NEI 08-08 [Revision 1]

GENERIC FSAR TEMPLATE GUIDANCE FOR LIFE CYCLE MINIMIZATION OF CONTAMINATION

May 2009

Nuclear Energy Institute, 1776 I Street N. W., Suite 400, Washington D.C. (202.739.8000)

NEI 08-08 [Revision 1]

Nuclear Energy Institute

Generic FSAR Template Guidance for Life Cycle Minimization of Contamination

May 2009

Nuclear Energy Institute, 1776 I Street N. W., Suite 400, Washington D.C. (202.739.8000)

ACKNOWLEDGEMENTS

This program description document, NEI 08-08, *Generic FSAR Template Guidance for Life-Cycle Minimization of Contamination*, Revision 1, 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 guidance.

EXECUTIVE SUMMARY

NEI 08-08, *Generic FSAR Template Guidance for Life-Cycle Minimization of Contamination*, Revision 1, 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. In addition, the generic program description in this document will meet the requirements of 10 CFR 20.1406 for life cycle minimization of contamination, in part, by addressing the applicable regulatory position elements of Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning." A main objective of this program description is to assist in expediting NRC review and issuance of the combined license.

NOTICE

Neither NEI, nor any of its employees, members, supporting organizations, contractors, or consultants make any warranty, expressed or implied, or assume any legal responsibility for the accuracy or completeness of, or assume any liability for damages resulting from any use of, any information apparatus, methods, or process disclosed in this report or that such may not infringe privately owned rights.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1 INTRODUCTION 1

2 APPLICABILITY AND CONTROLS 3

3 MINIMIZING FACILITY CONTAMINATION 5

3.1. MINIMIZATION OF LEAKS AND SPILLS AND PROVISION OF CONTAINMENT 5

3.2. PROMPT DETECTION OF LEAKAGE 7

3.3. MINIMIZE THE POTENTIAL OF THE RELEASE OF CONTAMINATION FROM UNDETECTED LEAKS 8

3.4. REDUCING THE NEED FOR DECONTAMINATION OF EQUIPMENT AND STRUCTURES 8

3.5. REVIEW OF OPERATIONAL PRACTICES 9

4 GUIDES FOR MINIMIZING CONTAMINATION OF THE ENVIRONMENT 11

4.1. SITE CONCEPTUAL MODEL DEVELOPMENT 11

4.2 EARLY DETECTION OF LEAKAGE AND CONTAMINANT MIGRATION 12

4.3. FINAL SITE CONFIGURATION 12

5. FACILITATION OF DECOMMISSIONING 13

5.1. DESIGN AND OPERATIONAL FEATURES THAT FACILITATE DECOMMISSIONING 13

5.2 DECOMMISSIONING RECORDS 13

6 MINIMIZING THE GENERATION OF WASTE 15

6.1 WASTE MANAGEMENT 15

6.2 ONSITE STORAGE OF RADIOACTIVE WASTE 15

7. DEFINITIONS 15

8. REFERENCES 17

APPENDIX A A-1

GENERIC FSAR TEMPLATE GUIDANCE FOR LIFE-CYCLE MINIMIZATION OF CONTAMINATION

1 INTRODUCTION

The nuclear power industry has long recognized the benefits and value of implementing sound radiation protection principles to achieve occupational and public doses that are as low as reasonably achievable (ALARA) and to minimize contamination and radioactive waste generation. The implementation of procedures, engineering controls, lessons learned and financial assurance requirements for decommissioning have been evident in the nuclear industry's efforts to minimize contamination and the generation of radioactive waste. In addition, under the Industry Ground Water Protection Initiative (GPI), nuclear power plants developed and implement a site-specific/company ground water protection program to assure timely and effective management of situations involving inadvertent or unintentional releases of licensed material to ground water. The GPI guidance was amended to include lessons learned and was published as "Industry Ground Water Protection Initiative – Final Guidance Document" (Reference 3). "Groundwater Protection Guidelines for Nuclear Power Plants," EPRI Report 1016099, dated January 2008 (Reference 4) provides one acceptable approach for an effective ground water protection program and provides a technical basis for this template.

The new reactors' general design consideration for the ALARA principles results in plants that minimize contamination and the generation of radioactive waste. Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be ALARA," recognizes that contaminated air and liquids present the potential for intake by inhalation and absorption and that contaminated surfaces present the potential for intake by ingestion. The basic variables identified that can be controlled to limit dose from internal exposure include those that limit: (1) the amount of contamination and (2) the dispersal of the contamination. Therefore, the ALARA principles include elements of a contaminant management philosophy that are part of the nuclear industry's total life cycle consideration for a facility. In implementing these ALARA principles, all reasonable engineered measures and operational practices should be considered in achieving the objectives identified in the template; however, cost alone should not be the only factor used in determining whether such measures are implemented.

This template implements Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning" (Reference 5) Regulatory Position for Combined License (COL) applicant's operational program. A COL applicant's program consistent with NEI 08-08 meets the requirements of 10 CFR 20.1406.

Each licensee's risk informed approach toward limiting leakage and/or controlling the spread of contamination is integrated in the design of the type facility selected and supplemented by the operating programs, processes and procedures. This template describes the content of operating programs/processes that will demonstrate compliance with 10 CFR 20.1406. Where specific site information is needed, that information is contained in double parentheses **(( ))** and will be provided by the applicant as specified in FSAR Section 13.4 prior to initial fuel load. A Note is provided for additional information or clarification of a section.

2 APPLICABILITY AND CONTROLS

This template applies to applicants for licenses whose applications are submitted after August 20, 1997 and provides an acceptable format and information for an operational program that may be used by a Combined License (COL) applicant to meet 10 CFR 20.1406.

This template applies to the applicant that has selected a Standard Design, as defined by 10 CFR Part 52, with design features and COL described design features, that when supplemented with operating programs, processes, and procedures as needed, are adequate to comply with 10 CFR 20.1406. The operating programs, processes and/or procedures identified within this template supplement those adequate design features to provide reasonable assurance that 'spills, leaks, and inadvertent or unintentional discharges of radioactive effluents will be prevented or minimized.'

The operational, programmatic, and inspection/surveillance elements of Regulatory Guide 4.21 Regulatory Positions are addressed in this template. The controls identified within are based on specified plant programs that should be incorporated into those programs as necessary. The site program that addresses ground water monitoring should also address the identification of inadvertent or unintentional contamination of subsurface or native soil. The technical basis for the program for early detection of leakage for new reactor applications is the Industry Ground Water Protection Initiative-Final Guidance Document NEI 07-07 Section 1.0 Ground Water Protection Program. EPRI TR-1016099 provides a detailed technical basis in the accomplishment of NEI 07-07 and NEI 08-08, and should be used to implement a comprehensive approach to the operational aspects of groundwater protection for new reactors. The applicant should develop the appropriate site procedures and/or programs to meet the GPI and implement these procedures and programs consistent with applicant's FSAR section 13.4 (Radiation Protection Milestone 3 initial fuel load). The applicant's program involves an initial and periodic evaluation of the facility SSCs, work activities, and generic issues. The frequency of the evaluation should reflect factors that affect the likelihood and potential consequences from an inadvertent or unintentional loss of radioactive material to the environment.

Note: Section 2 of NEI 07-07 provides guidance on voluntary communication that is not part of the guidance provided in NEI 08-08.

NEI 08-08 identifies the base operational program to supplement the standard designs. A COL applicant may identify site-specific programs/controls that depart from or enhance the items within NEI 08-08 based on a site-specific evaluation of the design features of the systems, structures, or components including any additional design information provided by the licensee in the COLA.

This template recognizes that other site programs, such as the maintenance and surveillance program and the radiation protection program, help to minimize contamination of the facility and the environment. The radiation protection program addresses the handling of radioactive materials including the control of contamination inside indoor structures or facilities and the movement of radioactive materials from one part of the site to another.

3 MINIMIZING FACILITY CONTAMINATION

3.1. MINIMIZATION OF LEAKS AND SPILLS AND PROVISION OF CONTAINMENT

3.1.1 The facility incorporates design features that ensure, to the extent practicable, the integrity of systems, structures, and components (SSCs) to minimize leaks and spills, contain leaks/spills where they might occur, and include detection where industry experience indicates potential for leakage.

Note: Provide a listing of the section (s) of the Design Control Document (DCD) and/or Combined Operating License Application (COL) that describe, to the extent practicable, how the facility design minimizes contamination of the facility and the environment, facilitates eventual decommissioning, and minimizes the generation of radioactive waste. This information should consider, as a minimum, the items identified in Appendix A of this document. ((Complete appropriate items in Appendix A))

3.1.2 The facility layout will include designated areas for maintenance of equipment, decontamination of equipment/tools, and the storage of radioactive material. Clean areas will be segregated from contaminated areas.

3.1.3 Radiologically significant leaks and spills are evaluated and contained to ensure compliance with 10 CFR Part 20 and to minimize contamination to the extent practicable and cost effective.

3.1.4 The applicant will evaluate all SSCs that contain or could contain licensed material and for which there is a credible mechanism for the licensed material to reach ground water consistent with Reference 3 and Reference 4 and will:

Note: A ”credible mechanism” for the licensed material to reach ground water is considered one wherein the failure of a single barrier between the SSC and the environment that could result in inadvertent or unintentional contamination of ground water or native soil.

Note: "reasonably expected" takes into account the maintenance history, condition, or age of the SSC as determined during the evaluation of the SSC described in this step and could result in an uncontrolled release to the environment by some means other than an ODCM-credited release point.

a. Identify each SSC that involves or could reasonably be expected to involve licensed material and for which there is a credible mechanism for the licensed material to reach ground water. Examples of SSCs of interest include: refueling water storage tanks, if outdoors; spent fuel pools; spent fuel pool leak detection systems; outdoor

tanks; outdoor storage of contaminated equipment; buried piping; retention ponds or basins or reservoirs; and lines carrying steam.

Note: For additional examples of systems that could become contaminated see IE Bulletin No. 80-10, Contamination of Non-Radioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment, (Reference 6).

b. Identify existing leak detection methods for each SSC that involve or could involve licensed material and for which there is a credible potential for inadvertent releases to ground water. These may include ground water monitoring, operator rounds, engineering walk downs or inspections, leak-detection systems, or periodic integrity testing.

c. Identify potential enhancements to leak detection systems or programs. These may include additional or increased frequency of rounds or walk downs or inspections, or integrity testing.

d. Identify potential enhancements to prevent spills or leaks from reaching ground water. These may include resealing or paving surfaces or installing spill containment measures.

e. Identify the mechanism or site process for tracking corrective actions.

f. Establish long term programs to perform preventative maintenance or surveillance activities to minimize the potential for inadvertent releases of licensed materials due to equipment failure.

g. Establish the frequency for periodic reviews of SSCs.

Note: Licensee should provide justification for the selected period for reviewing SSCs.

3.1.5 The minimization of leaks and spills from operational practices is discussed in section 3.5.

3.1.6 Site procedures and programs will include measures to control contamination resulting from leaks or spills of licensed material to surface water from SSCs or work practices in accordance with the ALARA principles described in Regulatory Guide 8.8 (Reference 2).

((Identify and describe site procedure and/or report that documents performance of section 3.1))

3.2. PROMPT DETECTION OF LEAKAGE

Note: A ”credible mechanism” for the licensed material to reach ground water is considered one wherein failure of a single barrier between the SSC and the environment could result in inadvertent or unintentional contamination of ground water or native soil.

3.2.1 The site procedures and programs will include monitoring and routine surveillance of accessible systems with the potential for leakage and for which there is a credible mechanism for the licensed material to reach ground water. The objective is to enable early detection of contamination and to provide a timely assessment and responses based on the location and characteristics of the leak or spill consistent with Reference 3 and Reference 4.

3.2.2 The applicant will establish an on-site ground water monitoring program to ensure timely detection of inadvertent radiological releases to ground water and will:

a. Using the hydrology and geology studies developed under 4.1.below, consider placement of ground water monitoring wells downgradient from the plant but within the boundary defined by the site license. (i.e. the boundary defined for compliance with 10 CFR Part 20).

b. Consider, as appropriate, placing sentinel wells closer to SSCs that have the highest potential for inadvertent releases that could reach ground water or SSCs where leak detection capability is limited.

c. Establish sampling and analysis protocols and frequencies, including analytical sensitivity requirements, for ground water and soil. Sampling for tritium in the vadose or unsaturated zone may not be practicable and may require additional evaluation. For split or duplicate samples, analytical sensitivity levels should be discussed with and agreed to by those external stakeholders responsible for the analyses to preclude future disputes.

   Note: Analytical sensitivity levels are typically the Lower Limits of Detection (LLD)/Minimum Detectable Activity (MDA) and external stakeholder’s (State & local authorities) LLDs or MDAs will vary from site to site.

d. Establish a formal, written program for long-term ground water monitoring. For those ground water monitoring locations that are included in the REMP, include them in the site’s ODCM/ODAM.

e. Periodically review existing station or contract lab(s) analytical capabilities. An important consideration is the time needed to obtain results.

f. Establish a long-term program for preventative maintenance of ground water wells.

g. Establish the frequency for periodic review of the ground water monitoring program.

((Identify and describe site procedure and/or program that documents performance of section 3.2))

3.3. MINIMIZE THE POTENTIAL OF THE RELEASE OF CONTAMINATION FROM UNDETECTED LEAKS

3.3.1 The leak detection program objective is to identify leaks that may be hard to identify due to accessibility or the size of the leak and that, over an extended period of time, could result in accumulation of subsurface residual contamination. Examples of SSCs of interest include: buried pipes with radioactive liquids, tanks/pools embedded in concrete, or tanks in contact with soil; all of which are susceptible to undetected leakage (Reference 5).

3.3.2 The use of remote monitoring techniques, e.g. cameras, should be considered for SSCs that are potential sources of leaks and are located in areas that are not readily accessible or that are not frequently accessed.

((Identify and describe site procedure and/or program that documents performance of the above section 3.3))

3.4. REDUCING THE NEED FOR DECONTAMINATION OF EQUIPMENT AND STRUCTURES

3.4.1 The facility design for components containing radioactive liquids considers the selection of materials; minimization of buried components; improved protection of buried components. Site procedures should incorporate the use of industry consensus codes and standards for repair and/or replacement of components; periodic inspection or testing; and quality control and quality assurance in the procurement specifications and during installation of components based on their potential for leakage.

3.4.2 The facility ventilation design for areas containing radioactive contamination includes provisions for ensuring that air flow moves from the areas of no or minor contamination to areas with greater contamination. The site radiation protection program includes routine airborne sampling of general areas that would identify radioactive contamination resulting from ventilation problems.

3.4.3 The site procedures for the operational ALARA program should decrease the probability of a release, the amount released, and the spread of a contaminant by including, when appropriate, temporary or supplemental ventilation systems; by treating the exhaust from vents and overflows, and by using techniques to control releases of radioactive liquids and steam.

((Identify and describe site procedure and/or program that documents performance of section 3.4))

3.5. REVIEW OF OPERATIONAL PRACTICES

3.5.1 The applicant will evaluate work practices that involve licensed material and for which there is a credible mechanism for the licensed material to reach ground water consistent with Reference 3 and Reference 4 and will:

Note: a "credible mechanism" for the licensed material to reach ground water is considered one wherein the failure of a single barrier between the work practice and the environment could result in inadvertent or unintentional contamination of ground water or native soil.

Note: "Reasonably expected" takes into account the condition or age of equipment used in the work practice or its operational history as determined during the evaluation of the work practice described in this step and could result in an uncontrolled release to the environment by some means other than an ODCM-credited release point.

a. Identify each work practice that involves or could reasonably be expected to involve licensed material and for which there is a credible mechanism for the licensed material to reach ground water. Examples of work practices that should be evaluated may be found in Reference 4.

b. Identify existing leak detection methods for each work practice that involves or could involve licensed material and for which there is a credible potential for inadvertent releases to ground water. These may include ground water monitoring, operator rounds, engineering walk downs or inspections, leak-detection systems, or periodic integrity testing.

c. Identify potential enhancements to leak detection systems or programs. These may include additional or increased frequency of rounds or walk downs or inspections, or integrity testing.

d. Identify potential enhancements to prevent spills or leaks from reaching ground water. These may include resealing or paving surfaces or installing spill containment measures.

e. Identify the mechanism or site process for tracking corrective actions.

f. Establish long term programs to perform preventative maintenance or surveillance activities to minimize the potential for inadvertent releases of licensed materials due to equipment failure.

g. Establish the frequency for periodic reviews of work practices.

((Identify and describe site procedure and/or program that documents performance of the above section 3.5.1))

3.5.2 Events that result in leaks and spills of radioactive materials should be analyzed and evaluated based on the significance of the event (See Reference 5 page 6 footnote 1). The analysis should:

a. Determine the apparent or root cause that contributed to the event,

b. Evaluate of the extent of condition/applicability to similar related facility operations and,

c. Identify immediate and interim corrective actions as required by the site corrective action program.

((Identify and describe site procedure/and or program that documents performance o the above section 3.5.2))

4 GUIDES FOR MINIMIZING CONTAMINATION OF THE ENVIRONMENT

4.1. SITE CONCEPTUAL MODEL DEVELOPMENT

Note: As used in NEI 08-08, the term "site conceptual model" is used to denote "conceptual site model" or "conceptual model".

4.1.1 The applicant will ensure that the site characterization of geology and hydrology provides an evaluation of predominant ground water flow characteristics based upon current site conditions consistent with Reference 3 and Reference 4 and will:

Note: FSAR Section 2 Hydrologic Engineering contains the data for site characterization.

a. Perform hydrogeologic and geologic studies to determine predominant ground water flow characteristics and gradients.

b. As appropriate, review existing hydrogeologic and geologic studies, historical environmental studies, and permit or license related reports.

c. Identify potential pathways for ground water migration from on-site locations to off-site locations through ground water.

d. Establish the frequency for periodic reviews of site hydrogeologic studies. As a minimum, reviews should be performed whenever any of the following occurs.

   i. Substantial on-site construction,

   ii. Substantial disturbance of site property,

   iii. Substantial changes in on-site or nearby off-site use of water, or

   iv. Substantial changes in on-site or nearby off-site pumping rates of ground water.

   Note: Substantial changes to the hydrological conditions are site specific and should be evaluated by the applicant's professional geologist/hydrologist.

e. As appropriate, update the site's Final Safety Analysis Report with changes to the characterization of hydrology and/or geology.

4.1.2 The applicant's site characterization, facility design, construction, potential release mechanisms, release pathways and location of contaminant provides an evaluation of the interface between environmental systems and the features that will control movement of contamination in the environment.

((Identify and describe site procedure and/or program that documents performance of section 4.1))

4.2 EARLY DETECTION OF LEAKAGE AND CONTAMINANT MIGRATION

4.2.1 The site ground water monitoring systems should be deployed to support the early detection of leakage and contaminant migration. These systems will be placed, based on the potential flow paths, in optimum locations relative to SSCs that contain radioactive liquids and that are either buried or are in contact with the ground.

4.2.2 The site procedures for the ground water monitoring program should include a program for periodic sampling of ground water close to the potential source to verify the integrity of the system.

((Identify and describe site procedure and/or program that documents performance of section 4.2))

4.3. FINAL SITE CONFIGURATION

Note: Consistent with NEI 07-07, the applicant will develop the appropriate site procedures and/or programs to meet the GPI and implement them consistent with FSAR section 13.4 prior to initial fuel load.

4.3.1 The site conceptual model should be updated with the final "as-built" site configuration following construction.

4.3.2 The site characterization of geology and hydrology should be reviewed to ensure that it provides an understanding of predominant ground water flow characteristics based upon this final site configuration.

4.3.3 The on-site ground water monitoring program should be reviewed to ensure that it provides timely detection of inadvertent radiological releases to ground water that reflect the final site configuration.

4.3.4 The site protocol for responding to the detection of leaks and spills should be reviewed to ensure that it reflects the final site configuration and facility design.

((Identify and describe site procedure and/or program that documents performance of the above section 4.3))

5. FACILITATION OF DECOMMISSIONING

5.1. DESIGN AND OPERATIONAL FEATURES THAT FACILITATE DECOMMISSIONING

5.1.1 The means for facilitating decommissioning begins at the design stage and should be incorporated into the procedures and operations. The objective is to ensure that throughout the life of the facility, the plant design and the operating procedures minimize the amounts of residual radioactivity that will require remediation at the time of decommissioning.

5.1.2 The applicant will establish a remediation protocol to prevent migration of licensed material off-site and to minimize decommissioning impacts that are consistent with Reference 3 and Reference 4 and will:

a. Establish written procedures outlining the decision making process for remediation of leaks and spills or other instances of inadvertent releases. This process is site specific and shall consider migration pathways.

b. Evaluate the potential for detectible levels of licensed material resulting from planned releases of liquids and/or airborne materials.

Note: Applicants should use the first 5 years of effluent release data to perform the evaluation in section 5.1.2.b. This time frame allows the licensee to obtain statistically valid data sets for radioactive effluent releases and for on-site ground water monitoring samples over time, while the plant completes at least one refueling outage. Licensees will perform on-site ground water monitoring throughout the plant's operation, beginning at initial fuel load.

c. Evaluate and document, as appropriate, decommissioning impacts resulting from remediation activities or the absence thereof.

((Identify and describe site procedure (s) that will implement section 5.1.2))

5.2 DECOMMISSIONING RECORDS

5.2.1 Records of instances of facility and environmental contamination and operational events that are of interest for decommissioning or that result in residual contamination will be documented over the lifetime of the plant.

5.2.2 The applicant will ensure that records of leaks, spills, and remediation efforts are retained and retrievable to meet the requirements of 10 CFR 50.75(g) and 10 CFR 72.30 (d).

5.2.3 The above documented events will assist in developing a historical assessment of the site and facility, thereby reducing the time, effort, and potential hazard to personnel during decommissioning activities. These records should also be used to determine an area's classification for purposes of performing surveys during decommissioning. (See NRC Regulatory Issue Summary 2002-02 Lessons Learned Related to Recently Submitted Decommissioning Plans and License Termination Plans). (Reference 9).

6 MINIMIZING THE GENERATION OF WASTE

6.1 WASTE MANAGEMENT

6.1.1 The approach used to identify significant radioactive components (for example replacement of steam generator(s), reactor head, pressurizer, reactor coolant pump(s)) used in the facility and the waste that will result from operations and processing should be documented in a life-cycle waste management plan.

6.1.2 The waste management program should consider options to implement measures that minimize waste generation and radioactivity levels over the life cycle of the facility, including decommissioning.

((Identify and describe site procedure and/or program that documents performance of the above section 6.1))

6.2 ONSITE STORAGE OF RADIOACTIVE WASTE

6.2.1 The waste management program should include additional onsite storage when other disposal or treatment options are not available. Provisions for the decontamination and decommissioning of the storage facility should be considered.

6.2.2 Periodic assessments of the waste stored onsite should also be performed using the guidance provided in References 7 and 8.

((Identify and describe site procedure and/or program that documents performance of the above section))

7. DEFINITIONS

Radiologically Significant: Unless already defined in an application or licensing basis document, this term refers to the presence of radioactive materials at levels which could result in radiation exposures and doses in excess of the 10 CFR Part 20 requirements for radiation workers and members of the public, or in excess of liquid and airborne effluent concentration limits and releases to sewers under Appendix B to Part 20.

Ground water as used in this document, means any subsurface water, whether in the unsaturated or vadose zone, or in the saturated zone of the earth.

Leak or Spill: The terms “leak” or “spill” refers to an inadvertent event or perturbation in a system or component’s performance that results in contamination escaping from its intended confinement or container.

Licensed material (from 10 CFR 20.1003) means source material, special nuclear material, or byproduct material received, possessed, used, transferred or disposed of under a general or specific license issued by the Commission.

REFERENCES

1. 10 CFR Part 20.1406 "Minimization of Contamination"
2. Regulatory Guide 8.8, Information Relevant To Ensuring That Occupational Radiation Exposures At Nuclear Power Stations Will Be As Low As Is Reasonably Achievable
3. NEI 07-07 "Industry Ground Water Protection Initiative – Final Guidance Document", August 2007
4. EPRI –TR-1016099, Groundwater Protection Guidelines for Nuclear Power Plants, January 2008 (Public Edition)
5. Regulatory Guide 4.21, Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning
6. IE Bulletin No. 80-10, Contamination of Nonradioactive System and Resulting Potential For Unmonitored, Uncontrolled Release of Radioactivity to Environment
7. NRC Regulatory Issue Summary 2008-32 Interim Low Level Radioactive Waste Storage at Reactor Sites. December 30, 2008
8. EPRI Report # 1018644, February 2009- " Guidelines for Operating an Interim On Site Low Level Radioactive Waste Storage Facility – Revision1"
9. NRC Regulatory Issue Summary 2002-02 Lessons Learned Related to Recently Submitted Decommissioning Plans and License Termination Plans

APPENDIX A

FACILITY DESIGN, OPERATIONAL, AND PROCEDURAL IMPLEMENTATION OF 10 CFR 20.1406		
Design Items		**((DCD/FSAR REFERENCE))**
	Minimize leaks and spills and provide containment in areas where such events may occur,	
	Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage,	
	Use leak detection instrumentation capable of detecting leaks in areas where it is difficult or impossible to conduct regular inspections (such as for spent fuel pools, tanks that are in contact with the ground, and buried, embedded, or subterranean piping) to avoid release of contamination from undetected leaks,	
	Reduce the need to decontaminate equipment and structures by decreasing the probability of any release, reducing any amounts released, and decreasing the spread of the contaminant from the source,	
	Provide for early detection of leakage and contamination migration to minimize contamination of the environment,	
	Facilitate decommissioning by minimizing embedded and buried piping,	

FACILITY DESIGN, OPERATIONAL, AND PROCEDURAL IMLEMENTATION OF 10 CFR 20.1406		
Design Items		**((DCD/FSAR REFERENCE))**
	Facilitate decommissioning by designing the facility to facilitate the removal of any equipment and/or components that may require removal and/or replacement during facility operation or decommissioning,	
	Minimize the generation and volume of radioactive waste both during operation and during decommissioning (by minimizing the volume of components and structures that become contaminated during plant operation)	
	Detect leakage from the piping in any radwaste trenches.	
	Verify that there are no piping runs containing contaminated fluids that will be buried in the ground and not routed through one of the radwaste trenches.	
	Isolate areas containing radioactive components and materials from areas containing non-radioactive components and minimize interfaces between them	
	Use designs and materials that facilitate maintenance, decontamination and eventual disposal	
	To the extent practical, ensure that SSC containing radioactive materials are separated from the environment by at least two impermeable barriers	

FACILITY DESIGN, OPERATIONAL, AND PROCEDURAL IMLEMENTATION OF 10 CFR 20.1406		
Operational and Procedural Items		**((SITE PROCEDURE/PROGRAM))**
	Periodically review operational practices to ensure that, operating procedures are revised to reflect the installation of new or modified equipment, personnel qualification and training are kept current, and facility personnel are following the operating procedures,	
	Facilitate decommissioning by maintenance of records relating to facility design and construction, facility design changes, changes to the facility during operation, site conditions before and after construction, onsite waste disposal and contamination and results of radiological surveys,	
	Develop a site conceptual model (based on site characterization and facility design and construction) which will aid in the understanding of the interface with environmental systems and the features that will control the movement of contamination in the environment,	
	Evaluate the final site configuration after construction to assist in preventing the migration of radionuclides offsite via unmonitored pathways,	
	Describe the criteria that govern the frequency of performing periodic visual inspections of areas such as; the piping in the radwaste pipe trenches to check for leaks, the floor/wall expansion joints in the radwaste pipe trenches, accessible building seams, to ensure that no spills or leaks enter unmonitored areas beneath the floors and foundations. The use of remote monitoring is considered for areas that are not readily accessible or frequently accessed.	