NEI 07-09A [Revision 0]

Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description

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Nuclear Energy Institute

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ACKNOWLEDGEMENTS

This program description document, *Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM),* NEI 07-09A, Revision 0, was developed by the NEI New Plant Radiation Protection and Radioactive Waste Task Force. We appreciate the time, efforts and expertise of the individuals who contributed to the development of this guideline.

EXECUTIVE SUMMARY

NEI 07-09A, *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, "Combined License Applications for Nuclear Power Plants," 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 ODCM, and Radiological Environmental Monitoring Program (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.13.4. 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.

TABLE OF CONTENTS

1 INTRODUCTION

The Process and Effluent Monitoring and Sampling program consists of four component programs:

- Radiological Effluent Technical Specifications/Standard Radiological Effluent Controls (RETS/SREC)
- Offsite Dose Calculation Manual (ODCM)
- Radiological Environmental Monitoring Program (REMP)
- Process Control Program (PCP)

The PCP is provided as a separate document, and portions of the RETS/SREC are provided in the plant technical specifications. This document (NEI 07-09) provides program descriptions for the ODCM and the REMP, and portions of the RETS/SREC that are not in the plant technical specifications.

The ODCM is a supporting document of the facility's technical specifications and contains the REMP. Since the ODCM contains the REMP and major portions of the RETS/SREC, these components of the Process and Effluent Monitoring and Sampling program will hereafter be referred to as the ODCM.

This document provides an acceptable template that may be used by a Combined License (COL) applicant to fully describe the ODCM. The program description addressed in this document is not a substitute for the complete ODCM; it is a description of the full program. Typical timing for development and implementation of the full ODCM is in the FSAR section 13.4. Information within double parentheses (( )) will be provided by licensee in the full ODCM.

The ODCM described in this document conforms to 10 CFR 50.36a for the control of radioactive effluents and for maintaining the doses to members of the public from radioactive effluents as low as is reasonably achievable, and includes remedial actions to be taken whenever the program limits are exceeded.

The methodology is provided to calculate offsite doses resulting from radioactive gaseous and liquid effluents, to calculate gaseous and liquid effluent monitoring alarm/trip setpoints, and to conduct the REMP. Requirements are established for the annual radiological effluent report required by 10 CFR 50.36a.

The equations and methods used in this ODCM program description are based on those presented in NUREG-0133, Regulatory Guide 1.109, Regulatory Guide 1.111, Regulatory Guide 1.113 and NRC regulatory requirements and guidance identified in the reference section of this document..

2 PURPOSE

This template applies to the Radioactive Effluent and Environmental Monitoring Programs. It provides an acceptable format that may be used by a Combined License (COL) applicant to fully describe the ODCM.

3 SCOPE

This template applies to licensee's Radioactive Effluent and Environmental Monitoring Programs. It provides program descriptions for the ODCM and the REMP, and portions of the RETS/SREC that are not in the plant technical specifications.

4 DEFINITIONS

Channel Calibration

A channel calibration shall be the adjustment, as necessary, of the channel output such that it responds within the necessary 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 channel OPERABILITY. The channel calibration may be performed by means of any series of sequential, overlapping, or total channel steps.

Channel Check

A Channel Check shall be qualitative assessment, by observation, of channel behavior during operation. This assessment includes, where possible, comparison of the channel indication and status with other indications or status derived from independent instrumentation channels measuring the same parameter.

Channel Operational Test

A Channel Operational Test (COT) shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify 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 setpoints required for channel OPERABILITY such that setpoints are within the necessary range and accuracy. The COT may be performed by means of any series of sequential, overlapping, or total channel steps.

Critical Organ

That organ, which has been determined to be the maximum exposed organ based on an effluent pathway analysis, thereby ensuring the dose and dose rate limitations to any organ will not be exceeded. Dose calculations to the critical organ will be evaluated in accordance with Technical Specifications dose rate limits specified for any organ to verify these limits have not been exceeded.

Dose Equivalent I-131

The dose equivalent I^{131} is that concentration of I^{131} (μCi/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I^{131}, I^{132}, I^{133}, I^{134}, and I^{135} actually present. The thyroid dose conversion factors used for this calculation are listed in Table III of TID-14844, Calculation of Distance Factors for Power and Test Reactor Sites. Thyroid dose conversion factors from Table E-7 to E-14 of NRC Regulatory Guide 1.109, Revision 1, may be used.

Frequency Notations

NOTE: Frequencies are allowed a maximum extension of 25 percent.

NOTATION	FREQUENCY
S – Once per shift	At least once per 12 hours
D – Daily	At least once per 24 hours
W – Weekly	At least once per 7 days
M – Monthly	At least once per 31 days
Q – Quarterly	At least once per 92 days
SA – Semi-annually	At least once per 184 days
R – Refueling	At least once per 18 -24 months (Based on a plants nominal refueling cycle)
S/U – Start-up	Prior to each reactor start-up
P – Prior to release	Completed prior to each release
NA – Not applicable	Not applicable
DR – During the release	At least once during each release

Gaseous Waste Management System

A system that reduces radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing delay or holdup to reduce total radioactivity prior to release to the environment.

General Nomenclature

X = Chi: concentration at a point at a given instant (curies per cubic meter)

D = Deposition: quantity of deposited radioactive material per unit area (curies per square meter)

Q = Source strength (instantaneous; grams, curies)

Q = Emission rate (continuous; grams per second, curies per second)

Q = Emission rate (continuous line source; grams per second per meter)

Liquid Waste Management System

A system designed and installed to reduce radioactive materials in liquid effluents by systematic collection, retention, and processing prior to release to the environment.

Lower Limit of Detection (LLD)

The smallest concentration of radioactive material in a sample that will yield a net count (above system background) that can be detected with 95 percent probability with only five percent probability of falsely concluding that a blank observation represents a "real" signal.

Members of the Public

Individuals who, by virtue of their occupational status, have no formal association with the site. This category includes non-employees of the licensee who are permitted to use portions of the site for recreational, occupational, or other purposes not associated with site functions. This category does not include non-employees such as vending machine servicemen or postal workers who, as part of their formal job function, occasionally enter an area that is controlled by the licensee to protect individuals from exposure to radiation and radioactive materials.

Operable - Operability

A system, subsystem, train, component, or device is operable or has operability when it is capable of performing its specified functions and all necessary, attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its functions are also capable of performing their related support functions.

Purge - Purging

The controlled discharge of air or gas from a confinement to maintain temperature, pressure, humidity, concentration, or other operating condition, so that replacement air or gas is required to purify the confinement.

Rated Thermal Power

Total reactor core heat transfer rate to reactor coolant.

Site Boundary

That line beyond which the licensee does not own, lease, or otherwise control the land.

Source Check

A qualitative assessment of channel response when a channel sensor is exposed to a source of increased radioactivity.

Special Report

A report to NRC to comply with Subsections 6.2, 6.3, or 6.5 of this template.

Thermal Power

Total reactor core heat transfer rate to the reactor coolant.

Unrestricted Area

Any area at or beyond the site boundary, access to which is neither limited nor controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, or any area within the site boundary used for residential quarters or for industrial, commercial, institutional and/or recreational purposes.

Ventilation Exhaust Treatment System

Any system designed and installed to reduce radioactive releases to the environment. The system typically consists of charcoal absorbers and filters for the purpose of removing iodine and particulates from the gaseous effluent prior to release to the environment.

5 RESPONSIBILITIES

The organizations responsibility for implementation are identified in the licensee FSAR Section 13.1 Organization, Section 13.2 Training, Section 13.4 Operational Programs, and as-applicable, Sections 17.1, 17.2, 17.3 and 17.5 for Quality Assurance.

6 INSTRUCTIONS

Meteorological, liquid, and gaseous pathway analyses are presented in Meteorological, Liquid, and Gaseous Pathway Analysis (Attachment 13).

6.1 SAMPLING AND MONITORING CRITERIA

6.1.1 Surveys, sampling, and analyses shall use instruments calibrated for the type and range of radiation monitored and the type of discharge monitored.

6.1.2 Installed monitoring systems shall be calibrated for the type and range of radiation or parameter monitored.

6.1.3 A sufficient number of survey points shall be used or samples taken to adequately assess the status of the discharge monitored.

6.1.4 Samples shall be representative of the volume and type of discharge monitored.

6.1.5 Surveys, sampling, analyses, and monitoring records shall be accurately and legibly documented, and sufficiently detailed that the meaning and intent of the records are clear.

6.1.6 Surveys, analyses, and monitoring records shall be reviewed for trends, completeness, and accuracy.

6.2 LIQUID RADIOACTIVE WASTE EFFLUENTS

6.2.1 Liquid Effluent Concentration Limitations

a. Liquid waste concentrations discharged from the site shall not exceed the following limits:

   1. For radionuclides (other than dissolved or entrained noble gases), liquid effluent concentrations released to unrestricted areas shall not exceed ten times the effluent concentration values specified in 10 CFR 20, Appendix B, Table 2, Column 2.

   2. For dissolved or entrained noble gases, concentrations shall not exceed 2E-4 μCi/ml total activity.

b. If the concentration of liquid effluent exceeds the limits in Step 6.2.1.a., promptly reduce concentrations to within limits.

c. Concentrations of radioactive materials in liquid waste released to unrestricted areas shall be calculated as follows:
((Define Equation)) ((Define Terms))

   NOTE: This calculation defines how liquid effluent concentrations will be restricted to within the 10 CFR 20 Appendix B limits, considering the volume of liquid effluents and the volume of dilution water.

6.2.2 Liquid Monitoring Instrumentation

a. Radioactive Liquid Effluent Monitoring Instrumentation

Radioactive liquid effluent monitoring instrumentation channels shown on Radioactive Liquid Effluent Monitoring Instrumentation (Attachment 1) shall be operable with their alarm/trip setpoints set to ensure that Step 6.2.1.a. limits are not exceeded.

1. Alarm/trip setpoints of these channels shall be determined and adjusted in accordance with Step 6.2.2.d., Setpoint Calculations.
2. If a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint is less conservative than required by Step 6.2.2.a., perform one of the following:

   (a). Promptly suspend release of radioactive liquid effluents monitored by the affected channel
   (b). Declare the channel inoperable
   (c). Change the setpoint to an acceptable, conservative value

b. Radioactive Liquid Effluent Monitoring Instrumentation Operability

Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated operable by performing a Channel Check, Source Check, Channel Calibration, and Channel Operational Test at the frequencies shown in Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirements (Attachment 2).

1. If the number of operable channels is less than the minimum required by the tables in Radioactive Liquid Effluent Monitoring Instrumentation (Attachment 1) perform the action shown in those tables.
2. Attempt to return the instruments to operable status within 30 days. If unsuccessful and the channel is required to be in service, then explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

c. Applicable Monitors

Liquid effluent monitors for which alarm/trip setpoints shall be determined are:

Release Point	Instrument Number
((Release point noun description**))**	((Equipment **ID))**

d. Setpoint Calculations

Maximum setpoint values shall be calculated by:

((Define Equation)) ((Define Terms))

NOTE: The setpoint calculation should take into consideration the fraction of the effluent concentration limit for the monitor used to implement 10CFR20 for the site, the maximum design pathway effluent flow rate, the dilution water flow rate, and the radiation monitor calibration response for the nuclide mix.

((Provide a flow schematic of the liquid radioactive waste effluent system from the treatment system to the point of release.))

6.2.3 Liquid Effluent Dose Limit

a. Requirement

At least once per 31 days, perform the dose calculations in Step 6.2.3.c. to ensure the dose or dose commitment to the maximum exposed member of the public from radioactive materials in liquid releases (from each reactor unit) to unrestricted areas is limited to:

1. During any calendar quarter:
   (a). Less than or equal to 1.5 mrem to the total body
   (b) Less than or equal to 5 mrem to the critical organ
2. During any calendar year:
   (a) Less than or equal to 3 mrem to the total body
   (b) Less than or equal to 10 mrem to the critical organ

b. Action

If the calculated dose from release of radioactive materials in liquid effluents exceeds any of the above limits, prepare and submit to the NRC, within 30 days, a special report that identifies causes for exceeding limits and defines corrective actions taken to reduce releases of radioactive materials in liquid effluents to ensure that subsequent releases will be in compliance with the above limits.

c. Dose Contribution Calculations

Dose contribution (total body and critical organ)shall be calculated for all radionuclides identified in liquid effluents released to unrestricted areas based on:

((Define Equation)) **((Define Terms))**

NOTE: This calculation should consider for each significant pathway, the dose commitment factors of each nuclide for each age group of interest, the critical organ, the time period, and the average concentration.

d. Quarterly Composite Analyses

For radionuclides not determined in each batch or weekly composite, dose contribution to current monthly or calendar quarter cumulative summation may be approximated by assuming an average monthly concentration based on previous monthly or quarterly composite analyses. However, for reporting purposes, calculated

dose contribution shall be based on the actual composite analyses.

6.2.4 Liquid Waste Management System

Historical data pertaining to the volumes and radioactivity of liquid effluents released in connection with specific site functions, such as maintenance or refueling outages, shall be used in projections as appropriate.

a. Requirement

1. The liquid waste management system shall be used to reduce the radioactive materials in liquid waste prior to discharge when projected dose due to liquid effluent, from each reactor unit, to unrestricted areas would exceed 0.06 mrem to total body or 0.2 mrem to the critical organ in a 31-day period.
2. Doses due to liquid releases shall be projected at least once per 31 days.

b. Action

If radioactive liquid waste is discharged without treatment and in excess of the above limits prepare and submit to the NRC, within 30 days, a special report that includes the following:

1. An explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or sub-system, and the reason for the inoperability.
2. Actions taken to restore inoperable equipment to operable status.
3. Summary description of actions taken to prevent recurrence.

c. Projected Total Body Dose Calculation

((Define the process for projecting total body dose from liquid effluents consistent with the method identified in step 6.2.3. c))

d. Projected Critical Organ Dose Calculation

((Define the process for projecting Critical Organ dose from liquid effluents consistent with the method identified in step 6.2.3.c.**))**

6.2.5 Liquid Sampling

Radioactive liquid wastes shall be sampled and analyzed according to the requirements in Radioactive Liquid Waste Sampling and Analysis Program (Attachment 3).

6.3 GASEOUS RADIOACTIVE WASTE EFFLUENTS

6.3.1 Gaseous Effluent Dose Rate Limitation

a. Requirement

Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to:

1 The dose rate limit for noble gases shall be less than or equal to 500 mrem/year to the total body and less than or equal to 3000 mrem/year to the skin.
2. The dose rate limit for I^{131}, I^{133}, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days shall be less than or equal to 1500 mrem/year to the critical organ.

b. Action

1. If dose rates exceed Step 6.3.1.a. limits, promptly decrease the release rate to within the above limits.

2.Dose rates due to noble gases in gaseous effluents shall be determined, continuously, to be within Step 6.3.1.a. limits.

3. Dose rates due to I^{131}, I^{133}, tritium, and all radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents shall be determined to be within the above limits by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in the Radioactive Gaseous Waste Sampling and Analysis Program (Attachment 4).

c. **Calculations of Gaseous Effluent Dose Rates**

1. The dose rate limit for noble gases shall be determined to be within the limit by limiting the release rate to the lesser of:

((Define equation)) less than or equal to 500 mrem/yr to the total body

((Define equation terms))

OR

((Define equation)) less than or equal to 3000 mrem/yr to the skin

((Define equation terms))

NOTE: The equations includes for each release point of interest, assessment of:

(a)Release source terms for nuclide i (Each building vent for ground, elevated, or mixed mode release.)
(b) Dose factors for nuclide i (Total body, skin, and air dose factors in Att. 5)
(c) Atmospheric dispersions at location of interest for the identified dose receptor.

2. The dose rate limit for I^{131}, I^{133}, tritium, and for all radionuclides in particulate form

with half-lives greater than 8 days, shall be determined to be within the limit by restricting the release rate to:

((Define equation)) less than or equal to 1500 mrem/yr to the critical organ

((Define equation terms))

NOTE: The equations includes for each release point of interest, assessment of:

(a) Release source terms for nuclide i (Each building vent for ground, elevated, or mixed mode release.)
(b) Dose factors for nuclide i (Inhalation dose factors, see Att. 5)
(c) Atmospheric dispersions and deposition at location of interest for the identified dose receptor

6.3.2 Gaseous Monitoring Instrumentation

a. Requirement

1. The radioactive gaseous effluent monitoring instrumentation channels shown in Radioactive Gaseous Effluent Monitoring Instrumentation (Attachment 6) shall be operable with alarm/trip setpoints set to ensure that Step 6.3.1.a. noble gas limits are not exceeded. Alarm/trip setpoints of these channels shall be determined and adjusted in accordance with Step 6.3.2.d.

2. Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated operable by Channel Checks, Source Checks, Channel Calibrations, and Channel Operational Tests at the frequencies shown in Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Requirements (Attachment 7).

b. Action

1. If a radioactive gaseous effluent monitoring instrumentation channel alarm/trip setpoint is less conservative than required by Step 6.3.2.a.1, promptly:

   (a) Suspend the release of radioactive gaseous effluents monitored by the affected channel **and** declare the channel inoperable, or
   (b) Change the setpoint so it is acceptably conservative

2. If the number of operable channels is less than the minimum required by tables in Radioactive Gaseous Effluent Monitoring Instrumentation (Attachment 6) take the action shown in those tables.

3. Return instruments to operable status within 30 days. If unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

c. Applicable Monitors

Radioactive gaseous effluent monitors for which alarm/trip setpoints shall be determined are:

Release Point	Instrument Number
((Release point noun description))	((Equipment ID))

d. Setpoint Calculations

1. Setpoint calculations for each monitor listed in Step 6.3.2.c. shall maintain this relationship:

   ((Define Equation)) ((Define equation terms))

   NOTE: This equation indicates the summation of doses from all release points will be less than or equal to the dose limits that implement 10CFR20.

2. Setpoint values shall be determined by:

   ((Define Equation)) ((Define equation terms))

   NOTE: This equation should consider the release pathway's effluent concentration limit implementing 6.3.1.a. for the site, the release rate limit for the pathway determined from methodology in step 6.3.1.c. using Xe-133 or other nuclide identified by the licensee as the nuclide to be released, and the maximum flow rate for the release point.

   NOTE: According to NUREG-0133, the radioactive effluent radiation monitor alarm/trip setpoints should be based on the radioactive noble gases. It may not be practicable to apply instantaneous alarm/trip setpoints to integrating monitors sensitive to radioiodines, radioactive materials in particulate form, and radionuclides other than noble gases.

   ((Provide flow schematics of airborne effluent radioactivity release points from all building ventilation systems and plant process vents.))

6.3.3 Noble Gas Effluent Air Dose Limit

a. Requirement

1. The air dose in unrestricted areas due to noble gases released in gaseous effluents from each unit at or beyond the site boundary shall be limited to:

(a) During any calendar quarter less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation
(b) During any calendar year less than or equal to10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation

2. Cumulative dose contributions for noble gases for the current calendar quarter and current calendar year shall be determined in accordance with Step 6.3.3.c. at least once per 31 days.

b. Action

If the calculated air dose from radioactive noble gases in gaseous effluents exceeds any of the above limits, prepare and submit to the NRC, within 30 days, a special report that identifies the causes for exceeding the limits and defines corrective actions that have been taken to reduce releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the limits in Step 6.3.3.a.

c. Noble Gas Effluent Air Dose Calculation

The air dose to areas at or beyond the site boundary due to noble gases shall be determined by the following:

For gamma radiation:

((Define Equation)) ((Define equation terms))

NOTE: The equations include for each release point of interest, assessments of the following:

(a) Release source terms for nuclide i , (Each building vent for ground, elevated, or mixed mode release.)
(b) Dose factors for nuclide i, (Gamma air dose factors in Att. 5)
(c) Atmospheric dispersions at locations of interest for the identified dose receptor.

For beta radiation:
((Define Equation)) ((Define equation terms))

NOTE: The equations include for each release point of interest, assessments of the following:

(a) Release source terms for nuclide i, (Each building vent for ground, elevated, or mixed mode release.)
(b) Dose factors for nuclide i, (Beta air dose factors in Att. 5)
(c) Atmospheric dispersions at locations of interest for the identified dose receptor.

6.3.4 I-131, I-133, H-3 & Radionuclides In Particulate Form Effluent Dose Limit

a. Requirement

1. Methods shall be implemented to ensure that the dose to any organ of a member of the public from I^{131}, I^{133}, tritium, and all radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents released from the site to unrestricted areas from each reactor unit shall be:

   (a) During any calendar quarter less than or equal to 7.5 mrem to the critical organ
   (b) During any calendar year less than or equal to 15 mrem to the critical organ

2. Cumulative dose contributions to a member of the public from I^{131}, I^{133}, tritium, and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents released to unrestricted areas for the current calendar quarter and current calendar year shall be determined at least once per 31 days in accordance with Step 6.3.4.c.

b. Action

If the calculated dose from the release of I^{131}, I^{133}, tritium, and radionuclides in particulate form, with half-lives greater than 8 days, in gaseous effluents exceeds any of the above limits, prepare and submit to the NRC within 30 days, a special report that contains:

1. Cause(s) for exceeding limits.

2. Corrective action(s) taken to reduce releases.

3. Proposed corrective action(s) to be taken to assure that subsequent releases will be in compliance with limits stated in Step 6.3.4.a.

c. Dose Calculations

Gaseous releases associated with anticipated operational occurrences and unplanned and unmonitored releases shall be included in the determination of a release. Historical data pertaining to the volumes and radioactive concentrations of gaseous effluents released in connection to specific plant functions, such as containment purges, shall be used in the estimates as appropriate.

1. The dose to the maximum exposed member of the public, attributable to gaseous effluents at and beyond the site boundary, that contain I^{131}, I^{133}, tritium, and particulate-form radionuclides with half-lives greater than 8 days, shall be determined by:

   ((Define equation)) **((Define equation terms))**

NOTE: This equation should consider the release source term, the dose factors in Attachment 8 for the effluent pathways, and the dispersion at location of interest.

6.3.5 Gaseous Waste Management System

Historical data pertaining to the volumes and radioactive concentrations of gaseous effluents released in connection with specific plant functions, such as containment purges shall be used to calculate projected doses, as appropriate.

a. Requirement

1. The gaseous waste management system shall be used to reduce radioactive material in gaseous waste before its discharge, when projected gaseous effluent air doses due to gaseous effluent releases from each unit to areas at and beyond the site boundary would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation, averaged over 31 days.

2. The gaseous waste management system shall be used to reduce radioactive materials in gaseous waste before its discharge, when the projected doses due to gaseous effluent releases from each unit to areas at and beyond the site boundary, would exceed 0.3 mrem to the critical organ, averaged over 31 days.

3. Doses due to gaseous releases from the site shall be projected at least once per 31 days, when the gaseous waste management system is not being fully utilized, based on the calculations in Step 6.3.5.c.

b. Action

If gaseous waste that exceeds the limits in Step 6.3.5.a. is discharged without treatment, prepare and submit to the NRC within 30 days, a special report that includes:

1. An explanation why gaseous radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability.

2. Actions taken to restore the inoperable equipment to operable status.

3. Summary description of actions taken to prevent recurrence.

c. Projected Gamma Dose

Determine the projected 31-day gamma air dose using the equation derived in Section 6.3.3.c for gamma radiation and the ratio of estimated gaseous effluent radioactivity in the current 31-day period to that released in the previous 31-day period..

d. Projected Beta Dose

Determine the projected 31-day beta air dose using the equation derived in Section 6.3.3.c for beta radiation and the ratio of estimated gaseous effluent radioactivity in the current 31-day period to that released in the previous 31-day period.

e. Projected Maximum Exposed Member of the Public Dose

Determine the projected maximum exposed member of the public using the equation derived in Section 6.3.4.c and the ratio of estimated effluent radioactivity due to radioiodines, tritium, and radioactive material in particulate form with half-lives greater than 8 days in the current 31-day period to that released in the previous 31-day period..

((Define equation)) ((Define equation terms))

6.4 RADIOACTIVE LIQUID AND GASEOUS RELEASE PERMITS

The licensee shall maintain procedures for liquid and gaseous release permits to ensure effluent dose limits are not exceeded when making releases.((Identify responsible organization and release permit system for type of release applicable to site based on examples in step 6.4))

6.4.1 Liquid Waste Batch Release Permits

Site implementing procedures control batch releases of radioactive liquids. Examples of batch releases include:
((List all systems with expected batch releases))

Liquid releases associated with anticipated operational occurrences and unplanned and unmonitored releases shall be characterized using sampling and analytical procedures to assess the amounts of radioactivity released or currently being released to the environment and for determining doses to offsite receptors.

6.4.2 Continuous Release Permit

Site implementing procedures control continuous releases of radioactive liquids.

Continuous Releases

A Continuous Release Permit is required for:

((List all expected continuous release pathways))

6.4.3 Waste Gas Release Permits

Site implementing procedures control initiating waste gas releases.

6.4.4 Reactor Containment Release Permits

Site implementing procedures control initiating containment purges Release Permits shall be valid from start of purge until:

(a) Routine termination
(b) Terminated for cause
(c) Receipt of radiation monitoring system (RMS) high alarm

6.4.5 Miscellaneous Gaseous Release Permit

Gaseous releases associated with anticipated operational occurrences and unplanned and unmonitored releases shall be characterized using sampling and analytical procedures to assess the amounts of radioactivity released or currently being released to the environment and for determining doses to offsite receptors.

((List all expected system release pathways))

6.4.6 Radioactive Liquid and Gaseous Release Controls

a. Notifications of pending releases shall be made by responsible section and a request to initiate the appropriate release permit prior to any release.

b. A representative sample shall be obtained of the source to be released.

c. Site implementing procedures control the performance of required sample collection and analyses.

d. The calculation and recording of the maximum authorized release rate, percent of ODCM/Technical Specification limits, and applicable conditions or controls pertaining to each release on the release permit.

e. Site implementing procedures control notifications of responsible personnel or if it is determined that a release may not be within the effluent dose limits.

f. The release permit will include:

   1. Verification that the correct source is authorized for release.

   2. Identification of maximum authorized release rate.

   3. The percent of ODCM/Technical Specifications limits the release represents.

   4. Identification of any indicated controls or conditions applicable to the release.

g. Site implementing procedures control in initiating the release and identify information as appropriate, such as:

1. Date and time release was started
2. Starting tank/sump level
3. Beginning pressure
4. Release flow rate
5. Dilution water or air flow rate

h. Site implementing procedures control terminating the release and identify information needed for completing permit, for example:

1. Date and time release was stopped
2. Tank/sump ending level
3. Release flow rate just prior to termination
4. Ending pressure
5. Volume released

6.5 TOTAL DOSE LIMIT TO PUBLIC FROM URANIUM FUEL CYCLE SOURCES

6.5.1 Requirement

The annual (calendar year) dose or dose commitment to a real individual due to releases of radioactivity and radiation from uranium fuel cycle sources shall not exceed 25 mrem to the total body or the critical organ (except the thyroid, which shall not exceed 75 mrem).

6.5.2 Action

a. If the calculated doses from release of radioactive materials in liquid or gaseous effluents exceed twice the limits in Steps 6.2.3.a., 6.3.3.a., or 6.3.4.a., calculate (including direct radiation contribution from the units and from outside storage tanks) whether limits in Step 6.5.1 have been exceeded.

b. If the limits in Step 6.5.1 have been exceeded, prepare and submit to the NRC within 30 days, a special report that defines the corrective action to be taken to reduce subsequent releases and to prevent recurrence, and includes a schedule for achieving conformance with the limits. Special reports, as defined in 10 CFR 20.2203(a) (4), shall include:

1. An analysis that estimates the radiation exposure (dose) to a real individual from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the releases covered by the report.
2. A description of the levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations.
3. If the estimated dose exceeds the limits in Step 6.5.1, and if the release condition that violates 40 CFR 190 has not already been corrected, the special report shall include a request for a variance in accordance with the provisions of 40 CFR 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

6.6 RADIOLOGICAL ENVIRONMENTAL MONITORING

6.6.1 Monitoring Program

a. Requirement

1. The Radiological Environmental Monitoring Program shall be conducted as specified in Radiological Environmental Monitoring Program (Attachment 9).

2. Samples shall be collected from specific locations specified in Environmental Sampling Locations (Attachment 10).

3. Samples shall be analyzed in accordance with:

(a) Radiological Environmental Monitoring Program (Attachment 9) requirements
(b) Detection capabilities required by Detection Capabilities for Environmental Sample Analysis (Attachment 11)
(c) Guidance of the Radiological Assessment Branch Technical Position on Environmental Monitoring dated November, 1979, Revision No. 1 or latest guidance

b. Action

1. If the Radiological Environmental Monitoring Program is not being conducted as required in Step 6.6.1.a., report the situation by preparing and submitting to the NRC, in the Annual Radiological Environmental Operating Report required by Technical Specifications Section 5.0 Administrative Controls a description of the reasons for not conducting the program as required, and the plan for precluding recurrence.

2. If, when averaged over any calendar quarter, radioactivity exceeds the reporting levels of Reporting Levels for Radioactivity Concentrations in Environmental Samples (Attachment 12) prepare and submit to the NRC within 30 days, a special report that:

(a) Identifies the causes for exceeding the limits, and
(b) 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 Steps 6.2.3a, 6.3.3a, and 6.3.4a.

When more than one of the radionuclides listed in Reporting Levels for Radioactivity Concentrations in Environmental Samples (Attachment 12) are detected in the sampling medium, the report shall be submitted if:

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

3. When radionuclides other than thoselisted in Reporting Levels for Radioactivity Concentrations in Environmental Samples (Attachment 12) are detected and are the result of plant effluents, the 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 Steps 6.2.3a, 6.3.3a, and 6.3.4a. The report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, report and describe the condition in the Annual Radiological Environmental Operating Report.

4. If milk or fresh leafy vegetable samples are unavailable from one or more of the sample locations required by Environmental Sampling Locations (Attachment 10), identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the cause of the unavailability of samples and identify the new locations for obtaining replacement samples in the next Annual Radioactive Effluent Release Report. Include in the report a revised figure and table for the ODCM to reflect the new locations.

6.6.2 Land Use Census

a. Requirement

1. 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 following:

(a) Nearest milk animal
(b) Nearest residence
(c) Nearest garden greater than 50 m^2 (500 ft^2) that produces broad leaf vegetation

2. The land use census shall be conducted during the growing season, at least once per 12 months, using methods that will provide the best results (e.g., door-to-door survey, aerial survey, local agriculture authorities). Land use census results shall be included in the Annual Radiological Environmental Operating Report.

3. In lieu of the garden census, 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 ground deposition (D/Qs). Specifications for broad leaf vegetation sampling in Radiological Environmental Monitoring Program (Attachment 9) shall be followed, including analysis of control samples.

b. Action

1. If a land use census identifies locations that yield a calculated dose or dose commitment greater than the values currently being calculated in 6.3.4.a.2,

identify the new locations in the next Annual Radioactive Effluent Release Report.

2. If a land use census identifies locations that yield a calculated dose or dose commitment (via the same exposure pathway) ((specify percentage)) greater than at a location from which samples are currently being obtained, add the new locations to the Radiological Environmental Monitoring Program within 30 days. Sampling locations, excluding the control station location, that have the lowest calculated dose or dose commitments (via the same exposure pathway) may be deleted from the monitoring program. Identify new locations in the next Annual Radioactive Effluent Release Report and include in the report revised figures and tables reflecting the new locations.

6.6.3 Interlaboratory Comparison Program

a. Requirement

Radioactive materials (which contain nuclides produced at the site), supplied as part of an Interlaboratory Comparison Program, shall be analyzed, given the environmental media identified in Attachment 9.

b. Action

Analyses shall be performed at least semiannually as follows:

((Define frequency, media, and analysis to be performed))

If analyses are not performed as required by Step 6.6.3.b., report in the Annual Radiological Environmental Operating Report the corrective actions taken to prevent recurrence.

c. Results

Results shall be reported in the Annual Radiological Environmental Monitoring Report. The discussion of acceptance criteria and corrective actions for any analysis that do not meet the acceptance criteria should be included.

6.7 REPORTING REQUIREMENTS

6.7.1 Annual Radiological Environmental Operating Report

Routine Radiological Environmental Operating Reports covering the operation of the units during the previous calendar year shall be submitted prior to May 1 of each year. A single submittal may be made for the site's. Radiological Environmental Operating Reports shall include:

a. Summaries, interpretations, and analysis of trends of results of radiological environmental surveillance activities for the report period, including:

   1. A comparison (as appropriate) with preoperational studies, operational controls, and previous environmental surveillance reports
   2. An assessment of the observed impacts of the plant operation on the environment
   3. Results of land use census per Step 6.6.2

b. Results of analysis of radiological environmental samples and of environmental radiation measurements taken per Step 6.6.1, Monitoring Program. Results shall be summarized and tabulated in the format of the table in the Radiological Assessment Branch Technical Position on Environmental Monitoring.

   1. If some individual results are not available for inclusion with the report, the report shall be submitted, noting and explaining reasons for missing results.

   2. Missing data shall be submitted in a supplementary report as soon as possible.

c. A summary description of the radiological environmental monitoring program.
d. At least two legible maps covering sampling locations, keyed to a table giving distances and directions from the centerline of one reactor. One map shall cover sampling locations near the site boundary; a second shall include more distant sampling locations.
e. Results of the site participation in the Interlaboratory Comparison Program, per Step 6.6.3.
f. Discussion of deviations from the site's environmental sampling schedule per Radiological Environmental Monitoring Program (Attachment 9).
g. Discussion of analyses in which the lower limit of detection (LLD) required by Detection Capabilities for Environmental Sample Analysis (Attachment 11) was not achievable.
h. Any sample results from any groundwater wells described in the environmental program, whether the results were required by the environmental program or not.

6.7.2 Annual Radioactive Effluent Release Report

a. Requirement

Radioactive Effluent Release Reports covering operation of the units during the previous 12 months of operation shall be submitted before May 1 of each year. A single submittal may be made for the site and should combine those sections that are common to all units. Radioactive Effluent Release Reports shall include:

1. A summary of quantities of radioactive liquid and gaseous effluents and solid waste released. Data shall be summarized on a quarterly basis following

the format of Regulatory Guide 1.21, Appendix B, for liquid and gaseous effluents. Data shall be summarized on an annual basis following the format of Regulatory Guide 1.21, Appendix B, for solid waste.

2. An assessment of radiation doses to the maximum exposed members of the public due to the radioactive liquid and gaseous effluents released from the site during the previous calendar year. This assessment shall be in accordance with Step 6.7.2.b.
3. A list and description of unplanned and/or unmonitored releases from the site to unrestricted areas, during the reporting period, which meet the following criteria:
   ((Define site specific criteria))
4. Major changes to radioactive liquid, gaseous, and solid waste treatment systems during the reporting period.
5. Changes to the Offsite Dose Calculation Manual.
6. A listing of new locations for dose calculations or environmental monitoring identified by the land use census (See Step 6.6.2).
7. A summary of radioactive leaks or spills meeting the following criteria:

   (a) An unintended spill or leak with the potential to reach groundwater, as defined in NEI 07-07, **and**
   (b) The spill or leak must be greater than 100 gallons in volume or the volume cannot be quantified but is estimated to be greater than 100 gallons; **or**
   (c) Any spill or leak, regardless of volume or activity deemed by the licensee to be reportable.

8. Any groundwater sample results from locations not part of the Radiological Environmental Monitoring Program.

b. Dose Assessment

   1. Radiation dose to individuals due to radioactive liquid and gaseous effluents from the site during the previous calendar year shall either be calculated in accordance with this template or in accordance with Regulatory Guide 1.109. Population doses shall not be included in dose assessments.

   2. The dose to the maximum exposed member of the public due to radioactive liquid and gaseous effluents from the site shall be incorporated with the dose assessment performed above. If the dose to the maximum exposed member of the public exceeds twice the limits of 6.2.3.a.1, 6.2.3.a.2, 6.3.3.a.1, or 6.3.4.a.1, the dose assessment shall include the contribution from direct radiation.

      NOTE: NUREG-0543 states: "There is reasonable assurance that sites with up to four operating reactors that have releases within Appendix I design objective values are also in conformance with the EPA Uranium Fuel Cycle Standard, 40 CFR Part 190."

   3. Meteorological conditions during the previous calendar year or historical annual average atmospheric dispersion conditions shall be used to determine

gaseous, radioiodines, tritium, and particulates with half-lives greater than 8 days, pathway doses.

((Define the site specific meteorological conditions to be used to determine gaseous pathway doses referring to Attachment 13 for details.))

6.7.3 Annual Meteorological Data

a. Meteorological data collected during the previous year shall be in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.

b. Meteorological data shall be retained in a file on site and shall be made available to NRC upon request.

6.7.4 Changes to the ODCM

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

a. Reviewed and approved by the appropriate level of management prior to implementation. ((Identify the functional organization and define the level of review and approval))

b. Records of reviews shall be retained as site records. Documentation shall include:

    1. Sufficient information to support changes, together with appropriate analyses or evaluations justifying changes.

    2. A determination that a change will not adversely impact the accuracy or reliability of effluent doses or setpoint calculations, and will maintain the level of radioactive effluent control required by:

        (a) 10 CFR 20 Subpart D
        (b) 40 CFR 190
        (c) 10 CFR 50.36a
        (d) 10 CFR 50, Appendix I

c. 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 Annual Radioactive Effluent Release Report for the period of the report in which any change was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (e.g., month/year) the change was implemented.

6.7.5 Groundwater Protection Initiative

a. Notifications and Reports

1. Informal communication shall be made to state/local/NRC officials by the end of the next business day for:

   (a) Any spill or leak meeting the requirements of Step 6.7.2.a.7.
   (b) Any groundwater sample result exceeding the reporting levels of Reporting Levels for Radioactivity Concentrations in Environmental Samples (Attachment 12).

2. A 30-day report shall be submitted to the NRC and a copy concurrently forwarded to state and local officials for any groundwater sampling result, whether on site or off site, exceeding the reporting levels of Reporting Levels for Radioactivity Concentrations in Environmental Samples (Attachment 12) and having the potential to reach groundwater or surface water that is or could be used as a source of drinking water. A 30-day report is only required on the initial discovery of a contaminated groundwater plume.

b. Any spill or leak for which an informal notification is made in accordance with Step 6.7.5.a. shall be summarized in the Annual Radioactive Effluent Report.
c. Any groundwater sample result from a groundwater source that is not part of the radiological environmental monitoring program shall be included in the Annual Radioactive Effluent Report.
d. Any groundwater sample result from any groundwater well described in the radiological environmental monitoring program shall be included in the Annual Radiological Environmental Operating Report.

6.8 RECORDS

The licensee shall maintain all records associated with the implementation of the ODCM in accordance with site records management system.

7 REFERENCES

1. 10 CFR Part 20, "Standards for Protection Against Radiation."

   a. 10 CFR 20.1301, "Dose Limits for Individual Members of the Public."

   b. 10 CFR 20.1302, "Compliance with Dose Limits for Individual Members of the Public."

   c. 10 CFR 20.2202, "Notification of Incidents."

   d. 10 CFR 20.2203, "Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Constraints or Limits."

   e. 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage."

2. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"

   a. 10 CFR 50.34a, "Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents—Nuclear Power Plants."

   b. 10 CFR 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors."

   c. 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors."

   d. 10 CFR 50.73, "Licensee Event Report System."

   e. 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."

3. 10 CFR Part 100, "Reactor Site Criteria"

4. 40 CFR, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations" as implemented under 10 CFR Part 20.1301 (e).

5. 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" as contained in NUREG-1301 and NUREG-1302

6. IE Bulletin No. 80-10, "Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment," May 6, 1980.

7. IE Information Notice No. 91-40, "Contamination of Nonradioactive System and Resulting Possibility for Unmonitored, Uncontrolled Release to Environment," June 19, 1991.

8. 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.

9. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)."

10. 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.

11. 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.

12. 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.

13. 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.

14. 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

15. Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

16. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

17. Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

18. Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants."

19. Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants."

20. Regulatory Guide 4.13, Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications Rev. 1, July 1977

21. 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 or Regulatory Guide 4.15, Rev2 "Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination)-Effluent Streams and the Environment." July 2007..

22. 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.

23. NUREG-0543, February 1980, Methods for Demonstrating LWR Compliance With the EPA Uranium Fuel Cycle Standard (40 CFR Part 190)

24. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, October 1978.

25. 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.]

26. NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors." [This NUREG includes Generic Letter 89-01.]

27. NUREG-0800, Standard Review Plan, 11.5 "Process and Effluent Radiological Monitoring Instrumentation and sampling Systems" Rev 4 March 2007

28. NUREG/CR-3332, "Radiological Assessment," U.S. Nuclear Regulatory Commission, 1983

29. 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, September1984.

30. "Radiological Assessment Branch Technical Position," U.S. Nuclear Regulatory Commission, November 1979 as contained in NUREG-1301 and NUREG-1302.

31. NUREG/CR-4013, "LADTAP II—Technical Reference and User Guide," U.S. Nuclear Regulatory Commission, April 1986.

32. NUREG/CR-4653, "GASPAR II—Technical Reference and User Guide," U.S. Nuclear Regulatory Commission, March 1987.

33. Report of the International Commission on Radiological Protection (ICRP) Committee II on Permissible Dose for Internal Radiation (1959)

34. ANSI/HPS N13.1-1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities," 1999.

35. ANSI N42.18-2004, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents," 2004.

36. DOE/TIC-11026, "Radioactive Decay Data Tables," 1981 or other standard reference.

37. FSAR Chapter 17 subsection on non safety related Quality Control Program

38. NEI 07-07, Industry Ground Water Protection Initiative – Final Guidance Document

39. Dominion VPAP-2103N, Offsite Dose Calculation Manual (North Anna) Rev 13.

Note: This template is based on the North Anna Unit 1 & 2 ODCM, it may be useful to review its approach and methods applied in deriving doses, dose projection, and determining radiation monitoring instrumentation alarm set-points in developing a plant-specific ODCM.

((List additional Reference documents))

((List commitment documents))

ATTACHMENT 1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Radioactive Liquid Effluent Monitoring Instrumentation

Instrument	Minimum Operable Channels	Action
((Define instrumentation))	((Identify min. #))	((Identify action))

((Define Action))

((Define Qualifying Conditions))

ATTACHMENT 2 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Radioactive Liquid Effluent Monitoring Instrumentation Surveillance Requirements

Channel Description	Channel Check	Source Check	Channel Calibration	Channel Operational Test
((Define instrumentation))	((Define frequency and qualifiers))	((Define frequency and qualifiers))	((Define frequency))	((Define frequency and qualifiers))

((Define Qualifiers))

ATTACHMENT 3 RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Radioactive Liquid Waste Sampling and Analysis Program

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)
((List Release Types))	((Define frequency and qualifiers))	((Define frequency and qualifiers))	((Define Analysis and qualifiers))	((Define LLD and qualifiers))

((Define Qualifiers))

ATTACHMENT 4 RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)
((List Release Types))	((Define frequency and qualifiers))	((Define frequency and qualifiers))	((Define Analysis and qualifiers))	((Define LLD and qualifiers))

((Define Qualifiers))

ATTACHMENT 5 GASEOUS EFFLUENT DOSE FACTORS

(PAGE 1 OF 2)

Gaseous Effluent Radioiodines, Tritium and Particulate Dose Factors

(Gamma and Beta Dose Factors)

Dose Factors for ((Define Mode of Release (i.e. ground level, mixed mode))

Noble Gas Radionuclide	**Ki Total Body mrem/yr per Curie/sec**	**Li Skin mrem/yr per Curie/sec**	**Mi Gamma Air mrad/yr per Curie/sec**	**Ni Beta Air mrad/yr per Curie/sec**
((Define Nuclide))	((Enumerate Dose Factor))	((Enumerate Dose Factor))	((Enumerate Dose Factor))	((Enumerate Dose Factor))

NOTE: Tables will need to be generated for each mode of release. (i.e. a table for Ground level, Mixed mode, or Elevated releases.) Dose factors are derived from Reg. Guide 1.109 using the appropriate X/Q values for the release types.

NOTE: The licensee will identify the parameter applicable to the site considering the following variables defined as follow:

1. Ki= The total body dose factor for gamma emissions for each identified noble gas radionuclide i in mrem/yr per Curie/sec

2. Li= The skin dose factor due to beta emissions for each identified noble gas radionuclide i, in mrem/yr per Curie/sec

3. Mi = The air dose factor for release due to gamma emissions for each identified noble gas radionuclide i, in mrad/yr per Curie/sec

4. Ni = The air dose factor for release due to beta emissions for each identified noble gas radionuclide i, in mrad/yr per Curie/sec.

ATTACHMENT 5 (CONTINUED)

(PAGE 2 OF 2)

Gaseous Effluent Radioiodine, Tritium, and Particulate Dose Factors

(Inhalation Pathway Dose Factors)
Dose Factors for ((Define Mode of Release (i.e. ground level, mixed mode))

Radionuclide	**Pi Critical Organ mrem/yr per Curie/sec**
((Define Nuclide))	((Enumerate Dose Factor))

NOTE: Tables will need to be generated for each mode of release. (i.e. a table for Ground level, Mixed mode, or Elevated releases.) Dose factors are derived from Reg. Guide 1.109 using the appropriate X/Q values for the release types.

NOTE: The licensee will identify the parameter applicable to the site considering the following variables defined as follow:

1. Pi = The critical organ dose factor for releases for I^{131}, I^{133}, H^3, and all radionuclides in particulate form with half-lifes greater than 8 days, for the inhalation pathway in mrem/yr per Curie/sec.

ATTACHMENT 6 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Radioactive Gaseous Effluent Monitoring Instrumentation

Instrument	Minimum Operable Channels	Action
((Define instrumentation))	((Identify min. #))	((Identify action))

((Define Action))

((Define Qualifying Conditions))

ATTACHMENT 7 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Requirements

Channel Description	Channel Check	Source Check	Channel Calibration	Channel Operational Test
((Define instrumentation))	((Define frequency and qualifiers))	((Define frequency and qualifiers))	((Define frequency))	((Define frequency and qualifiers))

((Define Qualifiers))

ATTACHMENT 8 CRITICAL ORGAN DOSE FACTORS

Critical Organ Dose Factors

(Critical Pathway Dose Factors)

Radionuclide	**RM_{ivv} mrem/yr per Curie/sec**	**RM_{ipv} mrem/yr per Curie/sec**
((Define Nuclide))	((Enumerate dose factor))	((Enumerate dose factor))

NOTE: Dose factors determined from Reg. Guide 1.109

NOTE: The licensee will identify the parameter applicable to the site considering the following variables defined as follow:

1. RMivv, RMipv = The dose factor for releases for ventilation vents or process vent release due to I^{131}, I^{133}, H^3, and all radionuclides in particulate form with half-lifes greater than 8 days, in mrem/yr per Curie/sec.

ATTACHMENT 9 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

(NOTE 1)

Exposure Pathway and/or Sample	**Number of Sample and Sample Location** (NOTE 2)	**Collection Frequency**	**Type and Frequency of Analysis**
1. DIRECT RADIATION (NOTE 3)	Forty (40) routine monitoring stations, either with two or more dosimeters or with one instrument for measuring and recording dose rate continuously, to be placed as follows: 1) An inner ring of stations, one in each emergency meteorological sector within the site boundary 2) An outer ring of stations, one in each emergency meteorological sector within 6 to 8 km range fromthe site 3) The balance of the stations to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control stations	Quarterly	GAMMA DOSE Quarterly

ATTACHMENT 9 (Continued)

(Page 2 of 5)

Exposure Pathway and/or Sample	Number of Sample and Sample Location (NOTE 2)	Collection Frequency	Type and Frequency of Analysis
2. AIRBORNE Radioiodines and Particulates	Samples from 5 locations: a) 3 samples from close to the 3 site boundary locations (in different sectors) of the highest calculated historical annual average ground level D/Q b) 1 sample from the vicinity of a community having the highest calculated annual average ground level D/Q c) 1 sample from a control location 15-40 km distant and in the least prevalent wind direction	Continuous sampler, operation with sample collection weekly	Radioiodine Canister I_{131} Analysis, weekly Particulate Sampler Gross beta radioactivity analysis following filter change; (NOTE 4) Gamma isotopic analysis sis of composite (by location) quarterly (NOTE 5)
3. WATERBORNE a) Surface	Samples from 3 locations: a) 1 sample upstream b) 1 sample downstream	Grab Monthly composite	Gamma isotopic analysis monthly; (NOTE 5) Composite for tritium analysis quarterly
b) Ground	Sample from 1 or 2 sources only if likely to be affected	Grab Quarterly composite	Gamma isotopic and tritium analysis quarterly (NOTE 5)
c) Sediment	1 sample from downstream area with existing or potential recreational value	Semi-Annually	Gamma isotopic analysis semi-annually (NOTE 5)
d) Drinking	1 sample from the nearest water supply that could be affected by discharge. 1 sample from control location	Monthly composite, bi-weekly when I-131 is present	Gamma isotopic analysis monthly; (NOTE 5,6) I-131 analysis when present Composite for tritium analysis quarterly

ATTACHMENT 9 (Continued)

(Page 3 of 5)

Exposure Pathway and/or Sample	Number of Sample and Sample Location (NOTE 2)	Collection Frequency	Type and Frequency of Analysis
4. INGESTION a) Milk (NOTE 7)	a) Samples from milking animals in 3 locations within 5 km that have the highest potential. If there are none, then 1 sample from milking animals in each of 3 areas between 5 to 8 km where doses are calculated to be greater than 1 mrem per yr (NOTE 6) b) 1 sample from milking animals at a control location (15-30 km in the least prevalent wind direction)	Semimonthly when animals are on pasture; Monthly at other times	Gamma isotopic (NOTE 5)and ^{I131} analysis monthly
b) Fish and Invertebrates	a) 1 sample of commercially and recreationally important species (bass, sunfish, catfish) in vicinity of plant discharge area b) 1 sample of same species in areas not influenced by plant discharge	Semiannually or when in season	Gamma isotopic on edible portions
c) Food Products	a) Samples three different kinds of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted historical annual average ground level D/Q if milk sampling is not performed b) 1 sample of broad leaf vegetation grown 15-30 km in the least prevalent wind direction if milk sampling is not performed c)1 sample of food products from any area that is irrigated by water in which plant liquid effluents have impacted.	Monthly if available, or at harvest	Gamma isotopic (NOTE 5) and ^{I131} analysis

ATTACHMENT 9 (Continued)

NOTE 1: The number, media, frequency, and location of samples may vary from site to site. See Table 3.12-1 "Radiological Environmental Monitoring Program" of NUREG-1301 or NUREG-1302 for specific guidance on the scope and elements of the program, including qualifying notations on radiological analysis, determination of up and downstream sampling locations from discharge points, composite sampling, groundwater sampling when groundwater is a source of drinking water, and sampling of food products during harvest times. This table presents an acceptable minimum program for a site at which each entry is applicable. Local site characteristics must be examined to determine if pathways not covered by this table may significantly contribute to an individual's dose and be included in the sampling program.

NOTE 2: For each and every sample location in Environmental Sampling Locations (Attachment 10), specific parameters of distance and direction sector from the centerline of the reactor, and additional description where pertinent, shall be provided in Attachment 10. Refer to Radiological Assessment Branch Technical Positions and to NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plant. Deviations are permitted from the required sampling schedule if specimens are unattainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unattainable due to sampling equipment malfunction, every effort shall be made to complete corrective action before the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report pursuant to Step 6.7.1. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program. In lieu of a Licensee Event Report and pursuant to Step 6.7.2, identify the cause of the unavailability of samples for that pathway and identify the new locations for obtaining replacement samples in the next Annual Radioactive Effluent Release Report, and include revised figures and tables from the ODCM reflecting the new locations in the report.

NOTE 3: One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation. The number of direct radiation monitoring stations may be reduced according to geographical limitations, e.g., at an ocean site, some sectors will be over water so that the number of dosimeters may be reduced accordingly. The frequency of analysis or readout for TLD systems will depend upon the characteristics of the specific system used and should be selected to obtain optimum dose information with minimal fading.

ATTACHMENT 9 (Continued)

(Page 5 of 5)

NOTE 4: Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

NOTE 5: Gamma isotopic analysis is the identification and quantification of gamma-emitting radionuclides that may be attributable to effluents from the facility.

NOTE 6: The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM.

NOTE 7: If milk sampling cannot be performed, use item 4.c (Page 3 of 5, Radiological Environmental Monitoring Program Attachment 9).

ATTACHMENT 10 ENVIRONMENTAL SAMPLING LOCATIONS

Distance and Direction From ((Define Location))

Sample Media	Location	Station No.	Distance (Miles)	Direction	Collection Frequency
((Define Media))	((Define Location))	((Enumerate Station #))	((Enumerate Distance))	((Define Direction))	((Define Frequency))

NOTE: Add descriptive qualifiers to each sample media required

NOTE: Provide a map showing the points of all identified sampling locations around the plant.

ATTACHMENT 11 DETECTION CAPABILITIES FOR ENVIRONMENTAL ANALYSIS

LOWER LIMIT OF DETECTION (LLD)

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg) (wet)	Milk (pCi/l)	Food Products (pCi/kg) (wet)	Sediment (pCi/kg) (dry)
((Nuclide))	((Enumerate LLD))	((Enumerate LLD))	((Enumerate LLD))	((Enumerate LLD))	((Enumerate LLD))	((Enumerate LLD))

NOTE: Identify the origin of required analysis, media, and values. State the equation, terms, and qualifying conditions, including measurable and identifiable radionuclides other than tabulated above.

NOTE: See NRC guidance on LLD's when a drinking water pathway exists..

ATTACHMENT 12 REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)
((Nuclide))	((Define level))	((Define level))	((Define level))	((Define level))	((Define level))

NOTE: See NRC guidance on reporting levels when a drinking water pathway exists.

ATTACHMENT 13 METEROLOGICAL, LIQUID AND GASEOUS PATHWAY ANALYSIS

1.0 METEOROLOGICAL ANALYSIS

1.1 Purpose

The purpose of the meteorological analysis is to determine the annual average X/Q and D/Q values at critical locations around the site for each mode of release. The annual average X/Q and D/Q values were used to perform a dose pathway analysis to determine both the maximum exposed individual at site boundary and member of the public.

1.2 Meteorological Data, Parameters, and Methodology ((Define origin of meteorological data)) ((Define how dispersion and deposition coefficients are calculated))

1.3 Results ((Describe results of Analysis))

2.0 LIQUID PATHWAY ANALYSIS

2.1 Purpose

The purpose of the liquid pathway analysis is to determine the maximum exposed member of the public in unrestricted areas as a result of radioactive liquid effluent releases. The analysis includes a determination of most restrictive liquid pathway, most restrictive age group, and critical organ. This analysis is required for Subsection 6.2.

2.2 Data, Parameters, and Methodology ((Describe analysis methodology, model assumptions and parameters))

2.3 Results ((Describe Results of Analysis))

3.0 GASEOUS PATHWAY ANALYSIS

3.1 Purpose

A gaseous effluent pathway analysis is performed to determine the location that would result in the maximum doses due to noble gases for use in demonstrating compliance with Steps 6.3.1.a. and 6.3.3.a. The analysis includes a determination of the critical pathway, location of maximum exposed member of the public, and the critical organ for the maximum dose due to I^{131}, I^{133}, tritium, and for all radionuclides in particulate form with half-lives greater than 8 days for use in demonstrating compliance with requirements in Step 6.3.4.a.1. In addition, the analysis includes a determination of the critical pathway, maximum age group, and sector location of an exposed individual through the inhalation pathway from I^{131}, I^{133}, tritium, and particulates with half-lives greater than 8 days to demonstrate compliance with Step 6.3.1.a.

3.2 Data, Parameters, and Methodology ((Describe analysis methodology, model assumptions and parameters))

3.3 Results ((Describe the results))

NOTE: The results of the above analysis may be incorporated by reference to the Environmental Report and/or FSAR.

APPENDIX A
FINAL SAFETY EVALUATION REPORT

January 27, 2009

Mr. Russell J. Bell, Director
New Plant Licensing
Nuclear Generation Division
Nuclear Energy Institute
1776 I Street, NW, Suite 400
Washington, DC 20006-3708

SUBJECT: FINAL SAFETY EVALUATION FOR NUCLEAR ENERGY INSTITUTE TOPICAL REPORT NEI 07-09, GENERIC FINAL SAFETY ANALYSIS REPORT TEMPLATE GUIDANCE FOR OFFSITE DOSE CALCULATION MANUAL PROGRAM DESCRIPTION, REVISION 4 (PROJECT NO. 689; TAC MD6753)

Dear Mr. Bell:

By letter dated September 11, 2007, the Nuclear Energy Institute (NEI) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review its proposed topical report, NEI 07-09, "Generic Final Safety Analysis Report (FSAR) Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," Revision 0. In a handout dated November 13, 2007, during a Category 2 public meeting, the NRC staff distributed comments on NEI 07-09, Revision 0. In February 2008, NEI submitted Revision 1 of the ODCM template. In response to the NRC staff's April 28, 2008, request for additional information (RAI), NEI submitted NEI 07-09, Revision 2 on May 30, 2008. In response to comments provided by NRC staff on June 12, 2008, NEI submitted Revision 3 of the ODCM template in August of 2008. NRC staff provided comments on Revision 3 of the template in Category 2 public meetings held in August through October of 2008. In response to these comments, NEI submitted Revision 4 of the ODCM template by letter dated November 14, 2008.

Enclosed is the staff's safety evaluation (SE) which defines the basis for acceptance of NEI 07-09, Revision 4. The NRC staff finds that for combined license (COL) applications, NEI 07-09, Revision 4, provides an acceptable template for assuring that the ODCM program meets applicable NRC regulations and guidance.

Our acceptance applies only to material provided in NEI 07-09, Revision 4. We do not intend to repeat our review of the acceptable material described in the NEI 07-09, Revision 4. When the NEI 07-09, Revision 4 appears as a reference in COL applications, our review will ensure that the material presented applies to the specific application involved. Licensing requests that deviate from NEI 07-09, Revision 4, will be subject to a plant-specific or site-specific review in accordance with applicable review standards.

In accordance with the guidance provided on the NRC website, we request that NEI publish the accepted version of NEI 07-09, Revision 4 within three months of receipt of this letter. The accepted version should incorporate this letter and the enclosed SE after the title page. The accepted version should also contain historical review information, including NRC's RAIs and your responses. The accepted versions shall include a "-A" (designating accepted) following the report identification symbol.

If future changes to the NRC's regulatory requirements affect the acceptability of NEI 07-09, Revision 4, NEI will be expected to revise NEI 07-09 appropriately, or justify its continued applicability for subsequent referencing.

If you have any questions, please contact Sheryl A. Burrows at (301) 415-6086 or via email at Sheryl.Burrows@nrc.gov.

Sincerely,

/RA/

William D. Reckley, Chief
Rulemaking, Guidance, and
Advanced Reactors Branch
Division of New Reactor Licensing
Office of New Reactors

Project No. 689

Enclosure:
Safety Evaluation

cc w/encl: See next page

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If you have any questions, please contact Sheryl A. Burrows at (301) 415-6086 or via email at Sheryl.Burrows@nrc.gov.

Sincerely,

/RA/

William D. Reckley, Chief
Rulemaking, Guidance, and
Advanced Reactors Branch
Division of New Reactor Licensing
Office of New Reactors

Project No. 689

Enclosure:
Safety Evaluation

cc w/encl: See next page

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OFFICE	PM:DNRL/NRGA	LA:DNRL	BC:DCIP/CHPB	OGC	BC:DNRL/NRGA
NAME	SBurrows	RRobinson	TFrye*	KWinsberg	WReckley
DATE	12/31/2008	12/30/2008	11/21/2008	01/26/2009	01/27/2009

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FINAL SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

TECHNICAL REPORT NEI-07-09

"GENERIC FSAR TEMPLATE GUIDANCE FOR OFFSITE DOSE CALCULATION MANUAL PROGRAM DESCRIPTION," (REVISION 4, NOVEMBER 2008)

NEI PROJECT NO. 689

1. INTRODUCTION

By letter dated November 14, 2008, the Nuclear Energy Institute (NEI) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review, its proposed, Generic Final Safety Analysis Report (FSAR) Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," Revision 4 [Reference a)]. NEI designated this program as NEI 07-09, under NEI Project No. 689, in a letter dated August 10, 2007 [Reference b)]. The NEI 07-09 Template was developed by NEI to assist NRC review and approval of combined licenses (COLs) submitted by applicants. Following a series of public meetings, communications and letters, NEI addressed NRC comments and issued the final version of the NEI 07-09 Template [References c) to f)]. The NEI 07-09 Template describes a generic ODCM, including provisions for standard radiological effluent controls (SRECs), and the elements of a process and effluent monitoring and sampling program.

The generic ODCM Program Description presented in the NEI 07-09 Template commits an applicant to NRC regulatory requirements, guidance and acceptance criteria listed in Regulatory Guide (RG) 1.206 [Reference g)] and Section 11.5 of the Standard Review Plan (SRP) (NUREG-0800, March 2007) [Reference h)]. The NEI template identifies text and table entries that a COL holder will provide as information or modify the generic information with plant and site-specific features before fuel load. This information is identified in the NEI 07-09 Template with double parentheses. Such information may include the definition of specific equations; terms to equations; nomenclature of plant specific system, equipment, and instrumentation; types of release points; pathway specific dose conversion factors; among others. As a result, the NEI 07-09 Template complies with applicable NRC regulations and guidance and may be used for COL applications submitted under the requirements of Subpart C of Title 10 of the *Code of Federal Regulations*, Part 52 (10 CFR Part 52). If a COL is issued, the licensee must develop operational programs by their implementation milestones, as required prior to fuel load, under regulatory requirements specified in Section 13.4 of applications, license conditions, and design certifications (DC). A COL holder is required to make available for NRC inspection and verification a plant and site-specific process and effluent monitoring and sampling program, consisting of the following elements:

(a) SRECs,
(b) an ODCM, and
(c) a radiological environmental monitoring program (REMP).

Enclosure

Finally, under the requirements of SECY 05-197 [Reference i)], the implementation of operational programs, including the elements identified in NEI 07-09 Template, does not necessitate inspections, tests, analyses, and acceptance criteria (ITAAC) in a DC or COL application.

2. REGULATORY EVALUATION

The staff reviewed NEI 07-09 Template in accordance with the guidance and acceptance criteria provided in SRP Section 11.5, "Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems" (NUREG-0800). Full descriptions of all applicable regulatory requirements and acceptance criteria are identified in SRP Section 11.5. The following listing identifies the major regulatory requirements:

- 10 CFR Part 20, "Standards for Protection against Radiation."
- 10 CFR Part 20.1301, "Dose Limits for Individual Members of the Public."
- 10 CFR Part 20.1302, "Compliance with Dose Limits for Individual Members of the Public."
- 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage."
- 10 CFR Part 50.34a, "Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents—Nuclear Power Reactors."
- 10 CFR Part 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors."
- 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."
- Generic Letter (GL) 89-01, "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications 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 (Generic Letter 89-01)," January 31, 1989. [GL 89-01 is included as Appendix C in NUREG-1301 and NUREG-1302.]

The relevant requirements of the regulations identified above are met by using regulatory positions and guidance contained in the following key RGs and industry standards. Full descriptions of all applicable SRP Section 11.5 acceptance criteria and regulatory guidance are identified in SRP Section 11.5. The following listing identifies key regulatory guidance documents and acceptance criteria of SRP Section 11.5:

a) RG 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."

b) RG 1.33, "Quality Assurance Program Requirements (Operation)."

c) RG 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."

d) RG 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors."

e) RG 1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors."

f) RG 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I."

g) RG 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants."

h) RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

i) RG 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants."

j) RG 4.8, "Environmental Technical Specifications for Nuclear Power Plants."

k) RG 4.15, "Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) - Effluent Streams and the Environment."

l) RG 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable."

m) American National Standards Institute (ANSI)/ Health Physics Society (HPS) N13.1-1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities."

n) ANSI N42.18-2004, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents," 2004.

o) NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants."

p) NUREG-0543, "Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR Part 190)." [The implementation of this Environmental Protection Agency (EPA) standard is addressed under 10 CFR Part 20.1301(e).]

q) NUREG-0800, SRP Section 11.5, "Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems," March 2007.

r) NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors." [This NUREG includes GL 89-01.]

s) NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors." [This NUREG includes GL 89-01.]

t) Radiological Assessment Branch Technical Position (BTP), Revision 1, November 1979. [Contained in Appendix A of NUREG-1301 and NUREG-1302].

u) Inspection and Enforcement (IE) Bulletin No. 80-10, "Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment," May 6, 1980.

v) IE Information Notice No. 91-40, "Contamination of Nonradioactive System and Resulting Possibility for Unmonitored, Uncontrolled Release to Environment," June 19, 1991.

3. TECHNICAL EVALUATION

In evaluating the content, organization, and level of detail of the NEI 07-09 Template, the staff followed SRP Section 11.5 for guidance (as referenced above) and three supporting documents. The documents are NUREG-0133, NUREG-1301, NUREG-1302, as referenced above. NUREG-0133 presents guidance for the preparation of radiological effluent technical specifications (RETS). NUREG-0133 presents definitions and staff positions, special considerations on supporting technical and regulatory topics, and methodology with which to comply with the dose requirements and effluent concentration limits of 10 CFR Part 20, and as low as reasonably achievable (ALARA) design objectives and numerical guides of Appendix I to 10 CFR Part 50. Other sections of the document present methods to derive alarm set-points for instrumentation used to provide an alert of conditions or terminate releases when liquid and gaseous effluent concentrations exceed established levels, define limiting conditions for operations, and specifications for limiting the amounts of radioactivity in liquid containing tanks and gas decay tanks. NUREG-1301 for pressurized-water reactors (PWRs) and NUREG-1302 for boiling-water reactors (BWRs) present guidance in developing ODCMs, including controls and surveillance requirements for instrumentation, radioactive effluents, radiological environmental monitoring, and technical and regulatory bases for such requirements. Also, each document provides, under GL 89-01, the option of consolidating the prior RETS to the ODCM in fulfillment of a Commission policy in improving the implementation of technical specifications. Also, GL 89-01 redefines the RETS as standard radiological effluent controls (SREC). This modification to the prior RETS involves only changes in procedural details and presentation format. This modification does not change any of the regulatory or reporting requirements.

The staff's review also evaluated whether the format and content of NEI 07-09 Template was generally consistent with the requirements of GL 89-01 and guidance of NUREG-1301 for PWR plants or NUREG-1302 for BWR plants and NUREG-0133 for either type of plant;

RGs 1.21, 1.33, 4.1, 4.8, and 4.15; and Radiological Assessment BTP (Revision 1, November 1979).

Given the above regulatory requirements and guidance, the staff's review focused in identifying the elements of the NEI 07-09 Template that address the programmatic elements of an ODCM, while recognizing that the specific elements of a plant and site-specific process and effluent monitoring and sampling program will be developed under the requirements of a license condition and made available to the NRC for verification and inspection before fuel load. The milestones for the development and implementation of a plant and site-specific process and effluent monitoring and sampling program are addressed in FSAR Section 13.4 of COL applications and DCs, and include a COL commitment in safety analysis reports (SARs) (Section 11.5).

Accordingly, the staff's review focused on confirming that NEI 07-09 Template (i.e., generic SREC, ODCM, and REMP) complies with the requirements of:

a) 10 CFR Part 50.34a and 10 CFR Part 50.36a;

b) Sections II to IV of Appendix I to 10 CFR Part 50 ALARA design objectives and numerical guides;

c) liquid and gaseous effluent concentration limits of Appendix B (Table 2) to 10 CFR Part 20;

d) dose limits of 10 CFR Part 20.1301 and 20.1302 for members of the public; and

e) 10 CFR Part 20.1301(e) for assessing total dose from all sources of radioactivity and radiation.

The requirements of General Design Criteria (GDC) 60, 63, and 64 [References j) to l)] from Appendix A to 10 CFR Part 50 are not identified here as they are included in the staff's review of the design bases of related plant systems presented in DCs or, alternatively, are evaluated if identified as supplemental information or as departures in a COL application for specific plant systems. In such instances, the staff will conduct a separate review and evaluation to determine if the inclusion of supplemental information or departures might impact any elements of the process and effluent monitoring and sampling program described in NEI 07-09 Template.

3.1 Overview of NEI 07-09 Template Program Description

The NEI 07-09 Template describes a generic ODCM, including the elements of a process and effluent monitoring and sampling program. A review of the information presented in the NEI 07-09 Template indicates that it is based on the ODCM of a currently operating PWR. The plant and site specific information were removed and left as generic place holders, with changes made accordingly to the nomenclature and terminology. The NEI 07-09 Template is organized in seven sections and 13 attachments. The first four sections include an introduction, purpose, scope, and definitions. The fifth section addresses organizational responsibilities, including training, operational programs, and quality assurance. The responsibilities reference specific sections of the SAR where these functions are described as

commitments. The sixth section describes the elements of a process and effluent monitoring and sampling program. This section identifies sampling and monitoring criteria, liquid and gaseous effluent controls, monitoring instrumentation, dose limits, effluent sampling, waste management, controls for effluent releases, total dose limits for members of the public, radiological environmental monitoring, and record keeping. Section 7 lists references on regulatory requirements, technical and regulatory guidance, and includes industry standards. Supporting information is presented in 13 attachments. The attachments identify for the COL holder the type of plant and site-specific information that must be included in the operational version of the ODCM for submission to the NRC before fuel load. This information is identified in the NEI 07-09 Template with double parentheses. In summary, the attachments identify requirements in describing the type and performance of radiological instrumentation used to monitor liquid and gaseous effluents, instrumentation and equipment surveillance requirements, sampling and analysis requirements, provisions to list dose conversion factors by specific exposure pathways, minimum requirements for the REMP, provisions to list sampling locations, description of detection and reporting levels by type of environmental media, and place holders for the evaluation of meteorological data, and considerations in evaluating exposures to members of the public due to liquid and gaseous release pathways.

3.2 NEI 07-09 Template Details

The staff review and evaluation of the NEI 07-09 Template is organized into five functional areas, organization, SREC, ODCM, REMP, and implementation responsibilities of a COL applicant/COL holder and NRC staff. This approach is consistent with the review process identified in the Section 11.5 of the SRP.

3.2.1 Organization of NEI 07-09 Template

The NEI 07-09 Template follows the guidance of NUREG-1301 for PWR plants or NUREG-1302 for BWR plants; NUREG-0133 for either type of plant; and Radiological Assessment BTP (Revision 1, November 1979). The key supporting references listed in the NEI 07-09 Template are also generally consistent with those identified as regulatory requirements, acceptance criteria, and regulatory guidance in SRP Section 11.5. The NEI 07-09 Template identifies organizational responsibilities, including training, operational programs, and quality assurance.

The NEI 07-09 Template addresses the programmatic elements of a generic ODCM, while recognizing that specific elements of a plant and site-specific process and effluent monitoring and sampling program will be developed under the requirements of license conditions and submitted to the NRC for review and approval before fuel load. This information is identified in the NEI 07-09 Template with double parentheses. The milestones for the development and implementation of a plant and site specific process and effluent monitoring and sampling program are addressed in FSAR Section 13.4 of COL applications and include a COL commitment in FSAR Section 11.5. Finally, under the requirements of SECY-05-0197 [Reference i)], the implementation of operational programs, including the elements identified in the NEI 07-09 Template, do not necessitate ITAACs in either a DC or COL application.

3.2.2 Standard Radiological Effluent Controls

For the sections of the NEI 07-09 Template addressing the generic elements of SREC, the template follows the provisions of GL 89-01 and NUREG-1301 for PWR plants or NUREG-1302 for BWR plants. The procedural and programmatic elements of the generic SREC are based on NRC guidance described in SRP Section 11.5. This approach is consistent with Technical Specifications (TS) (i.e., Section 5.0, Administrative Controls, and Section 5.5, Programs and Manuals) cited in Section 16.0 of DCs and COL applications [References m) and n)]. This review revealed that the scope and elements of the SREC program identified in the NEI Template 07-09 are consistent with the requirements identified in NRC regulations and guidance. The NEI 07-09 Template identifies surveillance requirements and controls; operational conditions of radiation monitoring and sampling equipment; required number of operational channels, conduct and frequencies of channel checks, source checks, channel calibrations, and channel functional checks; compliance with action statements and remediation whenever the number of operational channels and applicability are less than the required minimum; sampling and analysis programs for continuous and batch mode releases, including provisions for the collection of grab and composite samples; and derivations of lower limit of detections by categories of effluents or radionuclides and types of radiological analyses. Where plant and site-specific SREC information is not available, the NEI 07-09 Template identifies the information by using double parenthetical entries [e.g., ((release point noun description))] as place holders for such information in the main section and attachments of the template. The NEI 07-09 Template commits the COL holder to provide this information in fulfillment of the license condition, which specifies the submission to and approval, prior to fuel load, by the NRC of a plant and site-specific set of SREC, as part of the process and effluent monitoring and sampling program. The implementation milestones of license conditions are described in Section 13.4 of each DC and COL application.

The staff concludes that the generic SREC describing administrative and operational programs associated with its implementation is consistent with the requirements of GL 89-01 and guidance of NUREG-1301 for PWR plants or NUREG-1302 for BWR plants. The staff concludes that the NEI 07-09 Template sufficiently describes the programmatic elements and operational objectives to enable a reasonable assurance finding of acceptability for issuance of a combined license, followed with verification of the implementation of a plant-specific SREC through the inspection process before fuel load.

3.2.3 Offsite Dose Calculation Manual

For the sections of the NEI 07-09 Template addressing the generic elements of an ODCM, the template follows the provisions of GL 89-01 and NUREG-1301 for PWR plants or NUREG-1302 for BWR plants and NUREG-0133 for either type of plant. The procedural and programmatic elements of the generic ODCM are based on NRC guidance described in SRP Section 11.5. The NEI 07-09 Template includes provisions for identifying liquid and gaseous effluent release points; and lists place holders for information with which to calculate doses, define release rates, and establish alarm set points. The information place holders include a listing of the types and locations of radiological instrumentation used to monitor and control effluent releases; parameters used to derive effluent release rates and establish alarm set-points; dilution factors for liquid effluents (in-plant and beyond the point of release); atmospheric

dispersion (X/Q) and deposition (D/Q) factors for gaseous and particulate effluents; locations of offsite dose receptors and the basis for their selection using the results of annual land use census surveys; criteria to determine the operability of waste treatment systems and requirements in conducting dose projections, such as whenever treatment systems are not fully utilized, or in assessing monthly, quarterly, and yearly doses; and administrative and operational procedures associated with the implementation of the ODCM.

The template endorses calculation methods using the guidance of RG 1.109 for dose calculations, RG 1.111 for estimating atmospheric dispersion and deposition parameters at downwind locations, and RG 1.113 for estimating aquatic dispersion for routine releases beyond the point of discharge, and corresponding computer codes (e.g., LADTAP II (NUREG/CR-4013) and GASPAR II (NUREG/CR-4653)) used to calculate doses to members of the public. The template identifies other computational tools and guidance, such as NUREG/CR-3332 on radiological assessment, NUREG-0543 in demonstrating compliance with 10 CFR Part 20.1301(e), NUREG-4007 in deriving lower limits of detection for radiation monitoring equipment, ANSI/HPS N13.1-1999 for guidance in sampling and monitoring radioactive materials from plant stacks and vents, and ANSI N42.18-2004 when using continuous radiation monitoring instrumentation.

Where plant and site specific ODCM information is not available, the NEI 07-09 Template identifies the information by using double parenthetical entries [e.g., ((define equations, define equation terms))] as place holders for such information in the main section and attachments of the template. The NEI 07-09 Template commits the COL holder to provide this information in fulfillment of a license condition, which specifies the submission and approval, prior to fuel load, by the NRC of a plant and site-specific ODCM, as part of the process and effluent monitoring and sampling program. The implementation milestones of license conditions are described in Section 13.4 of each DC and COL application.

The NEI 07-09 Template does not include provisions for specifying maximum radioactivity levels in tanks and tank radioactivity monitoring program as these requirements are addressed separately in Section 16.0, TSs (i.e., Section 5.0, Administrative Controls, and Section 5.5, Programs and Manuals) of DCs and COL applications [References m) and n)]. Accordingly, these requirements are not repeated in NEI 07-09 Template given that they are mandated by plant TSs.

The staff concludes that the generic ODCM describing the methodology and parameters used for calculating offsite liquid and gaseous effluent concentrations and doses to members of the public, and administrative and operational programs associated with its implementation is consistent with the requirements of GL 89-01, and guidance of NUREG-1301 for PWR plants or NUREG-1302 for BWR plants, NUREG-0133 for either type of plant; RGs 1.21, 1.33, and 4.15; and Radiological Assessment BTP (Revision 1, November 1979). The staff concludes that the NEI 07-09 Template sufficiently describes the programmatic elements and operational objectives to enable a reasonable assurance finding of acceptability for issuance of a COL, followed with verification of the implementation of a plant and site-specific ODCM through the inspection process before fuel load.

3.2.4 Radiological Environmental Monitoring Program

For the sections of the NEI 07-09 Template addressing the generic elements of a REMP, the template follows the provisions of GL 89-01 and NUREG-1301 for PWR plants or NUREG-1302 for BWR plants and NUREG-0133 for either type of plant, and Radiological Assessment BTP (Revision 1, November 1979). The NEI 07-09 Template provides the means to monitor and quantify radiation and radioactivity levels in the environs of a plant associated with gaseous and liquid effluent releases and contribution of direct external radiation from contained sources of radioactive materials in tanks, equipment and buildings. The procedural and programmatic elements of the generic REMP are based on NRC guidance described in SRP Section 11.5.

The generic REMP describes a process and methods for monitoring, sampling, and analyzing environmental samples representative of expected radionuclide distributions and concentrations in environmental media and associated exposure pathways. The generic REMP provides place holders to indentify types, numbers, and sampling locations, and sampling and analytical frequencies of environmental samples. Samples include milk and milk products, surface and ground water, drinking water, fish and invertebrates, vegetables and leafy vegetables, food products potentially impacted by irrigation, sediments and soils, and air. The selection of sampling locations and types of samples, including control sample locations, are based on the results of a yearly land use census to ensure that changes in exposure pathways are identified and that modifications are made to the monitoring program to reflect such changes. In assessing direct external radiation exposures, the generic REMP identifies types of measurement methods and locations of monitoring stations around plant facilities, including those used to monitor doses to nearest receptors. The Template includes provisions to control releases of radioactive materials caused by spills and leaks that may impact ground and surface water and identifies reporting requirements consistent with the guidance of RG 1.143 and NEI Industry Ground Water Protection Initiative (NEI 07-07) [Reference o)]. The generic REMP includes provisions for detection limits and reporting levels for expected radionuclides and environmental samples and external radiation monitoring methods. The generic REMP describes participation in an inter-laboratory comparison program to assess the precision and accuracy of measurements of radioactivity in environmental samples as part of a quality assurance program.

Where plant and site-specific REMP information is not available, the NEI 07-09 Template identifies the information by using double parenthetical entries [e.g., ((define frequency, media, and analysis to be performed))] as place holders for such information in the main section and attachments of the template. The NEI 07-09 Template commits the COL holder to provide this information by a time specified in a license condition, making available for NRC inspection and verification prior to fuel load, a plant and site-specific REMP, as part of the process and effluent monitoring and sampling program. The implementation milestones of license conditions are described in Section 13.4 of each DC and COL application.

The staff concludes that the generic REMP describes the means to monitor and quantify radiation and radioactivity levels in the environs of a plant associated with gaseous and liquid effluent releases and assess the contribution of direct external radiation from contained sources of radioactive materials in tanks, equipment and buildings. The description of the implementation of its administrative and operational programs is consistent with the

requirements of GL 89-01, and guidance of NUREG-1301 for PWR plants or NUREG-1302 for BWR plants, and NUREG-0133 for either type of plant; RGs 1.21, 1.33, 4.1, 4.8, and 4.15; and Radiological Assessment BTP (Revision 1, November 1979). The staff concludes that the NEI 07-09 Template sufficiently describes the programmatic elements and operational objectives to enable a reasonable assurance finding of acceptability for issuance of a COL, followed with verification of the implementation of a plant and site-specific REMP through the inspection process before fuel load.

4. IMPLEMENTATION

Before the implementation of the plant and site-specific ODCM, the NRC staff will inspect the elements of ODCM following the NRC Construction Inspection Program defined in IMC 2504. The objectives of these inspections are to determine the readiness of the programs to perform their intended objectives. The inspection will confirm that the administrative programs and operational procedures implementing the standard radiological effluent controls, offsite dose calculation manual, and radiological environmental monitoring program are consistent with regulatory requirements of 10 CFR Part 20 and 10 CFR Part 50, and GL 89-01; NUREG-1301 for PWR Plants or NUREG-1302 for BWR plants and NUREG-0133 for either type of plant; RGs 1.21, 1.33, 4.1, 4.8, and 4.15; NRC guidance of Radiological Assessment BTP (Revision 1, November 1979); and industry guidance of ANSI/HPS N13.1 and ANS N42.18.

In addressing the requirements of 10 CFR Part 52.80(a), which requires that a DC application contains the proposed ITAACs, the NRC inspection will confirm that the COL holder has performed all applicable ITAACs for liquid and gaseous effluent systems, and process radiation monitoring and sampling systems. The ITAACs are described in DCD Tier 1 of DCs and Section 14.3 of the FSAR in COL applications. The staff will confirm whether the COL holder has addressed all relevant ITAACs, including confirming the descriptions and functional arrangements of systems (as safety and non-safety related subsystems); instrumentation indications of radiation or radioactivity levels, alarms on exceeding set-point values, alarms on inoperative conditions, and initiation of protective actions and isolation or termination of plant processes or effluent releases in demonstrating compliance with 10 CFR Part 20.1301 for doses to members of the public, effluent concentration limits in Table 2 (Columns 1 and 2) of Appendix B to 10 CFR Part 20, and numerical objectives of Appendix I to 10 CFR Part 50. The ITAACs, when completed by the COL holder and verified to meet their respective acceptance criteria, provide reasonable assurance that a plant that incorporates the features described in its DC and establishes operating programs in accordance with the DC will meet the provisions of NRC regulations.

5. CONCLUSION

The staff used the provisions of 10 CFR Part 20, 10 CFR Part 50.34a and Part 50.36a, ALARA design objectives and numerical guides of Appendix I to 10 CFR Part 50, and the guidance of SRP Section 11.5 as the bases for evaluating the acceptability of the NEI 07-09 Template. On the basis of the staff's review of the generic SAR Template for ODCM Program Description, the staff concludes that the provisions of the NEI Template 07-09 are generally consistent with the

applicable requirements of 10 CFR Part 20.1301 and 20.1302, 10 CFR Part 20.1301(e), 10 CFR Part 50.34a and 50.36a, and 10 CFR Part 50 Appendix I numerical guides and design objectives. This conclusion is based on the following:

a) The generic SREC, ODCM, and REMP, and associated administrative and operational programs, are found to be consistent with the requirements of GL 89-01; radiological guidance of NUREG-1301 or NUREG-1302 and NUREG-0133; RGs 1.21, 1.33, 4.1, 4.8, and 4.15; and Radiological Assessment BTP (Revision 1, November 1979).

b) The Template addresses provisions in establishing instrumentation alarm set-points for automatic termination of effluent releases and control over discharges, in accordance with 10 CFR Part 50.36a, numerical guides and design objectives of Appendix I to 10 CFR Part 50, 10 CFR Part 20.1301 and 20.1302 dose limits to members of the public, and liquid and gaseous effluent concentration limits of Table 2 in Appendix B to 10 CFR Part 20. The provisions for sampling process and effluent streams and conducting analysis of samples, including a requirement to develop a plant and site-specific analytical program, follow the guidelines in RGs 1.21, 1.33, 4.1, 4.8, and 4.15 for routine plant operation and anticipated operational occurrences. The Template includes requirements for annual reporting requirements describing quantities of radioactive materials released in the environment via liquid and gaseous effluents, and results of radiological assessment in comparing doses to members of the public against the limits of 10 CFR Part 20 and numerical criteria of 10 CFR Part 50. The Template includes provisions for reporting information on meteorological data collection and uses in deriving atmospheric dispersion and deposition parameters and calculating doses to members of the public.

c) The Template includes provisions to consider all sources of radiation and radioactivity in estimating associated doses to members of the public in fulfillment of the EPA generally applicable environmental radiation standards of 40 CFR Part 190, as implemented under 10 CFR Part 20.1301(e).

d) The Template includes provisions to monitor and quantify radiation and radioactivity levels in the environs of a plant associated with gaseous and liquid effluent releases and assess the contribution of direct external radiation from contained sources of radioactive materials. The Template includes provisions to control releases of radioactive materials caused by spills and leaks that may impact ground and surface water and identifies reporting requirements consistent with the guidance of RG 1.143 and NEI Industry Ground Water Protection Initiative (NEI 07-07). The Template includes requirements for participation in an inter-comparison program, yearly conduct of land-use census, and annual reporting requirements of the results of the REMP.

e) The Template includes administrative measures (e.g., release permits) to control discharges of radioactive materials in the environment, as continuous and batch releases, and releases associated with operational occurrences and unplanned and unmonitored discharges. The provisions include requirements to sample and monitor all appropriate process streams and effluents, characterize such radioactive releases, and assess doses to members of the public. The provisions include reporting and notification requirements, identify a process to make changes to the ODCM, and require that all records associated

with the implementation of the ODCM be maintained in accordance with an established records management system.

f) The Template identifies organizational responsibilities for the implementation of operational programs, with milestones defined under regulatory requirements and license conditions. The responsibilities and operational programs identified are those of FSAR Section 13.1 (Organization), Section 13.2 (Training), Section 13.4 (Operational Programs), and Section 17 (Quality Assurance).

The staff concludes that the NEI 07-09 Template sufficiently describes the programmatic elements and operational objectives to enable a reasonable assurance finding of acceptability for issuance of a COL, followed with verification of the implementation of a site and plant-specific SREC, ODCM, and REMP through the inspection process before fuel load. The staff concludes that the NEI 07-09 Template is adequate and may be referenced in a COL application, and that the implementation of a plant and site-specific SREC, ODCM, and REMP will be executed by COL holders in accordance to milestones described in COL SAR Section 13.4 and license conditions.

Accordingly, the NEI 07-09 Template fulfills a licensing requirement for submission of a COL application. A license condition will specify the timing for the licensee to make a site and plant-specific ODCM available for NRC inspection and verification prior to fuel load. Finally, under the requirements of SECY 05-0197, the implementation of operational programs identified in the NEI 07-09 Template does not necessitate ITAACs in a DC or COL application.

6. REFERENCES

a) Bell, R. J., NEI, to the NRC, "Generic FSAR Template for Offsite Dose Calculation Manual (ODCM) Program Description, Revision 4, November 14, 2008."

b) Bell, R. J., NEI, to the NRC, "Generic Templates on Radioactive Wastes and Radiation Protection Programs and Related Content of Final Safety Analysis Reports, August 10, 2007.

c) Bell, R. J., NEI, to the NRC, "Generic FSAR Template for Offsite Dose Calculation Manual (ODCM) Program Description, Revision 3, August 2008."

d) Bell, R. J., NEI, to the NRC, "Generic FSAR Template for Offsite Dose Calculation Manual (ODCM) Program Description, Revision 2, May 2008."

e) Bell, R. J., NEI, to the NRC, "Generic FSAR Template for Offsite Dose Calculation Manual (ODCM) Program Description, Revision 1, February 2008."

f) Bell, R. J., NEI, to the NRC, "Generic FSAR Template for Offsite Dose Calculation Manual (ODCM) Program Description, Revision 0, September 2007."

g) RG 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)."

h) NUREG-0800, SRP Section 11.5, "Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems," March 2007.

i) SECY-05-0197, "Review of Operational Programs in Combined License Applications and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," February 22, 2006.

j) 10 CFR Part 50, Appendix A, General Design Criterion 60, "Control of Releases of Radioactive Materials to the Environment."

k) 10 CFR Part 50, Appendix A, General Design Criterion 63, "Monitoring Fuel and Waste Storage."

l) 10 CFR Part 50, Appendix A, General Design Criterion 64, "Monitoring Radioactivity Releases."

m) NUREG-1431, "Standard Technical Specifications for Westinghouse Plants," Rev. 3, June 2004.

n) NUREG-1434, "Standard Technical Specifications for General Electric Plants, BWR/6," Revision 3, June 2004.

o) NEI, "Industry Ground Water Protection Initiative – Final Guidance Document, NEI 07-07, August 2007.

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APPENDIX B
NRC REQUEST FOR ADDITIONAL INFORMATION

April 28, 2008

Mr. Russell J. Bell, Director
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Nuclear Generation Division
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1776 I Street, NW, Suite 400
Washington, DC 20006-3708

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING NUCLEAR ENERGY INSTITUTE TOPICAL REPORT 07-09, GENERIC FINAL SAFETY ANALYSIS REPORT TEMPLATE GUIDANCE FOR OFFSITE DOSE CALCULATION MANUAL PROGRAM DESCRIPTION, REVISION 1 (PROJECT NO. 689; TAC MD6753)

Dear Mr. Bell:

By letter dated September 11, 2007, the Nuclear Energy Institute (NEI) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review its proposed topical report, NEI 07-09, "Generic Final Safety Analysis Report (FSAR) Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," Revision 0. In a handout dated November 13, 2007, during a Category 2 public meeting, the NRC staff distributed comments on NEI 07-09, Revision 0. In February 2008, NEI submitted Revision 1 of the ODCM template. The staff has determined that additional information is necessary to complete its review. On March 14, 2008, an electronic copy of the enclosed request for additional information (RAI) was transmitted to Ralph Andersen of NEI. Although this RAI has already been provided to you electronically, we will not expect a response until 30 days following date of issuance of this letter; therefore, please let me know if you will not be able to provide your written reply within that time period.

If you have any questions or comments regarding this matter, please contact Ms. Sheryl A. Burrows by telephone at (301) 415-6086 or by e-mail at Sheryl.Burrows@nrc.gov.

Sincerely,

/RA/

William D. Reckley, Chief
Rulemaking, Guidance and
Advanced Reactor Branch
Division of New Reactor Licensing
Office of New Reactors

Project No. 689
Enclosure:
As stated
cc: See next page
ADAMS ACCESSION NO.: ML080870117

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DATE	03/31/08	04/01/08	04/01/08	04/14/08	04/28/08

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING TOPICAL REPORT NUMBER NUCLEAR ENERGY INSTITUTE 07-09, GENERIC FINAL SAFETY ANALYSIS REPORT TEMPLATE GUIDANCE FOR OFFSITE DOSE CALCULATION MANUAL PROGRAM DESCRIPTION, REVISION 1 (PROJECT NO. 689; TAC MD6753)

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Request for Additional Information on the
Generic Final Safety Analysis Report Template Guidance for Offsite Dose Calculation
Manual Program Description, Nuclear Energy Institute 07-09 Rev. 1, Feb. 2008

The following presents a request for additional information (RAI) on Nuclear Energy Institute (NEI) Template No. NEI 07-09, entitled "Generic Final Safety Analysis Report (FSAR) Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description, Rev. 1, February 2008." The listed RAIs address technical and regulatory clarifications based on the staff's review of the template against U. S. Nuclear Regulatory Commission (NRC) regulatory and technical requirements and guidance. The RAIs are tied to specific sections of the NEI template. In some instances, the RAIs include suggested modifications to the existing text for the purpose of exemplifying the technical issue identified by the staff, but the staff recognizes that other approaches may be used in achieving the same objectives. Accordingly, the suggested modifications are presented for the purpose of conveying a clearer understanding of technical issues identified by the staff and facilitate NEI's effort in revising the ODCM template. The comments do not address editorial and formatting topics.

1. Section 1, Introduction

The last paragraph on p.1 should be edited to include a sentence directing the reader to the reference section for additional information on NRC regulatory requirements and guidance.

2. Section 6.2.2, Liquid Monitoring Instrumentation

The bullets used under item a.2., p.7, should be replaced with a numbering system, such as (i) or (a) in facilitating internal references to each topic. This comment applies to all subsequent ODCM sections as well.

3. Section 6.2.4, Liquid Waste Management System

Citation of systems, such as the Liquid Waste Management System in item a.1., p.9, should be made in lower caps since the template is a generic document. For the full ODCM, all system designations will be expected to reflect the exact nomenclature of each system, as defined in the FSAR. Note this comment applies here and throughout the entire template for all listed systems.

4. Section 6.3.1, Gaseous Effluent Dose Rate Limitation

In the note located on p.11, the reference to dose factors is inconsistent with Attachment 5. The total body, skin, and air dose factors do not apply here. Given that item c.2 addresses itself to radioiodines, tritium, and particulates, the dose factor should refer only to inhalation dose factors listed in Attachment 5.

5. Section 6.3.2, Gaseous Monitoring Instrumentation

Under item d.1., p.12, the note should refer to "the summation of **doses from** all release points..."

Enclosure

For consistency with Section 6.2.2, p.8, insert the following parenthetical text at the end of this section, p.12, to read:

((Provide flow schematics of airborne effluent radioactivity release points from all building ventilation systems and plant process vents))

6. Section 6.3.3, Noble Gas Effluent Air Dose Limit

In the notes located on p.13 and 14, the references to dose factors are inconsistent with Attachment 5. The total body, skin, and air dose factors do not apply here. Given that item c. addresses itself to gamma radiation and beta radiation, the dose factors should refer only to gamma air dose factors for the note on p.13 and beta air dose factors for the note on p.14, as listed in Attachment 5.

7. Section 6.3.4, I-131, I-133, H-3, & Radionuclides in Particulate Form Effluent Dose Limit

Under item c., Dose Calculations, p.14, the first sentence should be rewritten as follows: "Gaseous releases **associated with anticipated operational occurrences and unplanned and unmonitored releases** shall be included in the determination of a release."

The note on p.15 should refer the reader to Attachment 8 for the associated dose factors.

8. Section 6.3.5, Gaseous Waste Management System

As described at the top of p.16, the requirements are incomplete working definitions of gamma, beta, and public dose projections. The following revisions are believed to provide the necessary clarifications:

a. Proposed modified Text 1 for item c.

"Determine the projected 31-day gamma air dose **using the equation derived under Section 6.3.3.c for gamma radiation and the ratio of estimated gaseous effluent radioactivity in the current 31-day period to that released in the previous 31-day period."**

b. Proposed modified Text 2 for item d.

"Determine the projected 31-day beta air dose **using the equation derived under Section 6.3.3.c for beta radiation and the ratio of estimated gaseous effluent radioactivity in the current 31-day period to that released in the previous 31-day period."**

c. Proposed modified Text 3 for item e.

"Determine the projected maximum exposed member of the public **using the equation derived under Section 6.3.4.c and the ratio of estimated effluent radioactivity due to radioiodines, tritium, and particulates radionuclides with half-lives greater than**

8 days in the current 31-day period to that released in the previous 31-day period."

9. Section 6.4.1, Liquid Waste Batch Release Permits

In the parenthetical text, p.16, rather than stating "List examples of batch releases," the text should say instead "List **all systems with expected** batch releases." Apply related fixes to Section 6.4.2 and Section 6.4.5.

For consistency with Section 6.4.5, there is a need to address the potential for releases other than planned releases, see suggested text for Section 6.4.5 (item 10 below). The following paragraph should be inserted in Section 6.4.1, p.16, after the parenthetical text:

"Liquid releases associated with anticipated operational occurrences and unplanned and unmonitored releases shall be characterized by using sampling and analytical procedures for the purpose of assessing the amounts of radioactivity that were released or are being released to the environment and for determining doses to offsite receptors."

10. Section 6.4.5, Miscellaneous Gaseous Release Permit

The entire paragraph, p.17, should be rewritten as follows for clarity:

"Gaseous releases associated with anticipated operational occurrences and unplanned and unmonitored releases shall be characterized by using sampling and analytical procedures for the purpose of assessing the amounts of radioactivity that were released or are being released to the environment and for determining doses to offsite receptors."

11. Section 6.4.6, Radioactive Liquid and Gaseous Release Controls

The header for item g., p.17, should be edited to read "Site implementing procedures **control in initiating the release and** identify..." so as to be consistent with item h. that follows in addressing the termination of a release.

12. Section 6.6.2, Land Use Census

Under item b.2., p.21, the "25 percent" requirement in reporting doses should be edited and left as a parenthetical requirement for the development of the full ODCM. The following is suggested for this sentence: "...dose commitment (via the same exposure pathway) **((specify percentage))** greater than at a location from..."

13. Section 6.6.3, Interlaboratory Comparison Program

The sentence under item a. on p.21 should be edited to stipulate that the analyses for radioactive materials should be conducted for environmental media identified in Attachment 9 to read: "... shall be analyzed, **given the environmental media identified in Attachment 9**."

14. Section 6.7.2, Annual Radioactive Effluent Release Report

Under item a.3., p.23, the text should be revised to read "... description of unplanned **and/or unmonitored** releases from the site ..." so as to capture the range of all possible types of releases that must be reported to the NRC.

Under item b.3., bottom of p.23, the end of the sentence should read as follows: "... shall be used to determine gaseous, **radioiodines, tritium, and particulates, with half-lives greater than 8 days,** pathway doses."

Under item b.3., the parenthetical text on top of p.24 should refer to Attachment 13 for details on site specific meteorological conditions used for gaseous effluents dose pathways.

15. Section 6.7.4, Changes to the ODCM

The parenthetical text under item a., p.24, should be revised to read: "((**Identify the functional organization and** define the level review and approval))."

The word "Documented." under item b., p.24, seems extraneous. It should be deleted.

16. Section 6.7.5, Groundwater Protection Initiative

Under item a.2., p.25, the third line from the bottom should be edited to read "... and having the potential to reach groundwater **or surface water** that is or could be used as a source of drinking water." This change makes this requirement consistent with NEI 07-07, see subsection b.i., top of p.9.

17. Deleted Section 7, Records

The previously deleted Section 7, Records, should be reinstated in the ODCM and include the following sentence: **"The licensee shall maintain all records associated with the implementation of the ODCM in accordance with the site records management system."**

18. References

The following references should be added to the listing of current citations:

a. NUREG/CR-4013, "LADTAP II—Technical Reference and User Guide," NRC, April 1986.

b. NUREG/CR-4653, "GASPAR II—Technical Reference and User Guide," NRC, March 1987.

c. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)."

d. ANSI/HPS N13.1-1999, "Sampling and Monitoring Releases of Airborne Radioactive Substances from the Stacks and Ducts of Nuclear Facilities," 1999.

e. ANSI N42.18-2004, "Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents," 2004.

f. IE Bulletin No. 80-10, "Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment," May 6, 1980.

g. IE Information Notice No. 91-40, "Contamination of Nonradioactive System and Resulting Possibility for Unmonitored, Uncontrolled Release to Environment," June 19, 1991.

h. 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."

i. 10 CFR Part 20, Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage."

j. 10 CFR 50.34a, "Design Objectives for Equipment to Control Releases of Radioactive Material in Effluents—Nuclear Power Reactors."

k. 10 CFR 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors."

l. 10 CFR 20.1301, "Dose Limits for Individual Members of the Public."

m. 10 CFR 20.1302, "Compliance with Dose Limits for Individual Members of the Public."

n. 10 CFR 20.2202, "Notification of Incidents."

o. 10 CFR 20.2203, "Reports of Exposures, Radiation Levels, and Concentrations of Radioactive Material Exceeding the Constraints or Limits."

p. 10 CFR 50.72, "Immediate Notification Requirements for Operating Nuclear Power Reactors."

q. 10 CFR 50.73, "Licensee Event Report System."

Reference 20 should be edited by adding to it the following text, "**as implemented under 10 CFR Part 20.1301(e)**."

References 15 and 23 should be edited by adding to each the following text, "**as contained in NUREG-1301 and NUREG-1302**."

For reference 14, change the publication date to September 1984 as the correct date for this citation.

For reference 18, change the citation to read: "**Report of the ICRP Committee II on** Permissible Dose for Internal Radiation (1959)."

For reference 25, edit the reference for consistency as the cited section is only a subsection of FSAR Chapter 17.

Reference 32 should be edited by adding to it the following: **Note: Given that this template is based on the North Anna Unit 1 & 2 ODCM, it may be useful to review its approach and methods applied in deriving doses, dose projections, and in determining radiation monitoring instrumentation alarm set-points in developing a plant-specific ODCM.**

Comment: It is suggested that all references be reordered by decreasing order of importance, such as first by regulations and then by generic letters, regulatory guides, NUREGs, standard review plan, other types of guidance documents, etc.

19. Attachment 5

A review of the dose factors listed in Attachment 5, p.33, indicates that the "Pi" dose factor for inhalation is not tabulated, nor defined. See Attachment 5, p.3 of 3 of the North Anna ODCM. Accordingly, revise the tabulation of Attachment 5 to include the "Pi" inhalation dose factor and add its definition to those already listed under the second note of p.33.

The heading of the tabulation on p.33 should be revised to read: "Gaseous Effluent **Radioiodines, Tritium, and Particulate** Dose Factors."

20. Attachment 6

Delete the second note and the definition of the "Pi" organ dose factor as this is already addressed in Attachment 5.

21. Attachment 8

A review of the dose factors listed in Attachment 8, p.36, indicates that the "RMivv" and "RMipv" dose factors for critical organs are not defined when compared to Attachment 5, p.33. Accordingly, revise the tabulation of Attachment 8 to include the "RMivv" and "RMipv" dose factors for critical organs under a note. See Attachment 5 format for consistency.

The radiological units listed in the tabulation should be revised to read: "mrem/yr **per** Curie/sec."

22. Attachment 9

The following changes should be made to this attachment so as to make it consistent with generic NRC programs of NUREG-1301 and NUREG-1302:

a. Assign (NOTE 1) to the title heading of Attachment 9.

b. For direct radiation, the number of TLD locations should read "**Forty** routine monitoring ..."

c. In item 2) for direct radiation, change text to read: "... within **6 to** 8 km range..."

d. For waterborne media, qualify that grab sampling is based on a composite sample.

e. For drinking water, qualify that composite samples need to be collected bi-weekly when I-131 is present.

f. For drinking water, the scope of the radiological analysis must include I-131 when present.

g. For milk, specify that the collection and radio-analytical frequencies are semi-monthly when animals are on grazing pastures and monthly at other times.

h. For fish, specify that the collection frequency is seasonal for the listed species and semiannually if not seasonal.

i. For food products, specify that the samples must include three different kinds of broad leafy vegetables, and that food products subject to irrigation should be included when irrigated with irrigation water impacted by plant liquid effluent discharges.

j. For NOTE 1, p.40, the following text should be inserted after the first sentence:

"See Table 3.12-1 of NUREG-1301 or NUREG-1302 for specific guidance on the scope and elements of the program, including qualifying notations on radiological analysis, determination of up and downstream sampling locations from discharge points, composite sampling, groundwater sampling when groundwater is a source of drinking water, and sampling of food products during harvest times."

23. Attachment 10

Add the following notes, p.42, to the tabulation:

"Note: Add descriptive qualifiers to each sample media as required."

"Note: Provide a map showing the points of all identified sampling locations around the plant."

24. Attachment 11

The existing note, p.43, should be revised to read: "... and qualifying conditions, **including measurable and identifiable radionuclides other than tabulated above**."

A new footnote should be added for water samples identifying conditions whenever drinking water pathways exist. Add on p.43, the following footnote: "**See NRC guidance on LLDs when a drinking water pathway exists**."

25. Attachment 12

In Attachment 12, p.44, add the following note for water samples whenever drinking water pathways exist: "**See NRC guidance on reporting levels when a drinking water pathway exists**."

26. Attachment 13

The parenthetical text included in Section 2.2 and after Section 3.1 should be edited to read: "((Describe analysis methodology **and model assumptions and parameters**))."