beyond the SITE BOUNDARY shall be limited:

- During any calendar quarter: Less than or equal to 7.5 mrem to any organ, and
- During any calendar year: Less than or equal to 15 mrem to any organ.

3.1.4.2 Surveillance – Section 4.11.2.3

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

3.1.4.3 Bases – Section 3 /4.11.2.3

This ODCM control is provided to implement the requirements of Section II.B.2.b and II.C of Appendix I, 10 CFR Part 50. The limits stated in Section 3.1.4.1 are the guides set forth in Section II.C of Appendix I. The calculational methods specified in the Surveillance Requirements of Section 3.1.4.2 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 calculational methods in Section 3.4 for calculating the doses due to the actual releases of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109 (Reference 3), and Regulatory Guide 1.111 (Reference 5). These equations provide for determining the actual doses based upon the historical annual average atmospheric conditions. The release specifications for radioiodines, radioactive materials in particulate form, and radionuclide pathways to man, in the areas at and beyond the SITE BOUNDARY. The pathways which were examined in the development of these calculations were: 1) Individual inhalation of airborne radionuclides, 2) deposition of radionuclides onto green leafy garden vegetation with subsequent consumption by man, 3) deposition onto grassy areas where milk animals and meat producing animals graze with consumption of the milk and meat by man, and 4) deposition on the ground with subsequent exposure of man.

3.1.5 Gaseous Waste Management System

3.1.5.1 Controls – Section 3.11.2.4

In accordance with Technical Specification Section 5 Administrative Controls, the Gaseous Waste Management System shall be OPERABLE and appropriate portions of the system shall be used to reduce releases of radioactivity when the projected doses in 31 days due to gaseous effluent releases, from each unit, to areas at and beyond the SITE BOUNDARY would exceed 2% of the guidelines for the annual dose or dose commitment, conforming to 10 CFR 50 Appendix I;

- 0.2 mrad to air from gamma radiation, or
- 0.4 mrad to air from beta radiation or
- 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

3.1.5.2 Surveillance – Section 4.11.2.4

Doses due to gaseous releases from each unit to areas at and beyond the SITE BOUNDARY shall be projected at least once per 31 days in accordance with the methodology and parameters in the ODCM when the Gaseous Waste Management Systems are not being fully utilized.

3.1.5.3 Bases – Section 3/4.11.2.4

The OPERABILITY of the Gaseous Waste Management System ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in gaseous effluents will be kept ALARA. This ODCM control implement the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the Liquid Waste Management System were specified as a suitable fraction of the dose design objectives set forth in Section II.B and II.C of Appendix I, 10 CFR Part 50 for gaseous effluents.

3.2 GASEOUS WASTE MANAGEMENT SYSTEM

The objective of the Gaseous Waste Management System is to process and control the release of gaseous radioactive effluents to the site environs so as to maintain the exposure of persons in unrestricted areas to radioactive gaseous effluents as low as reasonably achievable according to 10 CFR 50, Appendix I and 10 CFR 50.34a. This is accomplished while maintaining occupational exposure as low as reasonably achievable without limiting plant operation or availability.

3.3 GASEOUS EFFLUENT MONITOR SET POINTS

3.3.1 General Provisions Regarding Noble Gas Monitor Set points

Noble gas radioactivity monitor set points calculated in accordance with the methodology presented in NUREG-0133 (Reference 1) section are intended to ensure that the limits of Section 3.1. are not exceeded. They will be regarded as upper bounds for the actual high alarm set points. That is, a lower high alarm set points may be established or retained on the monitor, if desired. Intermediate level set points should be established at an appropriate level to give sufficient warning prior to reaching the high alarm set points.

3.4 GASEOUS EFFLUENT COMPLIANCE CALCULATIONS

Because the dose rate limits for areas at and beyond the SITE BOUNDARY specified in section 3.1. Are site limits applicable at any instant in time, the summations extend over all simultaneously active gaseous final release pathways at the plant site. The licensee identified the gaseous final release pathways at the plant site in the DCD. The alarm/trip set points are established for compliance and calculated using site specific parameters with the equations from NUREG-0133, Reference 1.

The methods and parameters utilized for calculation of gaseous effluent pathway dose are based on NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, 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 50, Appendix I and Regulatory Guide 1.111, Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors.

4 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

4.1 LIMITS OF OPERATION

4.1.1 The Radiological Environmental Monitoring Program (REMP)

The REMP required by this ODCM control provides representative measurements of radiation and of radioactive materials in those exposure pathways, and for those radionuclides, which lead to the highest potential radiation exposure of MEMBERS OF THE PUBLIC resulting from the plant operation. The REMP implements Section IV.B.2, Appendix I, 10 CFR 50, and thereby supplements the radiological effluent monitoring program by measuring concentrations of radioactive materials and levels of radiation, which may then be compared with those expected on the basis of the effluent measurements and modeling of the environmental exposure pathways. The Controls, Surveillances and Bases are to be implemented consistent with sections 3.0 Controls, 4.0 Surveillances and Bases of NUREG-1301 for PWR's (Reference 10) and NUREG-1302 for BWR's (Reference 11) for radiological environmental monitoring as follow:

4.1.1.1 Controls – Section 3.12.1

In accordance with Technical Specification Section 5 Administrative Controls, the Radiological Environmental Monitoring Program shall be conducted as specified in Table 3.12-1.

4.1.1.2 Surveillance – Section 4.12.1

The REMP samples shall be collected pursuant to Table 3.12-1 from the site specific locations, and shall be analyzed pursuant to the requirements of Table 3.12-1 and the detection capabilities required by Table 4.12-1.

4.1.1.3 Bases – Section 3/4.12.1

The REMP required by this ODCM control provides representative measurements of radiation and of radioactive materials in those exposure pathways, and for those radionuclides, which lead to the highest potential radiation exposure of MEMBERS OF THE PUBLIC resulting from the plant operation. The REMP implements Section IV.B.2, Appendix I, 10

CFR 50, and thereby supplements the radiological effluent monitoring program by measuring concentrations of radioactive materials and levels of radiation, which may then be compared with those expected on the basis of the effluent measurements and modeling of the environmental exposure pathways.

4.1.2 Land Use Census

This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50.

The Controls, Surveillances and Bases are to be implemented consistent with sections 3.0 Controls, 4.0 Surveillances and B Bases of NUREG-1301 for PWR's (Reference 10) and NUREG-1302 for BWR's (Reference 11) for Land Use Census as follow:

4.1.2.1 Controls – Section 3.12.2

Land use census shall be conducted annually and shall identify the following within a distance of 5 miles in each of the 16 meteorological sections: the location of the nearest milk animal, the nearest permanent residence, and the nearest garden of greater than 500 square feet producing broad leafy vegetation. This ODCM control is provided to ensure that changes in the use of UNRESTRICTED AREAS are identified and that modifications to the REMP are made if required by the results of this census.

4.1.2.2 Surveillance – Section 4.12.2

The land use census shall be conducted annually, using that information which will provide good results, such as a door-to-door census, a visual census from automobile or aircraft, consultation with local agriculture authorities, or some combination of these methods, as feasible. Results of the land use census shall be included in the Annual Radiological Environmental Operating Report.

4.1.2.3 Bases- Section 3/4.12.2

This ODCM control is provided to ensure that changes in the use of UNRESTRICTED AREAS are identified and that modifications to the REMP are made if required by the results of this census. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 ft² 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/y) 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

percent 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 was obtained.

4.1.3 Inter-laboratory Comparison Program Analyses

The Controls, Surveillances and Bases are to be implemented consistent with sections 3.0 Controls, 4.0 Surveillances and B Bases of NUREG-1301 for PWR's (Reference 10) and NUREG-1302 for BWR's (Reference 11) for Inter-Laboratory Comparison Program as follow:

4.1.3.1 Controls – Section 3.12.3

This analysis is performed on radioactive materials supplied as part of an Inter-laboratory Comparison Program that satisfies the requirements of Regulatory Guide 4.15 (Reference 7).

4.1.3.2 Surveillance – Section 4.12.3

A summary of the results obtained as part of the required Inter-laboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report.

4.1.3.3 Bases – Section 3/4.12.3

The requirement for participation in an approved Inter-laboratory 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, Appendix I, 10 CFR 50.

4.1.4 Quality Assurance

Quality assurance is necessary to ensure that all radiological and non-radiological measurements that support the REMP are reasonably valid and of a defined quality. All steps of the monitoring process, which include but are not limited to, calibration of effluent monitoring instrumentation, sampling, shipment of samples, receipt of samples in a laboratory, preparation of samples, radiological measurements, data reduction, data evaluation, reporting of the measurements, monitoring results, record keeping, performance of assessments/audits, and preventive and corrective actions shall be in accordance with written standard operating procedures and policies, and in accordance with Reg Guide 4.15. and Chapter 17 of the FSAR.

4.1.5 Groundwater Monitoring

The licensee site procedure will establish action levels and reporting criteria for communications with State/Local officials and for documentation of accidental radioactive spills, leaks, or any other type of unplanned radioactivity releases to the environment which could affect groundwater both onsite and/or offsite. The groundwater sample results and a description of any significant onsite leaks/spills into groundwater will be reported in the Annual Radiological Environmental Operating Report and/ or Radioactive Effluent Release Report and/or licensee NRC approved report.

5 TOTAL DOSE DETERMINATIONS

5.1 LIMITS OF OPERATION

The Controls Surveillances and Bases are to be implemented consistent with sections 3.0 Controls, 4.0 Surveillances and B Bases of NUREG-1301 for PWR's (Reference 10) and NUREG-1302 for BWR's (Reference 11) for radioactive effluents as follow:

5.1.1 Controls Section 3.11.4

In accordance with Technical Specification Section 5 Administrative Controls , the dose or dose commitment to any Member of the Public over a calendar year, due to releases of radioactivity and to radiation from uranium fuel cycle sources, will be limited to less than or equal to 25 mrem to the total body or any organ, except the thyroid, which will be limited to less than or equal to 75 mrem.

5.1.2 Surveillance – Section 4.11.4

Cumulative dose contributions from liquid and gaseous effluents and from direct radiation shall be determined in accordance with Section 5.2 of the ODCM.

5.1.3 Bases –Section 3/4.11.4

This ODCM control is provided to meet the dose limitations and reporting requirements of 40 CFR 190. The control requires the preparation and submittal of a special report whenever the calculated doses from plant radioactive effluents exceed the limits of Section 5.1. 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 190 if the individual reactors remain within twice the dose design objectives of Appendix I and if direct radiation doses from the unit, such as direct exposure from outside storage tanks, are kept small. The special report will describe a course of action which should result in the limitation of dose to a MEMBER OF THE PUBLIC for a calendar year to within the 40 CFR 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 uranium fuel cycle facilities at the same site or within a radius of 5 miles must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR 190, the special report with a request for variance (provided the release conditions resulting in violation of 40 CFR 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.2203(a)(4), is considered to be a timely request and fulfills the requirements of 40 CFR 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR 190, and does not apply in any way to the requirements for dose limitation as addressed in other sections of this ODCM. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation which is part of the nuclear fuel cycle.

5.1.4 Total Dose – Sections 3/4/B.11.4

5.2 DEMONSTRATION OF COMPLIANCE

Each licensee will identify if there are any other uranium fuel cycle facilities within 5 miles of the plant site. If not, for the purpose of demonstrating compliance with the limits of Section 5.1, the total dose to a Member of the Public in the vicinity of the plant site due to uranium fuel cycle sources shall be determined. If other uranium fuel cycle facilities are within 5 miles, all sources are evaluated to determine compliance with the limits of Section 5.1.

6 POTENTIAL DOSE TO MEMBERS OF THE PUBLIC

6.1 REQUIREMENTS FOR CALCULATION

To support the reporting requirements of Section 7.2.2., an assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY shall be performed as specified in Section 6.2, at least once per calendar year.

6.2 CALCULATION METHOD

For the purpose of performing the calculations required in Section 6.1, the dose to a member of the public inside the SITE BOUNDARY will be determined at the locations, and for the receptor age groups, defined in a table format indicating, Attributes of Member of the Public Receptor Locations Inside the Site Boundary, at the site specific location.

7 REPORTS

7.1 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

7.1.1 Requirement for Report

In accordance with Technical Specification Section 5 Administrative Controls, the Annual Radiological Environmental Operating Report covering the REMP activities during the previous calendar year will be submitted before May 15 of each year. The material provided will be consistent with the information outlined in section 4.1 and section 7.1.2 of the ODCM, and in Sections IV.B.2, IV.B.3, and IV.C of Appendix I to 10 CFR Part 50.

7.1.2 Report Contents

The materials specified in the following sub-sections will be included in each Annual Radiological Environmental Operating Report:

7.1.2.1 Data

The report includes the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in Section 4.0 REMP, as well as summarized and tabulated results of these analyses and measurements taken during the report period, in a format similar to that contained in Table 3 of the Radiological Assessment Branch Technical Position (Reference 16); the results for any additional samples are also reported. In the event that some individual results are not available for inclusion with the report, the report is submitted noting and explaining the reasons for the missing results. The missing data is submitted in a supplementary report as soon as possible. The results for naturally-occurring radionuclides not included in plant effluents need not be reported.

7.1.2.2 Evaluations

Interpretations and analyses of trends of the results shall be included in the report, including the following (as appropriate):

- Comparisons with pre-operational studies, operational controls, and previous environmental reports; and
- An assessment of any observed impacts of the plant operation on the environment.

If the measured level of radioactivity in an environmental sampling medium exceeding the reporting levels of section 4 is not the result of plant effluents, the condition is described as required by Sections 4.1.1, 4.1.2, 4.1.3, 4.1.4 and 4.1.5.

7.1.2.3 Programmatic Information

Also included in each report are the following:

- A summary description of the REMP;
- Maps of all sampling/measurement locations;
- The results of land use censuses required by Section 4.1.2; and
- Results of licensee participation in the Inter-laboratory Comparison Program required by Section 4.1.3.

7.1.2.4 Descriptions of Program Deviations

Discussions of deviations from the established program must be included in each report.

7.2 RADIOACTIVE EFFLUENT RELEASE REPORT

7.2.1 Requirement for Report

In accordance with Technical Specification Section 5 Administrative Controls the Radioactive Effluent Release Report covering the operation of the unit during the previous year will be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report will include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR Part 50, Appendix I, Section IV.B.1.

7.2.2 Report Contents

The materials specified in the following sub-sections will be included in each Radioactive Effluent Release Report:

7.2.2.1 Quantities of Radioactive Materials Released

The report includes a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in NRC Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974 (Reference 14). Liquid and gaseous effluent data are summarized on a quarterly basis while solid radioactive waste data is summarized on a semiannual basis following the format of Appendix B of the Reg Guide. Unplanned releases of radioactive materials in gaseous and liquid effluents from the site to UNRESTRICTED AREAS are included in the report, tabulated either by quarter or by event. For gamma emitters released in liquid and gaseous effluents, in addition to the principal

gamma emitters for which MDCs are specifically established, other peaks which are measurable and identifiable are also identified and reported.

7.2.2.2 Metrological Data

The report will 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 of wind speed, wind direction, and atmospheric stability, and precipitation (if measured) on magnetic tape; or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability. In lieu of submission with the Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.

7.2.2.3 Dose Assessments

The report will include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit during the previous calendar year. Historical annual average meteorology conditions concurrent with the time of release of radioactive materials in gaseous effluents (as determined by sampling frequency and measurement) will be used for determining the gaseous pathway doses.

If a determination is required by Section 5.1, the report will also include an assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources (including doses from primary effluent pathways and direct radiation) for the previous calendar year to show conformance with 40 CFR 190, Environmental Radiation Protection Standards for Nuclear Power Operation; this dose assessment must be performed in accordance with Chapter 5. The report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY during the report period; this assessment must be performed in accordance with Chapter 6. All assumptions used in making these assessments (i.e., specific activity, exposure time, and location) shall be included in the report.

7.2.2.4 Solid Radioactive Waste Data

For each type of solid waste shipped offsite during the report period, the following information shall be included:

- Waste volume,
- Total curie quantity Principal radionuclides,
- Type of waste (e.g., spent resin, compacted dry waste, evaporator bottoms),
- Type of container,

- Solidification agent, and
- Class of solid wastes

7.2.2.5 Description of Program Deviations

Discussions of deviations from the established program shall be included in each report, as follows:

- The report will include deviations from the liquid and gaseous effluent monitoring instrumentation operability requirements. The report will include an explanation as to why the inoperability of the liquid or gaseous effluent monitoring instrumentation was not corrected within the specified time requirement.
- The report will include a description of the events leading to liquid holdup tanks or gas storage tanks exceeding the limits of Technical Specifications [Later].

7.2.2.6 Major Changes to Radioactive Waste Treatment Systems

In accordance with Technical Specification Section 5 Administrative Controls, the ODCM will contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip set points, and in the conduct of the radiological environmental monitoring program. Major changes to radioactive waste treatment systems (liquid and gaseous) that change the above methodology or parameters may require revision of the ODCM as determined by a site evaluation ,i.e.10 CFR 50.59, applicable 10 CFR Part 52 Processes for Change and Departures or the NRC approved site administrative process.

7.3 REVISION OF THE ODCM

In accordance with Technical Specification Section 5 Administrative Controls, Licensee initiated changes to the ODCM:

- Will be documented and records of reviews performed will be retained. This documentation will contain sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s), and a determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and not adversely impact the accuracy or reliability of effluent, dose, or set point calculations;
- Will become effective after approval of the plant manager; and will be submitted to the NRC in the form of a complete, legible copy of the changed portion of the ODCM as a part of, or concurrent with, the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change will

be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and will indicate the date (i.e., month and year) the change was implemented.

8 METEOROLOGICAL MODELS

The models are used to compute the specific values of meteorology-related parameters referenced throughout this ODCM. These models will also be used whenever it is necessary to calculate values of these parameters for new locations of interest. Both atmospheric dispersion and plume depletion will be calculated using the appropriate form of the sector-average Gaussian model in accordance with Reg. Guide 1.111, Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors. Gaseous release elevations may be considered to be either at ground-level, elevated, or mixed-mode. Site specific information to be provided in final ODCM completed prior to fuel load.

9 DEFINITIONS OF EFFLUENT CONTROL TERMS

The terms defined in this chapter are used in the presentation of the above chapters. These terms are shown in all capital letters to indicate that they are specifically defined.

9.1 TERMS SPECIFIC TO THE ODCM

The following terms are used in the ODCM, but are not found in the Technical Specifications:

| Term | Definition |
|---------------------------------|--|
| GASEOUS WASTE MANAGEMENT SYSTEM | The system designed and installed at the site to reduce radioactive gaseous effluents by collecting Reactor Coolant System offgases from the Reactor Coolant System and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment. |
| MEMBER(S) OF THE PUBLIC | A MEMBER OF THE PUBLIC means any individual except when that individual is receiving an <i>occupational dose</i> ¹ . This category may include persons who use portions of the site for recreational, occupational, or other purposes not associated with |

¹ The italicized terms in this definition, which are not otherwise used in this ODCM, shall have the definitions assigned to them by 10 CFR 20.1003.

| Term | Definition |
|-------------------|---|
| | the plant. |
| SITE BOUNDARY | For the purpose of effluent controls defined in the ODCM, the SITE BOUNDARY shall be shown in site specific Figure. |
| SOURCE CHECK | A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity. |
| UNRESTRICTED AREA | The UNRESTRICTED AREA shall be any area access to which is neither limited nor controlled by the licensee, or any area within the SITE BOUNDARY used for residential quarters or for industrial, commercial, institutional, and/or recreational purposes. |

| Term | Definition |
|---------------------|---|
| CHANNEL CALIBRATION | <p>A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel so that it responds within the required range and accuracy to known values of the parameter that the channel monitors. The CHANNEL CALIBRATION shall encompass all devices in the channel required for OPERABILITY.</p> <p>Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an in-place qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel. The CHANNEL CALIBRATION may be performed by means of any series of sequential, overlapping, or total channel steps.</p> |
| CHANNEL CHECK | A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same |

| Term | Definition |
|--------------------------------|---|
| | parameter. |
| CHANNEL OPERATIONAL TEST (COT) | A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of all devices in the channel required for channel OPERABILITY. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip set points required for channel OPERABILITY such that the set points are within the necessary range and accuracy. The COT may be performed by means of any series of sequential, overlapping, or total channel steps. |
| OPERABLE (or OPERABILITY) | A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s). |

10 REFERENCES

1. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, October 1978.
2. 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 50, Appendix I," U.S. Nuclear Regulatory Commission, March 1976.
3. Regulatory Guide 1.109, Revision 1, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I, U.S. Nuclear Regulatory Commission, October 1977.
4. Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," U.S. Nuclear Regulatory Commission, March 1976.
5. Regulatory Guide 1.111, Revision 1, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," U.S. Nuclear Regulatory Commission, July 1977.
6. Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.
7. Regulatory Guide 4.15, Rev 1 "Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) - Effluent Streams and the Environment." February 1979.
8. Regulatory Guide 8.8, Revision 3, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Stations Will Be As Low As Is Reasonably Achievable," June 1978.
9. NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors." [This NUREG includes Generic Letter 89-01 Supplement No.1.]
10. NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors." [This NUREG includes Generic Letter 89-01.]
11. NUREG-0800, Standard Review Plan, 11.5 "Process and Effluent Radiological Monitoring Instrumentation and sampling Systems" Rev 4 March 2007
12. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"

13. Regulatory Guide 1.21, Revision 1, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Reactors, U.S. Nuclear Regulatory Commission, June 1974.
14. NUREG/CR-4007, "Lower Limit of Detection: Definition and Elaboration of a Proposed Position of Radiological Effluent and Environmental Measurements," U.S. Nuclear Regulatory Commission, July 1984.
15. "Radiological Assessment Branch Technical Position," U.S. Nuclear Regulatory Commission, November 1979.
16. DOE/TIC-11026, "Radioactive Decay Data Tables," 1981.
17. NUREG/CR-3332, "Radiological Assessment," U.S. Nuclear Regulatory Commission, 1983.
18. International Commission on Radiological Protection (ICRP) Publication 2, "Permissible Dose for Internal Radiation" (1959)
19. 10 CFR Part 20, "Standards for Protection Against Radiation."
20. 40 CFR, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."
21. Regulatory Guide 4.13, Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications Rev. 1, July 1977
22. 10 CFR Part 100, "Reactor Site Criteria"
23. Generic Letter 89-01 "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications (RETS) in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose calculation Manual or to the Process Control Program"
24. NUREG-0800, Standard Review Plan, Branch Technical Position 7-10, Guidance on Application of Regulatory Guide 1.97, Rev 5 March 2007
25. Regulatory Guide 1.112 Revision 1, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Watercooled Nuclear Power Reactors, March 2007
26. FSAR Chapter 17 non safety related Quality Control Program
27. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

28. Regulatory Guide 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition).”
29. Regulatory Guide 4.1, “Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants.”
30. Regulatory Guide 4.8, “Environmental Technical Specifications for Nuclear Power Plants.”