ORP/OSR-2001-06
Revision 2

OFFICE OF SAFETY REGULATION POSITION ON APPLYING PROJECT-SPECIFIC SAFETY ANALYSIS METHODOLOGY CONSISTENT WITH THE DOE-STD-3009 SAFETY ANALYSIS METHODOLOGY FOR THE RPP-WTP

October 22, 2001

Office of Safety Regulation

U.S. Department of Energy
Office of River Protection
P.O. Box 450, H6-60
Richland, Washington 99352

PREFACE

As directed by Congress in Section 3139 of the *Strom Thurmond National Defense Authorization Act for Fiscal Year 1999,* the U.S. Department of Energy (DOE) established the Office of River Protection (ORP) at the Hanford Site to manage the River Protection Project (RPP), formerly known as the Tank Waste Remediation System. ORP is responsible for the safe storage, retrieval, treatment, and disposal of the high level nuclear waste stored in the 177 underground tanks at Hanford.

The initial concept for treatment and disposal of the high level wastes at Hanford was to use private industry to design, construct, and operate a Waste Treatment Plant (WTP) to process the waste. The concept was for DOE to enter into a fixed-price contract for the Contractor to build and operate a facility to treat the waste according to DOE specifications. In 1996, DOE selected two contractors to begin design of a WTP to accomplish this mission. In 1998, one of the contractors was eliminated, and design of the WTP was continued. However, in May 2000, DOE chose to terminate the privatization contract and seek new bidders under a different contract strategy. In December 2000, a team led by Bechtel National, Inc. was selected to continue design of the WTP and to subsequently build and commission the WTP.

On January 10,2001, the U.S. Department of Energy published the revised Nuclear Safety Management rule, 10 CFR 830. This rule, in Subpart B, "Safety Basis Requirements," established specific requirements for the establishment and maintenance of the safety basis of DOE nuclear facilities, including the River Protection Project Waste Treatment Plant (RPP-WTP) project.

A key element of the River Protection Project Waste Treatment Plant (RPP-WTP) is DOE regulation of safety through a specifically chartered, dedicated Office of Safety Regulation (OSR). The OSR reports directly to the ORP Manager. The regulation by the OSR is authorized by the document entitled *Policy for Radiological, Nuclear, and Process Safety Regulation of the River Protection Project Waste Treatment Plant Contractor* (DOE/RL-96-25) (referred to as the Policy) and implemented through the document entitled *Memorandum of Agreement for the Execution of Radiological, Nuclear, Process Safety Regulation of the RPP-WTP Contractor* (DOE/RL-96-26) (referred to as the MOA). These two documents provide the basis for the safety regulation of the RPP-WTP at Hanford, including the implementation of regulatory requirements such as 10 CFR 830..

The foundation of both the Policy and the MOA is that the mission of removal and immobilization of the existing large quantities of tank waste by the RPP-WTP Contractor must be accomplished safely, effectively, and efficiently.

The Policy maintains the essential elements of the regulatory program established by DOE in 1996 for the privatization contracts. The MOA clarifies the DOE organizational relationships and responsibilities for safety regulation of the RPP-WTP. The MOA provides a basis for key DOE officials to commit to teamwork in implementing the policy and achieve adequate safety of RPP-WTP activities.

The Policy, the MOA, the RPP-WTP Contract, and the four documents incorporated in the Contract define the essential elements of the regulatory program being executed by the OSR. The four documents incorporated into the Contract (and also in the MOA) are as follows:

> *Concept of the DOE Process for Radiological, Nuclear, and Process Safety Regulation of the RPP Waste Treatment Plant Contractor,* DOE-96-0005,
>
> *DOE Process for Radiological, Nuclear, and Process Safety Regulation of the RPP Waste Treatment Plant Contractor,* DOE/RL-96-0003,
>
> *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for the RPP Waste Treatment Plant Contractor,* DOE/RL-96-0006, and
>
> *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor,* DOE/RL-96-0004.

DOE patterned its safety regulation of the RPP-WTP Contractor to be consistent with the concepts and principles of good regulation (reliability, clarity, openness, efficiency, and independence) used by the Nuclear Regulatory Commission (NRC). In addition, the DOE principles of integrated safety management were built into the regulatory program for design, construction, operation, and deactivation of the facility. The regulatory program for nuclear safety permits waste treatment services to occur on a timely, predictable, and stable basis, with attention to safety consistent with that which would occur from safety regulation by an external agency. DOE established OSR as a dedicated regulatory organization to be a single point of DOE contact for nuclear safety oversight and approvals for the WTP Contractor. The OSR performs nuclear safety review, approval, inspection, and verification activities for ORP using the NRC principles of good regulation while defining how the Contractor shall implement the principles of standards-based integrated safety management.

A key feature of this regulatory process is its definition of how the standards-based integrated safety management principles are implemented to develop a necessary and sufficient set of standards and requirements for the design, construction, operation, and deactivation of the RPP-WTP facility. This process meets the expectations of the DOE necessary and sufficient closure process (subsequently renamed Work Smart Standards process) in DOE Policy 450.3, *Authorizing Use of the Necessary and Sufficient Process for Standards-based Environment, Safety and Health Management*, and is intended to be a DOE approved process under DOE Acquisition Regulations, DEAR 970.5204-2, *Laws, Regulations and DOE Directives,* Section (c). DOE approval of the contractor-derived standards is assigned to the OSR.

The RPP-WTP Contractor has direct responsibility for WTP safety. DOE requires the Contractor to integrate safety into work planning and execution. This integrated safety management process emphasizes that the Contractor's direct responsibility for ensuring that safety is an integral part of mission accomplishment. DOE, through its safety regulation and management program, verifies that the Contractor achieves adequate safety by complying with approved safety requirements.

Record of Revision

Document Title: Office of Safety Regulation Position on Applying Project-Specific Alternative Safety Analysis Methodology Consistent with the DOE-Std-3009 Safety Analysis Methodology for the RPP-WTP

Document Number: ORP/OSR-2001-06

Revision Date	**Revision Number**	**Reason for Revision**
5-1-01	0	New Issue
7-2-01	1	Revised to address HQ comments.
10-22-01	2	Revised the document portion to reflect 10 CFR 830, DOE Order 420.1. The appendixes were not affected.

This page intentionally left blank.

Table of Contents

Appendixes

List of Tables

This page intentionally left blank.

OFFICE OF SAFETY REGULATION POSITION ON APPLYING PROJECT-SPECIFIC SAFETY ANALYSIS METHODOLOGY CONSISTENT WITH THE DOE-STD-3009 SAFETY ANALYSIS METHODOLOGY FOR THE RPP-WTP

1.0 INTRODUCTION

On January 10,2001, the U.S. Department of Energy (DOE) published the revised Nuclear Safety Management rule, 10 CFR 830. This rule, in Subpart B, "Safety Basis Requirements," established specific requirements for the establishment and maintenance of the safety basis of DOE nuclear facilities, including the River Protection Project Waste Treatment Plant (RPP-WTP) project. 10 CFR 830, Subpart B, identified DOE Order 420.1, "Facility Safety," as an approved source of design criteria for the facility preliminary documented safety analysis.

This paper provides the DOE Office of River Protection (ORP), Office of Safety Regulation (OSR), position on applying the project-specific safety analysis methodology consistent with the DOE-STD-3009 safety analysis methodology and DOE Order 420.1 design criteria for the RPP-WTP. Guidance for developing safety analysis reports from 10 CFR 830, Subpart B, is provided by DOE in DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*. Guidance for the RPP-WTP Preliminary Documented Safety Analysis (PDSA)[1] is found in RL/REG-99-05, *Review Guide for the Construction Authorization Request (CAR)*.

2.0 REGULATORY BACKGROUND

As prescribed by 48 CFR 970.5204-78, a list of applicable DOE directives (List B) is identified in the Contract.[2] For this Contract, List B includes conformance to DOE-stipulated top-level safety standards and principles found in DOE/RL-96-0006, *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for the River Protection Project Waste Treatment Plant*. For the RPP-WTP Contract, the standards selection process is implemented through the List B specified contractual requirement that the Contractor's integrated standards based safety management program comply with DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the River Protection Project Waste Treatment Plant*. The standards selected by this process are specified in BNFL-5193-SRD-01-02, *Safety Requirements Document*, which is also an applicable directive specified on List B. The Contractor's implementation of DOE/RL-96-0004 also is consistent with the expectations of DOE M 450.3-1, "The Department of Energy Closure process for Necessary and Sufficient Sets of Standards." OSR has verified the integrity of the Contractor's process through

[1] NOTE: Although the RPP-WTP uses the terms Preliminary Safety Analysis Report and Final Safety Analysis Report, the terms PDSA and Documented Safety Analysis are used in this position paper for consistency with the terms used in 10 CFR 830, *Nuclear Safety Management*.

[2] Contract No. DE-AC27-91RV14136 between DOE and Bechtel National, Inc., dated December 11, 2000, Section J, Attachment E, "List of Applicable Directives (List B-0DEAR 970.5204.78)."

inspections, safety requirements documentation reviews, and approval of the Contractor's recommended set of subordinate radiological, nuclear, and process safety standards.

Subsequent to the implementation of 10 CFR 830, *Nuclear Safety Management*, the OSR has verified that the review guidance found in RL/REG-99-05 is consistent with the requirements of 10 CFR 830. Specifically, the methodology and criteria in RL/REG-99-05 are consistent with the design criteria identified in DOE Order 420.1, and the safety analysis methodology specified in DOE-STD-3009. DOE-STD-3009 describes a method that is acceptable to the DOE for preparing nuclear facility safety analysis reports. The methodology provided by the DOE-STD-3009 is intended to focus on characterizing facility safety in DSAs for existing facilities, as contrasted with using the facility design process to characterize safety in PDSAs for new facilities. DOE-STD-3009 notes that "for new facilities in which conceptual design or construction activities are in progress … elements of this guidance may be more appropriately handled as an integral part of the overall design requirements process." It further notes that "accordingly, contractors for facilities that are documenting conceptual designs … should apply the process and format of this Standard to the extent it is judged to be of benefit."

Finally, 10 CFR 830.206 requires, for construction projects that begin after December 11, 2000, DOE approval of the nuclear safety design criteria to be used in preparing the PDSA, unless the Contractor uses the design criteria in DOE Order 420.1, *Facility Safety*.

3.0 POSITION

The OSR's position is that RPP-WTP safety analysis methodology, as described in RL/REGRL/REG-99-05, is an acceptable methodology for the RPP-WTP PDSA, with the revision described in the first bullet below because it is consistent with, and will comply with the safe harbors listed in 10 CFR 830, including the requirements for the PDSA. 10 CFR 830 does not specify a safety analysis methodology for the PDSA. 10 CFR 830 uses the nuclear safety design criteria in DOE Order 420.1 as a safe harbor that does not require further DOE approval for the PDSA. The OSR considers that, in addition to RL/REG-99-05 being appropriate for PDSA review, RL/REG-99-05 provides the framework of an appropriate methodology for DSA review. The benefit of using the framework of RL/REG-99-05 for both the PDSA and DSA is consistency of safety analysis methodology as the analysis matures. The OSR position is based on observations derived from evaluating 10 CFR 830, DOE Order 420.1, DOE-STD-3009, comparison of DOE Order 420.1 with the Safety Requirements Document (SRD) design criteria, and comparison of DOE-STD-3009 with RL/REG-99-05.

Appendix A summarizes the comparison of DOE Order 420.1 design criteria with the RPP-WTP SRD safety criteria. Appendix B summarizes the comparison of DOE-STD-3009 with RL/REG-00-05, and Appendix C provides the detailed comparison. A summary of the observations in these appendixes include the following:

- A comparison of DOE Order 420.1 design criteria to RPP-WTP SRD safety criteria shows that RPP-WTP safety criteria meet DOE Order 420.1 design criteria in all except two cases. In both cases, DOE Order 420.1 requirements can be imposed on the RPP-WTP Contractor through a back-fit process with minimal impact (see Appendix A,

Table 1, Endnotes 6 and 9).

- The safety basis documentation required per RL/REG-99-05 encompasses the safety basis documentation expected under DOE-STD-3009 with a few small exceptions (see Section 4.0 in this paper). These exceptions can be easily addressed by minimal modifications to RL/REG-99-05 supported by Contract modifications as necessary.

- RL/REG-99-05 was developed to be compatible with the DOE-approved RPP-WTP standards based integrated safety management (ISM) process adopted for the RPP-WTP design development. This process is described in DOE/RL-96-0004. It is an iterative process that includes identifying the work features through the facility design, identifying and evaluating the hazards associated with the facility, developing control strategies to prevent or mitigate the hazards, identifying and confirming codes and standards applicable to the facility structures, systems, and components (SSCs), and documenting the resulting important-to-safety SSCs. RL/REG-99-05 achieves this focus for the WTP.

4.0 SUMMARY OF DOE-STD-3009 AND RL/REG-99-05 COMPARISON

In several areas, no significant differences exist in the documentation to be provided under DOE-STD-3009 and RL/REG-99-05: Chapter 1, "Site Characteristics;" Chapter 2, "Facility Description;" Chapter 6, "Prevention of Inadvertent Criticality;" Chapter 7, "Radiation Protection;" and Chapters 10 through 17 (covering a variety of topics ranging from in-service testing and operational safety through quality assurance and emergency preparedness). Differences between DOE-STD-3009 and RL/REG-99-05 in the remaining chapters (3, 4, 5, 8, and 9) are discussed below.

DOE-STD-3009, Chapter 3, "Hazard and Accident Analyses," requirements are fully encompassed in RL/REG-99-05, except for facility hazard classification. However, facility hazard classification can be performed based on the hazard analysis expected in the PDSA, and now is required by 10 CFR 830. Revising RL/REG-99-05 and the Contract to add the facility hazard classification requirement will have minimal impact.

DOE-STD-3009, Chapter 4, "Safety Structures, Systems and Components," requires identification of safety class and safety significant SSCs. The RPP-WTP approach to classifying safety systems and components is different and is based on identifying important-to-safety SSCs. (See Section 5 for further discussion.) However, important-to-safety SSCs encompass safety SSCs. Furthermore, the process for establishing design requirements on important-to-safety SSCs will ensure that all safety class SSCs are designed to equivalent or more conservative design requirements.

DOE-STD-3009, Chapter 5, "Derivation of Technical Safety Requirements," expects a complete and final set of technical safety requirements (TSRs). This is not yet expected by RL/REG-99-05. However, the approach of RL/REG-99-05 to TSRs derivation is similar to that of DOE-STD-3009. Inasmuch as the RPP-WTP is currently at the PDSA submittal stage, only draft TSRs are required. Final TSRs will be expected for the DSA, and can be required to be

consistent with DOE-STD-3009, Chapter 5 expectations when the DSA review guidance for the RPP-WTP is developed.

DOE-STD-3009, Chapter 8, "Hazardous Material Protection," and Chapter 9, "Radioactive and Hazardous Waste Management," require consideration of all hazardous materials. RL/REG-99-05 currently addresses hazardous materials as they pertain to process (i.e., chemical hazard) safety only. However, the Contractor is responsible under the Contract for following an ISM process for ensuring hazardous material protection for all hazardous material on site. As such, the Contractor is responsible for obtaining all relevant permits and obeying pertinent state and federal laws and regulations, including all Office of Safety and Health Assessment (OSHA) and Environmental Protection Agency (EPA) regulations for hazardous material. To ensure that the DSA safety analysis methodology incorporates complete treatment of hazardous materials and hazardous waste management (not currently addressed in RL/REG-99-05), the ORP will revise RL/REG-99-05 (and the Contract if necessary) to include hazardous material protection and hazardous waste management considerations consistent with those found in DOE-STD-3009, Chapters 8 and 9, for the DSA.

Overall, RL/REG-99-05 provides significantly greater detail and specificity than that available in DOE-STD-3009. RL/REG-99-05 is a comprehensive integrated guide for the PDSA that contains all project specific requirements, organized by topic, as well as advisory, supplementary information for the reviewer. RL/REG-99-05 has been developed on the basis of interactions between the Contractor and the OSR. The extensive preparation and review was intended to enhance the likelihood of timely PDSA review.

5.0 DISCUSSION

As discussed in the previous section, the documentation expected using RL/REG-99-05 is similar to or exceeds that expected by DOE-STD-3009 except for small differences, which can be addressed through revisions to RL/REG-99-05 and supporting contract modifications. A significant difference between DOE-STD-3009 and RL/REG-99-05, however, is the classification of SSCs that are relied on to provide a safety function and the uses of this classification in formulating control strategies and SSC safety functions. Use of different approaches by DOE-STD-3009 and RL/REG-99-05 requires further discussion.

The contractual safety analysis methodology for the RPP-WTP requires the completion of a preliminary safety analysis that includes the identification of important-to-safety SSCs and their safety functions. Important-to-safety SSCs are defined by the RPP-WTP Contract as a broader category than "safety" SSCs used in DOE-STD-3009. Specifically, important-to-safety SSCs are defined as those that "provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public." The approved method to identify important-to-safety SSCs is similar in concept but more elaborate than the method defined in Appendix A to DOE-STD-3009 for safety SSCs. As part of the RPP-WTP standards-based ISM process, safety requirements and control strategies are identified from the facility hazard analysis by the Contractor’s process review team, subject to OSR review and approval. Criteria for this identification process are detailed in Appendix A and B of the SRD.

For the RPP-WTP safety analysis, each postulated radiological accident is assigned one of four severity levels depending on the unmitigated consequences of the accident. For example, a Severity Level 1 accident is any accident with an unmitigated dose consequence >25 rem to a worker (co-located worker or facility worker), and/or >5 rem to a member of the public. The control strategies and safety functions provided by the important-to-safety SSCs are graded, depending on the severity level assigned to the associated accident. For example, the SSC control strategy for a Severity Level 1 accident must satisfy the single failure criterion and must be diverse and independent. Also, for Severity Level 1 accidents, the control strategies selected must ensure that the frequency of release, after prevention and mitigation, must be $<10^{-6}$ per year. An accident is assigned a severity level based on its unmitigated consequences to workers, co-located workers, and the public. Similar, but less demanding, criteria for important-to-safety SSC performance are provided for each of the other three severity levels.

Under DOE-STD-3009, Appendix A guidelines, safety class SSCs are expected to be those for which an unmitigated accident analysis indicates the potential for a dose to the public of at least 25 rem. Such SSCs will be, implicitly, a subset of the RPP-WTP important-to-safety SSCs associated with Severity Level -1 accidents, since safety class SSCs do not consider potential worker doses. The RPP-WTP contractual ISM process described above will ensure that the control strategies for these safety class SSCs will be at least as robust as those provided by Appendix A to DOE-STD-3009. Safety significant SSCs are defined by DOE-STD-3009 as those safety SSCs that are not safety class, but whose preventive or mitigative functions is a "major contributor to defense in depth and/or worker safety as determined from safety analyses." Under the RPP-WTP OSR approved methodology, neither safety class nor safety significant SSCs are explicitly identified. However, the RPP-WTP important-to-safety SSCs are a broader set. They include any SSCs that "provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public," regardless of whether they are a "major contributor to defense in depth and/or worker safety." Every safety significant SSC identified using the DOE-STD-3009 method will, implicitly, be an important-to-safety SSC identified using the RPP-WTP method, but not every important-to-safety SSC will necessarily be a safety significant SSC. Therefore, the RPP-WTP SSC classification process will be at least as encompassing as the DOE-STD-3009 process in identifying SSCs to be relied on for their identified safety functions, while including defense in depth as an integral part of the ISM process for new facility design. Specific defense in depth requirements beyond those provided by the severity level are described in the SRD, Appendix B, "Implementing Standard for Defense in Depth."

6.0 REFERENCES

10 CFR 20, "Standards for Protection Against Radiation," *Code of Federal Regulations*, as amended.

10 CFR 830, *Nuclear Safety Management*, Federal Register, Vol. 66, No. 7, pp. 1810-1827, January 10, 2001.

10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*, as amended.

29 CFR 1910.38, "Employee Emergency Plans and Fire Prevention Plans," *Code of Federal Regulations*, as amended.

29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals," *Code of Federal Regulations*, as amended.

40 CFR 68, "Chemical Accident Prevention Provisions," *Code of Federal Regulations*, as amended.

40 CFR 355, "Emergency Planning and Notification," *Code of Federal Regulations*, as amended.

48 CFR 970.5204-78, "DOE Laws, Regulations, and Directives," *Code of Federal* Regulations, as amended.

ACI 349-97, *Code Requirements for Nuclear Safety-Related Concrete Structures*, American Concrete Institute, 1997.

ACI 349R-97, Commentary on Code Requirements for Nuclear Safety-Related Concrete Structures, American Concrete Institute, 1997.

ANSI/ANS 8.1-1983, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," American National Standards Institute/American Nuclear Society, 1983.

ANSI/ANS 8.1-1986, R88, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," American National Standards Institute/American Nuclear Society, 1988.

ANSI/ANS 8.3-1986, "Criticality Accident Alarm System," American National Standards Institute/American Nuclear Society, 1986.

ANSI/ANS 8.5-1986, "Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material," American National Standards Institute/American Nuclear Society, 1986.

ANSI/ANS-8.6-1983, R88, "Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ," American National Standards Institute/American Nuclear Society, 1988.

ANSI/ANS-8.7-1975, R87, "Guide for Nuclear Criticality Safety in the Storage of Fissile Materials," American National Standards Institute/American Nuclear Society, 1987.

ANSI/ANS-8.9-1987, "Nuclear Criticality Safety Criteria for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Materials," American National Standards Institute/American Nuclear Society, 1987.

ANSI/ANS-8.10-1983, R88, "Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement," American National Standards Institute/American Nuclear Society, 1988.

ANSI/ANS-8.12-1987, R93, "Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors," American National Standards Institute/American Nuclear Society, 1993.

ANSI/ANS-8.15-1981, R87, "Nuclear Criticality Control of Special Actinide Elements," American National Standards Institute/American Nuclear Society, 1987.

ANSI/ANS-8.17-1984, R89, "Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors," American National Standards Institute/American Nuclear Society, 1989.

ANSI/ANS-8.19, "Administrative Practices for Nuclear Criticality Safety," American National Standards Institute/American Nuclear Society, 1984.

ANSI/ANS-8.21-1995, "Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors," American National Standards Institute/American Nuclear Society, 1995.

ANSI/ISO 140001-1996, *Environmental Management Systems – Specification With Guidance for Use*, American National Standards Institute/International Standards Organization, 1996.

ASME NQA-1 1994, *QA Requirements for Nuclear Facility Applications*, American Society of Mechanical Engineers, 1994.

DEAR 970.5223-1, "Integration of Environment, Safety and Health into Work Planning," Department of Energy Acquisition Regulation, 2000.

DOE G-440.1, "Worker Protection Management per DOE Federal & Contractor Employees," U.S. Department of Energy, 1997.

DOE-HDBK-3010-94, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, Vols. 1 and 2, U.S. Department of Energy, 1994.

DOE Newsletter, "Interim Advisory on Straight Winds and Tornadoes," January 22, 1998.

DOE M 411.1-1A, *Safety Management Functions, Responsibilities, and Authorities Manual*, Reviewed 2001, U.S. Department of Energy, 1999.

DOE M 450.3-1, *The Department of Energy Closure Process for Necessary and Sufficient Sets of Standards*, U.S. Department of Energy, 1996.

DOE Order 420.1, *Facility Safety,* Change 3, U.S. Department of Energy, 2000.

DOE Order 4330.4B, *Guidelines for the Conduct of Maintenance at DOE Nuclear Facilities*, U.S. Department of Energy, 1994.

DOE Order 5480.19, *Conduct of Operation Requirements for DOE Facilities*, U.S. Department of Energy, 1990.

DOE Order 5480.22, *Technical Safety Requirements*, U.S. Department of Energy, 1992.

DOE Order 5480.23, *Nuclear Safety Analysis Reports*, U.S. Department of Energy, 1994.

DOE Order 5480.28, *Natural Phenomena Hazards Mitigation*, (Change 0), 1993.

DOE P 450.2A, *Identification, Implementation, and Compliance With Environmental, Safety And Health Requirement*, U.S. Department of Energy, 1996.

DOE/RL-94-02, *Hanford Emergency Response Pla*n, Rev. 1, U.S. Department of Energy, Richland Operations Office, 1995.

DOE/RL-96-0003, *DOE Process for Radiological, Nuclear, and Process Safety Regulation of the RPP Waste Treatment Plant Contractor*, Rev. 2, U.S. Department of Energy, Office of River Protection, 2001.

DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor,* Rev. 2, U.S. Department of Energy, Office of River Protection, 2001.

DOE/RL-96-0006, *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for the River Protection Project Waste Treatment Plant Contractor*; Rev. 2, U.S. Department of Energy, Office of River Protection, 2001.

DOE/RL-96-25, *Policy for Radiological, Nuclear, and Process Safety Regulation of the River Protection Project Waste Treatment Plant Contractor*, Rev. 1, U.S. Department of Energy, Office of River Protection, 2001.

DOE/RL-96-26, *Memorandum of Agreement for the Execution of Radiological, Nuclear, and Process Safety Regulation of the River Protection Project Waste Treatment Plant Contractor*, Rev. 1, U.S. Department of Energy, Office of River Protection, 2001.

DOE/RL-99-05, *Review Guide for the Construction Authorization Request (CAR)*, Rev. 2, U.S. Department of Energy, Office of River Protection, 2000.

DOE/RW/0333P. Quality Assurance Requirements & Description, "QA Requirements and Description for the Civilian Radioactive Waste Management Process," U.S. Department of Energy, Office of Civilian Radioactive Waste Management, 2000.

DOE-STD-1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*, U.S. Department of Energy, 1006.

DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports,* U.S. Department of Energy, 2000.

DOE-STD-1021-93 (change 1, 1996), *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components*, U.S. Department of Energy, 1996.

DOE-STD-1066-97, *Fire Protection Design Criteria*, U.S. Department of Energy, 1997.

DOE-STD-1022-94, *DOE Standard Natural Phenomena Hazards Characterization Criteria*, U.S. Department of Energy, 1994.

DOE-STD-1023-95, *Natural Phenomena Hazards Assessment Criteria*, U.S. Department of Energy, Change 1, 1995.

DOE-STD-1024, "Guidelines for use of Probabilistic Seismic Hazard Curves at Department of Energy Sites for Department of Energy Facilities," U.S. Department of Energy, 1992.

DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, U.S. Department of Energy, 1992.

DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, U.S. Department of Energy, 1994.

Executive Order 12699, "Seismic Safety of Federal and Federally Assisted or Regulated new Building Construction," U.S. Department of Energy, 1990.

Executive Order 12941, "Seismic Safety of Existing Federally Owned or Leased Buildings," U.S. Department of Energy, 1994.

Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*, U.S. Department of Energy, 1988.

Guidelines for Chemical Process Quantitative Risk Analysis, Center for Chemical Process Safety, 2nd Edition, American Institute of Chemical Engineers, 1999.

Guidelines for Consequence Analysis of Chemical Releases, Center for Chemical Process Safety, American Institute of Chemical Engineers, 1999.

Guidelines for Hazard Evaluation Procedures, *Second Edition with Worked Examples*, Center for Chemical Process Safety, American Institute of Chemical Engineers, 1992.

Guidelines for Use of Vapor Cloud Dispersion Models, 2nd Edition, Center for Chemical Process Safety, American Institute of Chemical Engineers, 1996.

IEEE -1023-1988, *IEEE Guide for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Systems*, Institute of Electrical and Electronics Engineers, Inc., 1988.

INPO 96-008, *Guidelines for the Conduct of Operations at Nuclear Power Stations*, Institute of Nuclear Power Operations, 1996.

INPO 97-013, *Guidelines for the Conduct of Maintenance at Nuclear Power Stations*, Institute of Nuclear Power Operations, 1997.

NFPA Standard 70, "National Electrical Code," National Fire Protection Association, 1996.

NUREG-1293, *QA Guidance for a Low-Level Radioactive Waste Disposal Facility*, U.S. Nuclear Regulatory Commission, 1991.
NUREG-1400, *Air Sampling in the Workplace*, U.S. Nuclear Regulatory Commission, 1994.

NUREG/CR-6410, *Nuclear Fuel Cycle Facility Accident Analysis Handbook*, U.S. Nuclear Regulatory Commission,1998.

Regulatory Guide 8.25, *Air Sampling in the Workplace,*

Regulatory Guide 8.34, *Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*, U.S. Nuclear Regulatory Commission, 1992.

Regulatory Guide 8.36, *Radiation Dose to the Embryo/Fetus*, U.S. Nuclear Regulatory Commission, 1992.

RL/REG-97-13, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*, Rev. 5, U.S. Department of Energy, Richland Operations Office, 1999.

RL/REG-99-05, *Review Guide for the Construction Authorization Request (CAR)*, Rev. 2, U.S. Department of Energy, Richland Operations Office, 2000.

Safety Requirements Document, (SRD), BNFL-5193-SRD-01, Volumes I, and II, Rev. 2 and Rev. 4 respectively, Bechtel National, Inc., Richland, Washington, 2001.

SEN 35-91, "Nuclear Safety Policy," Secretary Energy Notice, 1991.

WAC 173-303, "Contingency plan and emergency procedures," *Washington Administrative Code*, as amended.

WAC 246-221-290, "Appendix A–Annual Limits on Intake (ALI) and Derived Air Concentrations (DAC) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sanitary Sewerage," *Washington Administrative Code*, as amended.

WAC 246-247, "Radiation Protection–Air Emissions," *Washington Administrative Code*, as amended.

WAC 246-247-120, " Appendix B, "BARCT Compliance Demonstration," *Washington Administrative Code*, as amended.

Uniform Building Code, 1997.

7.0 LIST OF TERMS

AHJ	Authority Having Jurisdiction
AIChE	American Institute of Chemical Engineers
ALARA	as low as reasonably achievable
ARF	airborne release fraction (or rate)
ARR	airborne release rate
BARCT	Best Available Radiation Control Technology
CAR	Construction Authorization Request
CAS	Criticality Accident Alarm System
CCSP	Contractor Criticality Safety Program
CDS	Criticality Detection Systems
CEDE	committed effective dose equivalent
CSP	Criticality Safety Program
D&D	decontamination and decommissioning
DBA	design basis accident
DBE	design basis event
DOE	U.S. Department of Energy
DOELAP	U.S. Department of Energy's Laboratory Accreditation Program
DR	damage ratio
DSA	Documented Safety Analysis
EPA	Environmental Protection Agency
EPP	emergency preparedness program
ERO	Emergency Response Organization
ERPP	Environmental Radiological Protection Program
FHA	fire hazard analyses
FSAR	Final Safety Analysis Report
HAR	Hazard Analysis Report
HAZOP	hazard and operability
HFE	human factors engineering
ICRP	International Commission on Radiological Protection
ISAR	Initial Safety Analysis Report
ISER	Initial Safety Evaluation Report
ISM	integrated safety management
ISMP	Integrated Safety Management Plan
ITS	important-to-safety
LCOs	Limiting Conditions for Operation
LCS	limiting control settings
LPF	leak-path factor
M&TE	measuring and test equipment
MAR	material at risk (curies or grams)
MPL	maximum possible fire loss
NFPA	National Fire Protection Association
NPH	natural phenomena hazards
NRC	U.S. Nuclear Regulatory Commission
NSC	Nuclear Criticality Safety

ORP	Office of River Protection
OSHA	Office of Safety and Health Assessment
OSR	Office of Safety Regulation
P&ID	Process and Instrumentation Drawing
PC	Performance Category
PDSA	Preliminary Documented Safety Analysis
PHA	Preliminary Hazard Analysis
PRA	probabilistic risk analysis
PSA	Preliminary Safety Analysis
PSAR	Preliminary Safety Analysis Report
QA	quality assurance
QAP	Quality Assurance Program
QC	quality control
RCRA	Resource Conservation and Recovery Act
RF	respirable fraction
RPP-WTP	River Protection Project Waste Treatment Plant
RWP	radiation work permit
SAR	Safety Analysis Report
SC	safety criteria
SC	Seismic Category
SEN	Secretary of Energy Notice
SRD	Safety Requirements Document
SRID	Standards and Requirements Identification Documents
SSCs	structures, systems, and components
TSRs	Technical Safety Requirements

Appendix A. Summary of the Comparison of DOE Order 420.1 Design Criteria to the RPP-WTP Safety Requirements Document Safety Criteria

O 420.1 Section 4.1	Requirement	Criteria Met (Yes/No)	Comments
4.1.1.1	First sentence: "Detailed application of these requirements shall be guided by safety analyses that establish the identification and functions of safety (safety class and safety significant) SSCs for a facility and establish the significance to safety of functions performed by these SSCs."	Yes	Safety analyses will identify all important to safety (ITS) SSCs, a broader category than safety SSCs (see Endnotes 1 and 2 for further explanation).
4.1.1.1	Middle two sentences: "Safety analyses shall consider facility hazards, natural phenomena hazards, and external man-induced hazards. Factors such as proximity to nearby facilities such as airports, pipelines, and barge traffic peculiar to the site shall be considered. A safety analysis shall be performed at the earliest practical point in conceptual or preliminary design, so that required functional attributes of safety SSCs can be specified in the detailed design."	Yes	Functional attributes of all ITS SSCs will be specified. ITS is a broader category than safety SSCs (see Endnotes 1 and 2 for further explanation).
4.1.1.1	Last sentence: "Safety analyses shall be performed in accordance with Safety Analysis Report (SAR) guidance for safety analysis, as described in DOE guidance documents."	Yes	DOE-STD-3009 identifies American Institute of Chemical Engineers (AIChE) "Guidelines for Hazards Evaluation Procedures" (1992), as one possible approach to fulfilling the requirements of SARs for Hazard Category 2 and 3 facilities. ISMP, Section 5.5, requires use of the methodologies and guidelines specified in AIChE (1992). (ISMP 5.5, in turn, is specified by SRD Safety Criteria 3.1 series.) (see also Endnote 3 for discussion).
4.1.1.2	Design requirements	Yes	SRD Safety Criteria (SC) 4.1-1.0-2, 1.0-7, 4.2-1, 4.3-4 all require this DOE O 420.1 criteria to be used.

O 420.1 Section 4.2	Requirement	Criteria Met (Yes/No)	Comment
4.2.1	The objectives of Section 4.2 are to establish requirements for a comprehensive fire and related hazards protection program for facilities sufficient to minimize the potential for (1) the occurrence of a fire or related event; (2) a fire that causes an unacceptable onsite or offsite release of hazardous or radiological material that will threaten the health and safety of employees, the public or the environment; (3) vital DOE programs suffering unacceptable interruptions as a result of fire and related hazards; (4) property losses from a fire and related events exceeding defined limits established by DOE; and (5) critical process controls and safety class systems being damaged as a result of a fire and related events.	Yes	SRD SC 4.5-12 and 4.5-14 (see Endnote 4).
4.2.2	Section 4.2 of this Order has primacy over all other DOE Orders with respect to matters concerning fire protection for facilities (refer to DOE 440.1 for worker protection requirements). To the extent that potential conflicts may arise resulting from the implementation of these requirements in relation to other DOE Orders or Directives, the cognizant fire protection Authority Having Jurisdiction (AHJ) within the Office of the Assistant Secretary for Environment, Safety and Health shall be responsible for resolving the issue in concert with the other AHJs.	No	See Endnote 5.
4.2.3	DOE facilities, sites, and activities (including design and construction) shall be characterized by a level of fire protection that is sufficient to fulfill the requirements of the best protected class of industrial risks ("Highly Protected Risk" or "Improved Risk") and shall be provided protection to achieve "defense-in-depth." This includes meeting the applicable building code and National Fire Protection Association codes and standards, or exceeding them (when necessary to meet safety objectives), unless an exemption has been granted. The applicable codes and standards are those in effect when facility design commences ("code of record"). When significant modifications to a facility occur, the current edition of the code or standard shall apply to the modification.	Yes	SRD SC 4.5-13 and DOE G-440.1, Sections 2.0, 3.0, and 5.0 (see Endnote 6).
4.2.1.1	DOE Elements and contractors shall develop, implement, and maintain an acceptable fire protection program with the following features: A policy	Yes	SRD SC 4.5-12, 4.5-12.1, and 4.5-13 supplemented by DOE G-440.1, Section 4.1 (see

O 420.1 Section 4.2	Requirement	Criteria Met (Yes/No)	Comment
	statement that incorporates the requirements of this Section, related DOE directives, and other applicable Federal, state and local fire protection requirements. The statement shall affirm management's commitment to support a level of fire protection and fire suppression capability sufficient to minimize losses from fire and related hazards consistent with the best class of protected property in private industry.		Endnote 6).
4.2.1.2	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: Comprehensive, written fire protection criteria that reflect additional site-specific aspects of the fire protection program, including the organization, training and responsibilities of the fire protection staff, administrative aspects of the fire protection program, and requirements for the design installation, operability, inspection, maintenance and testing of fire protection systems.	Yes	SRD SC 4.5-15 and DOE G 440.1, Section 4.2 (see Endnote 6).
4.2.1.4	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: A system to ensure that the requirements of the DOE fire protection program are documented and incorporated in the plans and specifications for all new facilities and for significant modifications of existing facilities. This includes a documented review by a qualified fire protection engineer of plans, specifications, procedures and acceptance tests.	Yes	SRD SC 4.5-17 and DOE G-440.1, Section 4.4 (see Endnote 6).
4.2.1.5	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: Fire hazards analyses (FHA) for all nuclear facilities, significant new facilities and facilities that represent unique or significant fire safety risks. The FHA shall be developed using a graded approach. The conclusions of the FHA shall be incorporated in the Safety Analysis Report (SAR) Accident Analysis and shall be integrated into design basis and beyond design basis accident conditions.	Yes	SRD 4.5-20 and DOE G-440.1, Section 4.5 (see Endnote 6).
4.2.1.6	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: Access to a qualified and trained fire protection staff, including a fire protection engineer(s), technicians and fire fighting personnel to implement the	Yes	SRD SC 4.5-21 and DOE G-440.1, Section 4.6 (see Endnote 6).

O 420.1 Section 4.2	Requirement	Criteria Met (Yes/No)	Comment
	requirements of this Section.		
4.2.1.7	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: A "baseline" needs assessment that establishes the minimum required capabilities of site fire fighting forces. This includes minimum staffing, apparatus, facilities, equipment, training, fire pre-plans, off-site assistance requirements, and procedures. Information from this assessment shall be incorporated into the site Emergency Plan.	Yes	SRD SC4.5-14 and 4.5-18 as supplemented by DOE G-440.1, Section 4.7 (see Endnote 6).
4.2.1.8	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: Written pre-fire strategies, plans, and standard operating procedures to enhance the effectiveness of site fire fighting forces, where provided. Such procedures include those governing the use of fire fighting water or other neutron moderating materials to suppress fire within or adjacent to moderation controlled areas. Restrictions on the use of water shall be fully justified on the basis of criticality safety.	Yes	SRD SC 4.5-22 and DOE G-440.1, Section 4.8 (see Endnote 6).
4.2.1.9	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: A comprehensive, documented fire protection self-assessment program, which includes all aspects (program and facility) of the fire protection program. Assessments shall be performed on a regular basis at a frequency established by DOE.	Yes	SRD SC 4.5-18 and DOE G-440.1, Section 4.9 (see Endnote 6).
4.2.1.10	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: A program to identify, prioritize and monitor the status of fire protection-related appraisal findings/recommendations until final resolution is achieved. When final resolution will be significantly delayed, appropriate interim compensatory measures shall be implemented to minimize the fire risk.	Yes	SRD SC 4.5-16 and DOE G-440.1, Section 4.10 (see Endnote 6).
4.2.1.11	DOE Elements and contractors shall develop, implement and maintain an acceptable fire protection program with the following features: A process for reviewing and recommending approval of fire safety "equivalencies" and "exemptions" to the DOE Authority Having Jurisdiction for fire safety.	Yes	SRD SC 4.5-12 and 4.5-12.1 as supplemented by DOE G-440.1, Section 4.11 (see Endnote 6).
4.2.2.1	DOE Elements and contractors shall develop, implement and maintain a		SRD SC 4.5-1

O 420.1 Section 4.2	Requirement	Criteria Met (Yes/No)	Comment
	comprehensive fire protection program for facilities that includes: A reliable water supply of adequate capacity for fire suppression.	Yes	
4.2.2.2	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: Noncombustible or fire-resistive construction, where appropriate. Complete fire-rated barriers that are commensurate with the fire hazard to isolate hazardous occupancies and to minimize fire spread and loss potential consistent with defined limits as established by DOE.	Yes	SRD SC 4.5-2 & 4.5-3 (see Endnote 7).
4.2.2.3	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: Automatic fire extinguishing systems throughout all significant facilities and in all areas subject to loss of safety class systems, significant life safety hazards, unacceptable program interruption, or fire loss potential in excess of defined limits.	Yes	SRD SC 4.5-4
4.2.2.4	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: Redundant fire protection systems in areas where safety class systems are vulnerable to fire damage and where no redundant safety capability exists outside of the fire area. In new facilities, redundant safety class systems shall be in separate fire areas. Redundant fire protection systems shall also be provided in areas where the maximum possible fire loss (MPFL) exceeds limits established by DOE.	Yes	SRD SC 4.5-5 (see Endnote 8), DOE G-440.1, Section 6.4 (see Endnote 6), and DOE-STD-1066, Section 5.1.1.
4.2.2.5	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: A means to summon the fire department in the event of a fire, such as a fire alarm signaling system.	Yes	SRD SC 4.5-7
4.2.2.6	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: A means to notify and evacuate building occupants in the event of a fire, such as a fire detection or fire alarm system and illuminated, protected egress paths.	Yes	SRD SC 4.5-6
4.2.2.7	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: Physical access and appropriate equipment to facilitate effective intervention by the	Yes	SRD SC 4.5-8

O 420.1 Section 4.2	Requirement	Criteria Met (Yes/No)	Comment
	fire department, such as an interior standpipe system(s) in multi-story or large facilities with complex configurations.		
4.2.2.8	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: A means to prevent the accidental release of significant quantities of contaminated products of combustion and fire fighting water to the environment, such as ventilation control and filter systems and curbs and dikes. Such features would only be necessary if required by the FHA or SAR in conjunction with other facility or site environmental protection measures	Yes	SRD SC 4.5-9
4.2.2.9	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: Fire and related hazards that are unique to DOE and are not addressed by industry codes and standards shall be protected by isolation, segregation or use of special fire control systems, such as inert gas or explosion suppression, as determined by the FHA.	Yes	SRD SC 4.5-10
4.2.2.10	DOE Elements and contractors shall develop, implement and maintain a comprehensive fire protection program for facilities that includes: Fire protection systems shall be designed such that their inadvertent operation, inactivation or failure of structural stability will not result in the loss of vital safety functions or inoperability of safety class systems as determined by the SAR.	Yes	SRD SC 4.5-11

DOE O 420.1 Section 4.3	Requirements	Criteria Met (Yes/No)	Comments
4.3	Contractor ... shall establish a nuclear criticality safety program.	Yes	The Contractor has provided a criticality safety program (CSP) document (BNI# PL-W375-NS00001) to implement the various SRD criticality safety criteria. OSR has accepted the commitments in the CSP.
4.3.1	Objective 1: Criticality safety is comprehensively addressed and receives an objective review.	Yes	The SRD, Section 3.3 criteria and the Contractor's CSP document comprehensively address criticality safety. SC 3.3-1: The implementing standard, ANSI 8.1, Section 4.1.6, requires operational reviews. The implementing standard, ANSI 8.19, defines review responsibilities for management and staff. The CSP also defines review requirements for the various aspects of the program.
4.3.1	Objective 1: Identified risks reduced to acceptably low levels	Yes	SC 3.3-1: The facility shall be designed and operated in a manner that prevents nuclear criticality.
4.3.1	Objective 1: Management authorization of the operation is documented.	Yes	DOE will authorize the Contractor to operate in a documented authorization agreement.
4.3.1	Objective 2: The public, workers, property, both government and private, the environment, and essential operations are protected from the effects of a criticality accident.	Yes	SC 3.3-1: The facility shall be designed and operated in a manner that prevents nuclear criticality.
4.3.2	Demonstrate that the operation will be subcritical under both normal and credible abnormal conditions	Yes	SC 3.3-2: The multiplication factor (k<eff>)... shall be shown to not exceed 0.95 under all credible normal, off-normal, and accident conditions.
4.3.2	No single credible event or failure shall result in a criticality accident having unmitigated consequences.	Yes	SC 3.3-3: Process designs shall incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible.
4.3.2	Item i: The nuclear criticality safety program ... shall include... Nuclear	Yes	SC 3.3-5: Nuclear criticality safety considerations

DOE O 420.1 Section 4.3	Requirements	Criteria Met (Yes/No)	Comments
	criticality safety evaluations.		and controls shall be evaluated for accidents, normal operations, and before any significant operational changes are made. The CSP has detailed requirements for criticality safety evaluations.
4.3.2	Item ii: The nuclear criticality safety program ... shall include... Implementation of limits and controls.	Yes	Section 7 of the CSP describes commitments for implementing criticality safety limits and controls.
4.3.2	Item iii: The nuclear criticality safety program ... shall include... Reviews of operations...	Yes	SC 3.3-1: Implementing standard, ANSI 8.1, Section 4.1.6, requires operational reviews. Implementing standard, ANSI 8.19, defines operational review responsibilities for management and staff. Section 7 of the CSP also has operating procedure review requirements.
4.3.2	Item iv: The nuclear criticality safety program ... shall include... Assessment of the need for criticality accident detection devices and alarm systems.	Yes	SC 3.3-6: Criticality Accident Alarm Systems (CAS) and Criticality Detection Systems (CDS) shall be required as follows...
4.3.3	Item a: Contractor Criticality Safety Programs (CCSPs) shall apply to operations involving fissionable materials... listed in Table 4.3-1.	Yes	Sections 6.1-6.3 of the CSP define fissionable material quantities exempt from SRD and CSP requirements. All isotopes in 420.1, Table 4.3-1, are addressed by the CSP.
4.3.3	Item b: ANSI/ANS 8.1-1986, R88, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors."	Yes	SC 3.3-1: Implementing standard.
4.3.3	Item b: ANSI/ANS 8.3-1986, "Criticality Accident Alarm System."	Yes	SC 3.3-6: ANSI/ANS 8.3 is included by reference.
4.3.3	Item b: ANSI/ANS 8.5-1986, "Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material."	No	Not applicable. Control strategy will not include use of neutron absorbers.
4.3.3	Item b: ANSI/ANS-8.6-1983, R88, "Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ."	No	Not applicable. Control strategy will not include neutron multiplication measurements.
4.3.3	Item b: ANSI/ANS-8.7-1975,R87, "Guide for Nuclear Criticality Safety in the Storage of Fissile Materials."	No	Not applicable. This standard applies to the storage of containers of uranium and plutonium in metal or oxide form. It is not applicable to storage of liquid waste or glassified waste.

DOE O 420.1 Section 4.3	Requirements	Criteria Met (Yes/No)	Comments
4.3.3	Item b: ANSI/ANS-8.9-1987, "Nuclear Criticality Safety Criteria for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Materials."	No	Not applicable. Standard applies to aqueous solutions of plutonium or uranium. It is not applicable to the vitrification plant process stream that may have a lower minimum critical concentration than aqueous mixtures. In any case, pipe intersections are not a concern due to the dilute nature of fissile material handled. Critical mass cannot be approached at pipe intersections.
4.3.3	Item b: ANSI/ANS-8.10-1983,R88, "Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement."	Yes	SC 3.3-3: ANSI/ANS-8.10-1983 is included by reference.
4.3.3	Item b: ANSI/ANS-8.12-1987,R93, "Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors."	No	Not applicable. This standard applies to aqueous plutonium/uranium mixtures. It is not applicable to the vitrification plant process stream, which may have a lower minimum critical concentration than aqueous mixtures
4.3.3	Item b: ANSI/ANS-8.15-1981,R87, "Nuclear Criticality Control of Special Actinide Elements."	No	Not applicable. This standard applies to storage of bulk quantities of actinide elements in unmoderated systems. It is not applicable to liquid waste or glassified waste storage.
4.3.3	Item b: ANSI/ANS-8.17-1984,R89, "Criticality Safety Criteria for the Handling, Storage, and Transportation of LWR Fuel Outside Reactors."	No	Not applicable. Standard applies to LWR fuel rods and units, not tank waste.
4.3.3	Item b: ANSI/ANS-8.19-1984,R89, "Administrative Practices for Nuclear Criticality Safety."	Yes	SC 3.3-1: Implementing standard.
4.3.3	Item b: ANSI/ANS-8.21-1995, "Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors."	No	Not applicable. Control strategy will not include neutron absorbers.
4.3.3	Item c: All recommendations in the ANSI/ANS standards listed in paragraph 4.3.3.b shall be addressed. When recommendations are not implemented, justification shall be documented in a manner described in the Implementation Plan.	No	See Endnote 9.
4.3.3	Item d-1: Application of double contingency...	Yes	SC 3.3-3: Text is identical to that in 420.1.
4.3.3	Item d-2: Application of Geometry Control...	Yes	SC 3.3-4 : Text is identical to that in 420.1 with the

DOE O 420.1 Section 4.3	Requirements	Criteria Met (Yes/No)	Comments
			addition of the following: "The geometry must be considered as water moderated and reflected unless it can be shown the presence of water is not credible."
4.3.3	Item d-3: Application of definition of "bias."	Yes	SC 3.3-1: ANSI/ANS 8.1-1986, R88 contains the definition of bias and is included as an implementing standard.
4.3.3	Item e: ...Criticality Accident Alarm Systems (CAS) and Criticality Detection Systems (CDS) shall be required as follows...	Yes	SC 3.3-6: Text is effectively equivalent to that in 420.1 (minor modifications only).
4.3.3	Item f: Section 5.3 of ANSI/ANS-8.6-1983,R88.	No	Not applicable. Control strategy will not include neutron multiplication measurements.
4.3.3	Item g: Section 4.3 of ANSI/ANS-8.17-1984,R89.	Yes	SC 3.3-6: See item e above.
4.3.3	Item h: It is acceptable to DOE to follow DOE-STD-3007-93.	No	Not a requirement in 420.1
4.3.3	Item i: Ensure that the contractor shall have a program to detect inadvertent accumulation of significant quantities of fissionable material.	Yes	SC 3.3-1 SC 3.3-5 These two safety criteria, taken together, ensure the criticality analysis and control strategy will include worst-case inadvertent accumulations of fissile material.
4.3.3	Item j: Transportation requirements.	No	Not applicable. Transportation of canisters is outside the scope of the project
4.3.3	Item k: Guidelines for firefighting.	No	Not applicable. Moderation control is unnecessary. Criticality controls will be based on analyses performed with optimal moderation.
4.3.3	Item l: Training and qualifications.	Yes	Training and qualification program requirements and responsibilities are discussed in Section 3 of the CSP.

DOE O 420.1 Section 4.4	Requirements	Criteria Met (Yes/No)	Comments
4.4	Natural Phenomena Hazards Mitigation The objectives of this section are to ensure that all DOE facilities are designed, constructed, and operated so that the general public, workers, and the environment are protected from the impact of natural phenomena hazards (NPHs). The provisions of this section cover all natural phenomena hazards such as seismic, wind, flood, lightning. Where no specific requirements are specified, model building codes or national consensus industry standards shall be used.	Not Applicable	This section describes the objectives of NPHs mitigation. Therefore, reference to implementing safety criteria is not applicable.
4.4.1	General Requirements For hazardous facilities, safety analyses shall include the ability ofSSCs and personnel to perform their intended safety functions under the effects of natural phenomena.	Yes	SRD SC 4.1-3 addresses NPH design for SSCs that are ITS and have a NPH safety function. The NPHs considered include events from seismic, wind, tornado, volcanic ash, flood, and snow. SSCs designated as ITS are required to be designed to withstand the effects of NPH events without the loss of capability to perform their ISM-derived safety functions.
4.4.2	Natural Phenomena Mitigation Design Requirements SSCs shall be designed, constructed and operated to withstand the effects of natural phenomena as necessary to ensure the confinement of hazardous material, the operation of essential facilities, the protection of government property, and the protection of the life safety for occupants of DOE buildings. The design process shall consider potential damage and failure of SSCsdue to both direct and indirect natural phenomena effects, including common cause effects and interactions from failures of other SSCs. Further, the seismic requirements of Executive Order 12699 shall be addressed.	Yes	DOE standard DOE-STD-1020, which is identified as one of the implementing standards of SC 4.1-3, provides criteria for the design of new SSCs so that DOE facilities can safely withstand the effects of NPHs such as earthquakes, extreme winds, and flooding. These criteria specified in DOE-STD-1020 are provided as the means of implementing DOE Order 420.1, the associated implementation guides, and Executive Orders 12699 and 12941 for

DOE O 420.1 Section 4.4	Requirements	Criteria Met (Yes/No)	Comments
	SSCs for new DOE facilities, and additions or major modifications to existing SSCs shall be designed, constructed, and operated to meet the requirements in the previous paragraph. Any additions and modifications to existing DOE facilities shall not degrade the performance of existing SSCs to the extent that the objectives in this section cannot be achieved under the effects of natural phenomena.		earthquakes. SC 4.1-3 requires that any ITS SSCs with a safety function as a result of a given NPH shall be designed to withstand NPH loading of that NPH as provided in Table 4.1 of the SRD. These SSCs are designated Seismic Category I (SC-I) for earthquakes and Performance Category 3 (PC-3) for other NPH as defined in DOE-STD-1020. Safety Criterion 4.1-3 further requires that any other ITS SSCs that do not have a safety function for an NPH event, but whose failure as a result of an NPH event could reduce the functioning of ITS SSCs that do have such a function such that the SRD exposure standards might be exceeded, shall be designed to withstand the NPH loading of that NPH as provided in Table 4.1 of the SRD. For these SSCs, for seismic response only, credit may be taken for inelastic absorption per Table 2-4 of DOE-STD-1020. These SSCs are designated as SC-II for earthquakes and PC-3 for other NPH. Finally, ITS SSCs that are neither SC I nor SC II and are not ITS, but still have significant inventories of radioactive or hazardous materials, are designated as SC-

DOE O 420.1 Section 4.4	Requirements	Criteria Met (Yes/No)	Comments
			III for earthquakes and PC-2 for other NPH. In addition to DOE-STD-1020, other implementing standards in SC 4.1-3 include ACI 349-97, ACI 349R-97, ASCE 4-98, 1997 Uniform Building Code, and DOE Newsletter ("Interim Advisory on Straight Winds and Tornados") dated 1/22/98.
4.4.3	Evaluation and Upgrade of Existing DOE Facilities	Not Applicable	Not Applicable for RPP-WTP
4.4.4	NPH Assessment The design and evaluation of facilities to withstand natural phenomena shall be based on an assessment of the likelihood of future natural phenomena occurrences. The NPH assessment shall be conducted commensurate with a graded approach and commensurate with the potential hazards of the facility For new sites; NPH assessment shall be conducted commensurate with a graded approach to the facility. Site planning shall consider the consequences of all types of NPH. For existing sites, if there are significant changes in NPH assessment methodology or site-specific information, the NPH assessment shall be reviewed and shall be updated, as necessary. The NPH assessment shall be reviewed at least every 10 years. The review shall include recommendations to DOE on the need for updating the existing NPH assessment based on the identification of any significant changes in methods or data.	Yes	For RPP-WTP, NPH assessment is conducted commensurate with the consideration of the likelihood of future natural phenomena occurrences and a graded approach. For the RPP-WTP design basis earthquake, a peak ground acceleration of 0.26g is selected based on an earthquake with 2000 year return period. This selection is made based on the Hanford site-specific seismic hazard curve. A Hanford site-specific design response spectrum has also been developed by the RPP-WTP Contractor as shown in Figures 4-1 and 4-2 of the SRD. As discussed in the response to Section 4.4.2 above, in performing NPH assessment, different seismic categories and performance categories are assigned to various SSCs for earthquake and other NPH

DOE O 420.1 Section 4.4	Requirements	Criteria Met (Yes/No)	Comments
			events, depending on the safety function of any particular SSC.
4.4.5	Natural Phenomena Detection Facilities or sites with hazardous materials shall have instrumentation or other means to detect and record the occurrence and severity of seismic events.	Yes	The RPP-WTP Contractor currently is not required to operate a monitoring station for seismic events. However, there is an active seismic monitoring station on Hanford site, operated by Pacific Northwest National Laboratory. The RPP-WTP Contractor has access to the seismic data provided by the station.
4.4.6	Post-Natural Phenomena Procedures Facilities or sites with hazardous materials shall have procedures that include inspecting the facility for damage caused by severe natural phenomena and placing the facility into a safe configuration when such damage has occurred.	No	OSR will backfit this 420.1 requirement. It is expected that the Contractor intended to develop these procedures even absent a specific requirement to do so; therefore, no significant cost impact to DOE is anticipated.

Endnotes

1 DOE has required that the RPP-WTP safety analyses establish the identification and functions of important to safety SSCs. "Important to safety" SSCs are defined by the DOE defined regulatory program and the RPP-WTP Contract as a broader category than "safety" SSCs defined by 10 CFR 830. Specifically, important to safety SSCs are defined as those that "provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public," whereas safety SSCs are defined more narrowly by 10 CFR 830. (Concerning "undue risk," the risk goals for the RPP-WTP are found in DOE/RL-96-0006, part of the DOE-defined regulatory program. The risk goals were derived principally from Secretary of Energy Notice, SEN 35-91, "Nuclear Safety Policy.")

The identification and functions of these ITS SSCs are developed from the DOE-required integrated standards development process, which is part of the RPP-WTP safety management system. Note 2 provides details concerning how ITS SSCs are identified. This process was defined in RL/REG 96-0004 and endorsed by DOE in DOE/RL-96-25 and DOE/RL-96-26. This process implements DEAR 970.5223-1, *Integration of Environment, Safety and Health into Work Planning*," and DOE M 450.3-1 as they relate to nuclear, radiological, and process safety.

In contrast to the explicit assignment of defense-in-depth control strategies to safety significant SSCs described in DOE-STD-3009, provisions for defense-in-depth are required for all ITS SSCs. In particular, Section 4.0 of DOE/RL-96-0006 provides a description of defense-in-depth principles that must be applied to the RPP-WTP facility design. These include defense-in-depth, prevention, control, mitigation, use of automatic systems, and human-aspects considerations. Section 4.1.1 elaborates on each of

these defense-in-depth principles. The Contractor has committed to these principles in the RPP-WTP SRD via safety criteria 1.0-2, 1.0-7, 4.1-1, 4.2-1, 4.3-1, 4.3-5, and 4.3-6. Implementation of these defense-in-depth principles for the RPP-WTP is further detailed in the SRD Appendix B, "Implementing Standard for Defense-in-Depth." Also, DOE O 420.1 (Section 4.1.1.2) is one of the implementing standards invoked by the SRD, Appendix B.

2 The OSR-approved method to identify ITS SSCs is similar in concept, but more elaborate, than the method defined in Appendix A to DOE-STD 3009 for safety SSCs. As part of the standards-based ISM process, safety requirements and control strategies are identified from the facility hazard analysis by the Contractor's process review team, subject to OSR review and approval. Criteria for this identification are detailed in Appendix A and B of the RPP-WTP SRD . These criteria were proposed by the Contractor as part of ISM and accepted by DOE in a December, 1998, revision of the SRD, to address OSR review concerns that the Contractor had not, to that point, adequately explained how defense in depth and single failure protection would be implemented at the RPP-WTP.

Each postulated radiological accident is assigned one of four "Severity Levels" (Severity Level 1, 2, 3, or 4) depending on the unmitigated consequences of the accident. For example, SL-1 accidents include any accident with >25 rem unmitigated consequence to a worker, or >5 rem to the public. The control strategies and safety functions that the SRD requires to be provided by the ITS SSCs vary, depending on the Severity Level of the corresponding accident.

Once the Severity Level is determined, criteria for ITS SSC performance are invoked that depend on the Severity Level specified. For example, the SSC control strategy for a Severity Level 1 accident must:

- satisfy the single failure criterion
- be diverse and independent
- ensure that the frequency of release, after prevention and mitigation, must be less than 10^{-6} per year.

Similar, but less demanding criteria for ITS SSC performance, are provided for each of the other three accident Severity Levels in the SRD.

In contrast, safety class SSCs are expected, using Appendix A to DOE-STD-3009, to be those for which an unmitigated accident analysis indicates the potential for an exposure to the public of at least 25 rem. Such SSCs are a subset of the ITS SSCs associated with SL-1 accidents. Every safety class SSC will be an ITS SSC associated with an SL-1 accident, but every ITS SSC associated with an Sl-1 accident will not be a safety class SSC. The criteria for SL-1 associated ITS SSCs (outlined above) ensure that the control strategies for safety class SSCs will be at least as robust as those provided by DOE-STD-3009 for these safety class SSCs.

Safety significant SSCs are those safety SSCs that are not safety class, but whose preventive or mitigative functions are a "major contributor to defense in depth and/or worker safety as determined from safety analyses." ITS SSCs are a broader set, since they are any SSCs that "provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public," regardless of whether they are a "major contributor to defense in depth and/or worker safety." Every safety significant SSC will be an ITS SSC, but every ITS SSC will not be a safety significant SSC.

As specified in the DOE-approved methodology for the RPP-WTP, however, safety class and safety significant SSCs are explicitly not identified. As discussed in the preceding paragraphs, both types of SSCs are, however, implicit subcategories of the ITS SSCs that are identified in the hazard and accident analysis portion of the standards-based ISM process. Design requirements for ITs SSCs associated with SL-1 and SL-2 events meet the design requirements for corresponding SSCs under DOE-0 420.1. For example, SSCs associated with SL-1 events are required to meet the single failure criteria in application of defense-in-depth. Similarly, for SSCs associated with SL-2 events, application of single failure criteria is to be considered. These two event categories encompass all events with a potential for exposure to the public in the "rem range" and consequently the associated SSCs should include all SSCs that may be candidates for Safety Class designation per DOE-O 420.1.

3 The "DOE guidance documents," other than DOE O 420.1, to be used for "SAR guidance for safety analysis" are not specified in this sentence. 10 CFR 830.206 b(1) requires DOE approval of nuclear safety design criteria for the PDSA, "other than those specified in DOE O 420.1." Since 10 CFR 830.206 specifically does not require use of DOE-STD-3009 for the PDSA as a safe harbor methodology, OSR's position is that, for the RPP-WTP, for the preliminary safety analysis report (i.e., the PDSA), use of the DOE-approved RL/REG 99-05, , satisfies the criteria of this sentence. The method by which other 420.1 criteria are satisfied is discussed in the other line entries of this table.

4 The DOE O 420.1 requirement that the RPP-WTP comprehensive fire protection program include the objective to minimize "property losses from a fire and related events exceeding defined limits established by DOE" can be imposed on the Contractor through the established backfit process. Since the fire protection program and design being implemented by the Contractor were intended to provide property protection of the level addressed by the Order, no significant financial or schedule impact should result.

5 This DOE Order O 420.1 requirement can be imposed on the Contractor through the backfit process. Since the intent of the Safety Requirements Document fire protection safety criteria and implementing codes and standards was to meet DOE O 420.1, this should result in no significant financial or schedule impact.

6 In the fire protection area, several of the DOE O 420.1 mandatory criteria ("shall" statements) are currently only recommendations in the sub-tier implementing standards that are part of the RPP-WTP SRD, if necessary to meet 10 CFR 830 for the PDSA methodology. OSR can initiate the backfit process, using the established OSR backfit procedure, to impose these new requirements on the Contractor. The Contractor had intended to meet the recommended criteria in these cases, so no significant financial or schedule impact is anticipated.

7 The DOE O 420.1 requirement that the facility fire protection program shall include "complete fire-rated barriers that are commensurate with the fire hazard to isolate hazardous occupancies and to minimize fire spread and loss potential consistent with defined limits as established by DOE" can be imposed on the Contractor through the backfit process. Since this is the fire protection design approach used by the Contractor to date, no significant financial or schedule impact should result.

8 The DOE O 420.1 requirement that in new facilities, redundant safety class systems "shall" be in separate fire areas can be imposed on the Contractor through the backfit process. Since this is the design approach for the placement of safety class systems that has been discussed to date between OSR and the Contractor, no significant financial or schedule impact should result.

9 OSR can backfit this DOE 420.1 requirement that disposition of all ANS 8.x series recommendations be documented as specified.

Appendix B. Summary of the Comparison of DOE-STD-3009 and the RPP-WTP Review Guide for the Construction Authorization Request (CAR)

The comparison of DOE-STD-3009 and RL/REG-99-05 is summarized in Table 1.

Table 1. Summary of the Comparison of DOE-STD-3009 and RL/REG-99-05

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
Executive Summary			X	The CAR format does not include an Executive Summary (see Endnote 1.)
E.1. Facility Background And Mission			X	The CAR format does not include an Executive Summary (see Endnote 1.)
E.2. Facility Overview			X	The CAR format does not include an Executive Summary (see Endnote 1.) The CAR Guide currently does not require a hazard classification for the PSAR submittal, although it can easily be deduced from the hazard analysis information.
E.3. Facility Hazard Classification			X	The CAR format does not include an Executive Summary (see Endnote 1.)
E.4 Safety Analysis Overview			X	The CAR format does not include an Executive Summary (see Endnote 1.)
E.5. Organizations			X	The CAR format does not include an Executive Summary (see Endnote 1.)
E.6. Safety Analysis Conclusions			X	The CAR format does not include an Executive Summary (see Endnote 1.)
E.7. Organization			X	The CAR format does not include an Executive Summary (see Endnote 1.)
Chapter 1, Site Characteristics		X		
1.1 Introduction		X		
1.2 Requirements		X		See Endnote 2.
1.3 Site Description		X		
1.3.1 Geography		X		
1.3.2 Demography		X		
1.4 Environmental Description		X		
1.4.1 Meteorology		X		

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
1.4.2 Hydrology		X		
1.4.3 Geology		X		
1.5 Natural Phenomena Threats		X		
1.6 External Man-Made Threats		X		
1.7 Nearby Facilities		X		
1.8 Validity Of Existing Environmental Analyses			X	There is an inconsistency caused by the existing versus new facility requirements.
Chapter 2, Facility Description		X		
2.1 Introduction		X		
2.2 Requirements		X		See Endnote 2.
2.3 Facility Overview		X		
2.4 Facility Structure		X		
2.5 Process Description	X			
2.6 Confinement Systems	X			
2.7 Safety Support Systems		X		Not all of the "safety functions not part of a specific process" are identified in the CAR since it is documentation of a PSAR, not an FSAR.
2.8 Utility Distribution Systems		X		
2.9 Auxiliary Systems And Support Facilities	X			
3. Hazard And Accident Analyses Purpose.		X		
3.1 Introduction		X		
3.2 Requirements		X		See Endnote 2.
3.3 Hazard Analysis		X		See Endnote 3.
3.3.1 Methodology		X		
3.3.1.1 Hazard Identification	X			
3.3.1.2 Hazard Evaluation	X			
3.3.2 Hazard Analysis Results 3.3.2.1 Hazard Identification		X		See Endnote 3.

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
3.3.2.2 Hazard Classification			X	The CAR Guide currently does not require a hazard classification for the PSAR submittal, although it can easily be deduced from the hazard analysis information.
3.3.2.3 Hazard Evaluation	X			
3.3.2.3.1 Planned Design And Operational Safety Improvements	X			See Endnote 3.
3.3.2.3.2 Defense In Depth	X			See Endnote 3.
TSRs		X		See Endnote 4.
3.3.2.3.3 Worker Safety		X		
3.3.2.3.4 Environmental Protection	X			
3.3.2.3.5 Accident Selection	X			
3.4 Accident Analysis		X		
3.4.1 Methodology		X		
3.4.2 Design Basis Accidents		X		
3.4.3 Beyond Design Basis Accidents	X			
Chapter 4 Safety Structures, Systems, And Components		X		
4.1 Introduction		X		CAR Guide addresses a new facility whereas DOE-STD-3009 relates to existing facilities (see Endnote 3).
4.2 Requirements		X		See Endnote 2.
4.3 Safety-Class Systems, Structures, And Components		X		All safety class SSCs are Security Level l, important-to-safety SSCs (see endnote 3 and 4).
4.4 Safety-Significant Structures, Systems, And Components		X		All safety class SSCs are Security Level l, important-to-safety SSCs (see endnote 3 and 4).
Chapter 5 Derivation Of Technical Safety Requirements		X		

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
5.1 Introduction		X		Although the graded approach mentioned in DOE-STD-3009 is not specifically mentioned in the CAR Guide, the graded approach is included in the RPP-WTP SRD and ISMP.
5.2 Requirements		X		See Endnotes 2 and 4.
5.3 TSR Coverage	X			
5.4 Derivation Of Facility Modes			X	CAR Guide addresses review of the PSAR for a new facility whereas DOE-STD-3009 principally addresses existing facilities. The RPP-WTP modes will be addressed in the FSAR.
5.5 TSR Derivation		X		TSR clarification is not addressed by the RL/REG-99-05, but will be addressed for the FSAR. (see Endnote 4).
5.6 Design Features		X		
5.7 Interface With TSRs From Other Facilities			X	TSR derivation and interface with tank farm TSRs will be addressed in the FSAR. (see Endnote 4)
Chapter 6 Prevention Of Inadvertent Criticality		X		
6.1 Introduction	X			
6.2 Requirements		X		See Endnote 2.
6.3 Criticality Concerns	X			
6.4 Criticality Controls	X			
6.4.1 Engineering Controls	X			
6.4.2 Administrative Controls	X			
6.4.3 Application Of Double Contingency Principle	X			
6.5 Criticality Protection Program 6.5.1 Criticality Safety Organization	X			
6.5.2 Criticality Safety Plans And Procedures	X			
6.5.3 Criticality Safety Training		X		

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
6.5.4 Determination Of Operational Nuclear Criticality Limits	X			
6.5.5 Criticality Safety Inspections/Audits		X		
6.5.6 Criticality Infraction Reporting And Follow-Up		X		
6.6 Criticality Instrumentation	X			
Chapter 7 Radiation Protection		X		
7.1 Introduction		X		
7.2 Requirements		X		See Endnote 2.
7.3 Radiation Protection Program And Organization		X		
7.4 ALARA Policy And Program		X		
7.5 Radiological Protection Training		X		
7.6.1 Administrative Limits		X		
7.6.2 Radiological Practices		X		
7.6.3 Dosimetry		X		
7.6.4 Respiratory Protection	X			
7.7 Radiological Monitoring	X			
7.8 Radiological Protection Instrumentation	X			
7.9 Radiological Protection Record Keeping		X		
7.10 Occupational Radiation Exposures	X			
Chapter 8 Hazardous Material Protection			X	Aspects other than chemical process safety will be imposed on the FSAR. (see Endnote 5).
8.1 Introduction	X			CAR Guide provides more detail. (Also see Endnote 5.)

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
8.2 Requirements			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnotes 2 and 5).
8.3 Hazardous Material Protection And Organization			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
8.4 ALARA Policy And Program			X	CAR does not provide integration of chemical process safety and as low as reasonably achievable (ALARA) (see Endnote 5).
8.5 Hazardous Material Training			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
8.6 Hazardous Material Exposure Control			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
8.7 Hazardous Material Monitoring			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
8.8 Hazardous Material Protection Instrumentation			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
8.9 Hazardous Material Protection Record Keeping			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
8.10 Hazard Communication Program			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
8.11 Occupational Chemical Exposures			X	Aspects other than chemical process safety will be imposed on the FSAR (see Endnote 5).
Chapter 9 Radioactive And Hazardous Waste Management	X			CAR Guide provides more detail. WTP commits to the Environmental Radiological Protection Program (ERPP) (see Endnote 6).
9.1 Introduction		X		See Endnote 6.
9.2 Requirements		X		See Endnotes 2 and 6.

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
9.3 Radioactive And Hazardous Waste Management Program And Organization			X	Hazardous materials are not being regulated by DOE/OSR (see Endnote 6).
9.4 Radioactive And Hazardous Waste Streams And Sources			X	Hazardous materials are not being regulated by DOE/OSR See Endnote 6).
9.4.1 Waste Management Process			X	Hazardous materials are not being regulated by DOE/OSR (see Endnote 6).
9.4.2 Waste Sources And Characteristics			X	Hazardous materials are not being regulated by DOE/OSR(see Endnote 6).
9.4.3 Waste Handling Or Treatment Systems			X	Hazardous materials are not being regulated by DOE/OSR (see Endnote 6).
Chapter 10 Initial Testing, In-Service Surveillance, And Maintenance		X		
10.1 Introduction		X		
10.2 Requirements		X		
10.3 Initial Testing Program		X		CAR Guide addresses a new facility whereas DOE-STD-3009 addresses existing facilities.
10.4 In-Service Surveillance Program		X		
10.5 Maintenance Program	X			
Chapter 11 Operational Safety		X		
11.1 Introduction		X		
11.2 Requirements		X		See Endnote 2.
11.3 Conduct Of Operations	X			
11.4 Fire Protection 11.4.1 Fire Hazards	X			
11.4.2 Fire Protection Program And Organization	X			
11.4.3 Combustible Loading Control	X			
11.4.4 Fire Fighting Capabilities		X		CAR addresses a new facility whereas DOE-STD-3009 addresses existing facilities.

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
11.4.5 Fire Fighting Readiness Assurance		X		
Chapter 12 Procedures And Training		X		
12.1 Introduction		X		
12.2 Requirements		X		See Endnote 2.
12.3 Procedure Program		X		
12.4 Training Program		X		
Chapter 13 Human Factors		X		
13.1 Introduction		X		
13.2 Requirements		X		
13.3 Human Factors Process	X			
13.4 Identification Of Human-Machine Interfaces	X			
13.5 Optimization Of Human-Machine Interfaces		X		CAR addresses a new facility whereas DOE-STD-3009 addresses existing facilities.
Chapter 14 Quality Assurance		X		
14.1 Introduction		X		
14.2 Requirements		X		See Endnote 2.
14.3 Quality Assurance Program And Organization		X		
14.4 Quality Improvement	X			CAR Guide focuses on unique requirements of the construction phase.
14.5 Documents And Records		X		
14.6 Quality Assurance Performance		X		
14.6.1 Work Processes		X		
14.6.2 Design		X		
14.6.3 Procurement		X		
14.6.4 Inspection And Testing For Acceptance		X		
14.6.5 Independent Assessment		X		

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
Chapter 15 Emergency Preparedness Program		X		
15.1 Introduction	X			CAR Guide provides specific details regarding the elements of the emergency preparedness program.
15.2 Requirements		X		See Endnote 2.
15.3 Scope Of Emergency Preparedness		X		
15.4 Emergency Preparedness Planning		X		
15.4.1 Emergency Response Organization		X		
15.4.2 Assessment Actions		X		
15.4.3 Notification		X		
15.4.4 Emergency Facilities And Equipment		X		
15.4.5 Protective Actions		X		
15.4.6 Training And Exercises		X		
15.4.7 Recovery And Reentry		X		
Chapter 16 Provisions For Decontamination And Decommissioning		X		
16.1 Introduction		X		
16.2 Requirements		X		See Endnote 2.
16.3 Description Of Conceptual Plans		X		
Chapter 17 Management, Organization, And Institutional Safety Provisions		X		
17.1 Introduction		X		
17.2 Requirements		X		See Endnote 2.

DOE-STD-3009 Chapter	The CAR Guidance is More Detailed Than 3009	The CAR Guidance is Equivalent to 3009	The CAR Guidance is Less Detailed Than 3009	Summary Comment (If needed)
17.3 Organizational Structure, Responsibilities, And Interfaces		X		
17.3.1 Organizational Structure		X		
17.3.2 Organizational Responsibilities		X		
17.3.3 Staffing And Qualifications		X		
17.4 Safety Management Policies And Programs 17.4.1 Safety Review And Performance Assessment		X		
17.4.2 Configuration And Document Control		X		
17.4.3 Occurrence Reporting		X		
17.4.4 Safety Culture		X		CAR Guide addresses a new facility whereas DOE-STD-3009 addresses existing facilities.

Endnotes

[1] While the outline of DOE-STD-3009 includes an "Executive Summary" section, under the RL/REG-99-05, such a section is not expected. However, the information expected per DOE-STD-3009 in the Executive Summary section is expected to be provided in Section 1 or other sections of the PSAR, albeit in more detail.

[2] In DOE-STD-3009, the "Requirements" section of each chapter expects a list of "design codes, standards, regulations, and DOE orders, which are required for establishing the safety basis of the facility." For the RPP-WTP, the list of codes, standards, and DOE orders required for establishing the safety basis of the facility is arrived at through a contract-stipulated ISM process and the results thereof are documented in the Contractor's SRD. Thus, while process embodied in the RL/REG-99-05 for establishing the safety requirements is different, it provides equivalent but more tailored set of requirements.

[3] The DOE has required that the RPP-WTP safety analyses establish the identification and functions of ITS SSCs. "Important to safety" SSCs are defined by the DOE-defined regulatory program and the RPP-WTP contract as a broader category than "safety" SSCs, defined by 10 CFR 830.

[4] Chapters 4 and 5 of the DOE-STD-3009 address expectations regarding TSRs. These expectations are appropriate for an existing facility in operation or ready for operation (i.e., for which an FSAR has been completed). The CAR Guide on the other hand is written to be applicable to a PSAR submittal. A complete set of TSRs is expected in the Contractor's FSAR submittal for Operations Authorization.

[5] Chapter 8 of DOE-STD-3009 pertains to hazardous material protection. The RPP-WTP PSAR submittal is currently required to address hazardous materials as they pertain to process safety only. However, the

Contractor is responsible under the Contract for following an ISM process for ensuring hazardous material protection for all hazardous materials on site. As such, the Contractor is responsible for obtaining all relevant permits and obeying pertinent state and federal laws and regulations. These include all OSHA regulations for hazardous materials. The Contractor will be required to address its activities in response to applicable regulations, including 10 CFR 830, in the FSAR.

[6] Chapter 9 of DOE-STD-3009 pertains to radioactive and hazardous waste management. The RPP-WTP PSAR submittal is currently not required to address radioactive and hazardous waste management. However, the Contractor is responsible under the Contract for obtaining all relevant permits and obeying pertinent state and federal laws and regulations. These include all OSHA regulations for hazardous materials. The Contractor will be required to address its activities in response to applicable regulations, including 10 CFR 830, in the FSAR.

This page intentionally left blank.

Appendix C. Detailed Comparison of DOE-STD-3009, "Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports," and RL/REG-99-05, *Review Guidance for the Construction Authorization Request*

A detailed comparison and evaluation of DOE-STD-3009 and RL/REG-99-05 was conducted, as shown in Table 2. Three columns of information are provided in Table 2. The first column contains a chapter-by-chapter listing of the content of DOE-STD-3009. The second column contains related guidance provided by RL/REG-99-05. The third column contains comments on the comparison of the information found in the first two columns. In several cases, RL/REG-99-05 contained detailed descriptions of what needed to be provided and how to document the information. In those cases, a summary of the information was included in Column 2, as noted by the use of the symbol **…** The full text from RL/REG-99-05 can be found in the referenced section.

Endnotes are provided for Table 2 and contain detailed comments, which typically may apply to several of the comments found in Column 3.

This page intentionally left blank.

Table 2. Detailed Comparison of DOE-STD-3009 and RL/REG-99-05

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
EXECUTIVE SUMMARY The purpose of the summary is to provide information that will satisfy the requirements of DOE 5480.23, §8.b.(3)(a) Provide an overview of the facility safety basis and present information sufficient to establish a top-level understanding of the facility, its operations, and the results of the safety analysis.	None	This information is found in Section 1 of the CAR Guide. (See Endnote 1)
E.1. FACILITY BACKGROUND AND MISSION This section identifies the facility and presents general background information as it relates to the stage of the facility life cycle. This includes the current mission statement and any relevant (i.e., short facility life cycle description, anticipated future change in facility mission, and/or approved DOE exemptions) that impact the safety analysis in the SAR. The impact of this information should be explained through application of the graded approach.	None	This information is found in Section 1 of the CAR Guide. (See Endnote 1)
E.2. FACILITY OVERVIEW This section provides an overview of the facility, including the facility location, physical and institutional boundaries, relationship and interfaces with nearby facilities, facility layout, and significant external interfaces (e.g. utilities, fire support, and medical support).	None	This information is found in Section 1 of the CAR Guide. (See Endnote 1)
E.3. FACILITY HAZARD CLASSIFICATION This section provides a statement of the facility hazard category as determined in accordance with DOE-STD-1027-92. If determination of the hazard category relied upon segmentation of facility hazards, then provide a brief explanation of the technical basis for such segmentation.	None	The CAR Guide currently does not specifically require a Hazard Classification for the PSAR submittal. However, Hazard Classification of the facility can be easily deduced from the hazard analysis information that is expected in the PSAR. A contract modification can be implemented to require Hazard Classification information to be explicitly included in the FSAR.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
7.1 E.4 SAFETY ANALYSIS OVERVIEW This section provides an overview of the facility operations and the results of the facility safety analysis to include: • Description of the facility operations analyzed in the SAR. • Summary of the significant hazards associated with the facility processes including DBAs. • Summary of the main preventive and mitigative features relied upon in the facility safety basis.	None	This information is found in Sections 1.2, 4.4, and 4.7 of the CAR Guide. (See Endnote 1)
E.5. ORGANIZATIONS This section identifies the prime contractors responsible for facility design and construction (e.g., architect-engineer) facility maintenance and operation, and any consultants, oversight groups, and outside service organizations with significant safety functions. This section should also identify participants, including consultants, participating in the SAR development process.	None	This information is found in Section 2 of the CAR Guide. (See Endnote 1)
E.6. SAFETY ANALYSIS CONCLUSIONS This section should provide a brief assessment of the appropriateness of the facility safety basis. As part of this summary, this section would identify any issues significant to the facility safety basis recognized by the facility operators to require further resolution, but for which delay in documenting the facility safety basis is not warranted or potential budgetary considerations require DOE involvement in a decision process requiring extensive study (e.g., backfit analysis).	None	This information is found in Section 4.11 of the CAR Guide. (See Endnote 1)
E.7. ORGANIZATION This section provides a guide to the structure and content of the SAR, its chapters, and appendixes. If the main body of the SAR parallels the format delineated in this Standard, a simple statement to that effect will suffice.	None	This information is found in Section D of the CAR Guide. (See Endnote 1)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
CHAPTER 1, SITE CHARACTERISTICS The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(c), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)3, of the Order (Topic 3). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in the Introduction of this Standard. This chapter provides a description of site characteristics necessary for understanding the facility environs important to the safety basis. Information is provided to support and clarify assumptions used in the hazard and accident analyses to identify and analyze potential external and natural phenomena accident initiators and accident consequences external to the facility. [NOTE: The cited text from DOE 5480.23 (paragraph(s) 8.b.(3)(c)), identifies site characteristics as one of the topics to be addressed in the SAR. Attachment 1, Topic 3 provides description of what should be included as site characteristics; demography, local and regional meteorology, climatology, regional land and water use patterns, surface and subsurface hydrology, geology, seismology and any unique or special features of the site relevant to the safety analysis. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**1.0 GENERAL INFORMATION** This section provides a general overview of the site, facilities, and process that the Contractor is proposing for processing the tank wastes. Information provided in these sections is used in preparing the Preliminary Safety Analysis (PSA), which is discussed in Section 4.0 in this Guide. **1.1 Site Description** The site description is a summary of the site information used in preparing the PSA and the Emergency Plan, which identify the hazards, potential credible accident scenarios, and the consequences of those accidents.	The element of site characteristics and the areas to be described are common to both DOE-STD-3009 and the CAR Guide. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
1.1. INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**1.0 GENERAL INFORMATION** This section provides a general overview of the site, facilities, and process that the Contractor is proposing for processing the tank wastes. Information provided in these sections is used in preparing the Preliminary Safety Analysis (PSA), which is discussed in Section 4.0 in this Guide.	Both DOE-STD-3009 and the CAR Guide include introductory material to serve as the basis for the safety analysis that follows.
1.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders, which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. Standards and Requirements Identification Documents (SRIDs) may be referenced as appropriate.	**1.1.3.2 Regulatory and Contractual Requirements** **…** Related regulatory and contractual requirements can be found in the Contractor's Safety Requirements Document (SRD). The following safety criteria apply directly to the site description: Safety Criterion 3.1-3 item (4), which states "the process hazards analysis shall address facility siting." Safety Criterion 3.1-4 item (4), which states, in part "the identification of anticipated operational occurrences and accident conditions shall consider internal events (i.e., equipment failure and human error), external events (e.g., nearby facilities and transportation) and natural phenomena." Safety Criteria 4.1-3 and 4.1-4, which address ensuring that structures, systems, and components (SSCs) designated as Important to Safety are designed to withstand the effects of natural phenomena hazards (NPHs) such as earthquakes, wind, and floods without loss of capability to perform their specified safety function. Safety Criterion 9.1-2 item (1), which requires a site description to be included in any Safety Analysis Report. These criteria are implemented within the Contractor's Integrated Safety Management Plan	DOE-STD-3009 requires the "principal health and safety criteria" and applicable facility design codes and standards to be identified as part of the SAR. However, this information has been documented in the Contractor's Safety Requirements Doucment (SRD) under "Implementing Codes and Standards." Therefore, the intent of the DOE-STD-3009 guidance is met. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	(ISMP) through Sections 5.5 and 1.3.4, both entitled "Process Hazards Analysis."	
1.3 SITE DESCRIPTION This section describes the site boundary and facility area boundary.	**1.1. Site Description** A summary of the site information used in preparing the PSA and the Emergency Plan, which identify the hazards, potential credible accident scenarios, and the consequences of those accidents.	Both DOE-STD-3009 and the CAR Guide include introductory site description information to serve as the basis for the safety analysis that follows.
1.3.1 Geography This section provides basic geographic information, such as: • State and county in which the site is located. • Location of the site relative to prominent natural and man-made features, such as rivers, lakes, mountain ranges, dams, airports, population centers. • General location map to define the boundary of the site and show the correct distance of significant facility features from the site boundary. • Public exclusion areas and access control areas. • Identification of the point where Evaluation Guidelines are applied. • Additional detail maps, as needed, to present near plant detail, such as orientation of buildings, traffic routes, transmission lines, and neighboring structures.	**1.1.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the site. The site description includes seven main components and several areas of review: 1. Site Geography a. Site location: state, county, municipality, topographical quadrangle (i.e., 7½ minute series). b. Major nearby highways. c. Nearby bodies of water. d. Any other significant geographic feature that may affect accident analysis (e.g., ridges, valleys, and specific geologic structures). **…**	Both DOE-STD-3009 and the CAR Guide include documentation of basic geographic information. The information described for geography by both DOE-STD-3009 and the CAR Guide are comparable.
1.3.2. Demography Population information based on recent census data is included to show the population distribution as a function of distance and direction from the facility. Demographic information emphasizes worker populations and nearby residences, major population centers, and major institutions such as schools, hospitals, etc., to the degree warranted by potential offsite consequences. The minimum area addressed is defined by the area significantly affected by the accidents analyzed in Chapter 3, "Hazard and Accident Analyses."	**1.1.2 Areas of Review …** 2. Demographics a. Latest census results for the area of concern. b. Description, distance, and direction to nearest population centers. c. Description, distance, and direction to nearest public facilities (e.g., schools, hospitals, and parks). d. Description, distance, and direction to nearby industrial areas or facilities that may present potential hazards (including other nearby nuclear facilities). e. Uses of land within one mile of the facility. f. Uses of nearby bodies of water, including the	Both DOE-STD-3009 and the CAR Guide include the documentation of basic demographic information. The information described for demography by both DOE-STD-3009 and the CAR Guide are comparable.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Columbia River. **…**	
1.4. ENVIRONMENTAL DESCRIPTION This section describes the site's meteorology, hydrology, and geology.	**1.1. Site Description** A summary of the site information used in preparing the PSA and the Emergency Plan, which identify the hazards, potential credible accident scenarios, and the consequences of those accidents.	Both DOE-STD-3009 and the CAR Guide include an introductory environmental description supports the safety analysis that follows.
1.4.1 Meteorology This section provides the meteorological information necessary to understand the regional weather phenomena of concern for facility operation and to understand the dispersion analyses performed.	**1.1. Site Description** **…** 3. Meteorology a. Primary wind speed and directions. b. Annual amount and forms of precipitation, the maximum snow or ice load, and the probable maximum precipitation. **…**	Both DOE-STD-3009 and the CAR Guide include the documentation of basic meteorological information. The information described for meteorology by both DOE-STD-3009 and the CAR Guide are comparable.
1.4.2 Hydrology This section provides the hydrological information necessary to understand any regional hydrological phenomena of concern for facility operation and to understand any dispersion analyses performed. Include information on groundwater aquifers, drainage plots, soil porosity, and other aspects of the hydrological character of the site. Discuss or reference, to the degree necessary, the average and extreme conditions as determined by historical data to meet the intent of this section.	**1.1. Site Description** **…** 4. Hydrology a. Characteristics of nearby rivers, streams, and bodies of water as appropriate. b. Depth to the water table and potentiometric surface map. c. Groundwater flow direction and velocity for the site. d. Characteristics of the uppermost aquifer. **…**	Both DOE-STD-3009 and the CAR Guide include the documentation of basic hydrological information. The information described for hydrology by both DOE-STD-3009 and the CAR Guide are comparable.
1.4.3 Geology This section provides the geological information necessary	**1.1 Site Description** **…**	Both DOE-STD-3009 and the CAR Guide include the documentation of basic

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
to understand any regional geological phenomena of concern for facility operation. Describe the nature of investigations performed and provide the results of the investigations. Include geologic history, soil structures, and other aspects of the geologic character of the site.	5. Geology a. Characteristics of soil types and bedrock. b. Description of potential geological hazards. **…**	geological information. The information described for geology by both DOE-STD-3009 and the CAR Guide are comparable.
1.5 NATURAL PHENOMENA THREATS This section provides identification of specific natural phenomena events, such as design basis earthquakes considered to be potential accident initiators. Summarize assumptions supporting the analysis in Chapter 3, "Hazard and Accident Analyses."	**1.1. Site Description** **…** 6. Seismicity a. Design basis peak ground accelerations and seismic response spectra used for the accident analysis and the rationale for their selection. 7. Natural Phenomena and Man-Made External Events a. Natural phenomena design requirements (other than earthquakes) and the rationale for their selection. **…** c. Type, frequency, and magnitude of severe weather and design basis event descriptions. d. Design basis hydrological events and the rationale for their selection. **…**	Both DOE-STD-3009 and the CAR Guide include the documentation of basic natural phenomena information. The information described for natural phenomena by both DOE-STD-3009 and the CAR Guide are comparable.
1.6 EXTERNAL MAN-MADE THREATS This section provides identification of specific external man-made phenomena associated with the site—events such as explosions from natural gas lines or accidents from nearby transportation activities—considered to be potential accident initiators, exclusive of sabotage and terrorism. Summarize assumptions supporting the analysis in Chapter 3, "Hazard and Accident Analyses."	**1.1. Site Description** **…** 7. Natural Phenomena and Man-Made External Events **…** b. Man-made external events at the Contractor site. **…** e. Nearby facilities and transportation. **…**	Both DOE-STD-3009 and the CAR Guide include the documentation of basic information on man-made threats against the facility. The information described for man-made threats by both DOE-STD-3009 and the CAR Guide are comparable.
1.7 NEARBY FACILITIES This section identifies any nearby facilities that could be affected by accidents within the facility being evaluated. Conversely, this section also identifies any hazardous operations or facilities onsite or offsite that could adversely impact the facility under evaluation. Summarize assumptions supporting the analysis in Chapter 3, "Hazard and Accident Analyses."	**1.1 Site Description** **…** 7. Natural Phenomena and Man-Made External Events **…** e. Nearby facilities and transportation. **…**	Both DOE-STD-3009 and the CAR Guide include the documentation of basic information on nearby facilities. The information described for nearby facilities by both DOE-STD-3009 and the CAR Guide are comparable.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
1.8 VALIDITY OF EXISTING ENVIRONMENTAL ANALYSES This section assesses the validity of site characteristic assumptions for existing environmental analyses and impact statements based on the more recent SAR effort. Simply state that no significant discrepancies exist or indicate the need to revise and update assumptions used in facility environmental statements through brief discussions summarizing major discrepancies.	**1.1. Site Description** **1.1.2 Areas Of Review …** The information must complement and agree with the site information presented in the Environmental Impact Statement for the Tank Waste Remediation System, the Emergency Plan, and the PSA prepared by the Contractor. **…**	Both DOE-STD-3009 and the CAR Guide include the documentation of a comparison with existing environmental analyses. However, the DOE-STD-3009 describes an assessment of the validity of site characteristic assumptions and environmental analyses, while the CAR Guide states that the information must complement and agree with existing information. This apparent inconsistency is a result of the CAR Guidance being written for a new facility, while DOE-STD-3009 was written to be applicable to an existing facility.
CHAPTER 2, FACILITY DESCRIPTION The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(d), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)4a, of the Order (Topic 4). Topic 4 parts b and c of the Attachment to the Order are covered in Chapter 4. This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. [NOTE: The cited text from DOE 5480.23 identifies the facility description and operation as topics to be addressed in the SAR. In Attachment 1, the Contractor is directed to include; the listing of safety-significant structures, systems, components, equipment, and processes; containment; detailed descriptions of safety-significant mechanical, electrical, and fluid systems including functions, design bases, and relevant design features; detailed descriptions of chemical process systems; functional description of process and operational support systems. Three other topics from DOE 5480.23 are also identified.	**1.2 Facility Description** **1.2.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the facility features that could affect potential accidents and their consequences. Examples of these features are facility location, facility design information, and the location and arrangement of buildings on the facility site.	The element of facility description is common to both DOE-STD-3009 and the CAR Guide. The level of detail for facility processes is similar. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]		
2.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed	**1.2 Facility Description** **…** Examples of these features are facility location, facility design information, and the location and arrangement of buildings on the facility site.	DOE-STD-3009 and the CAR Guide include similar introductory material to serve as the basis for the safety analysis that follows.
2.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders, which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**1.2.3.2 Regulatory and Contractual Requirements** The requirements for the facility description are found in the Regulatory Process document, which states that the Contractor shall design the facility 1) to comply with the design-related portion of the updated Safety Requirements Document (SRD) and 2) to properly account for the natural and man-made external events associated with the site. Related regulatory and contractual requirements are found in the Contractor's SRD and the Contractor's Integrated Safety Management Plan (ISMP).	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated ISM process and results are documented in the Contractor's SRD. Thus, safety basis information pertinent to the safety analysis expected under the CAR Guide is similar to that expected under DOE-STD-3009. (See Endnote 2)
2.3 FACILITY OVERVIEW This section includes a brief overview of the current and historical use of the facility, projected future uses, facility configuration, and the basic processes performed therein.	**1.2.3.3 Regulatory Acceptance Criteria** The Contractor's facility description submittal is acceptable if it is presented at a level of detail appropriate to support the Preliminary Safety Analysis (PSA) (see Section 4.0 of this Guide). The submittal should identify and describe the facility, emphasizing features that are Important to Safety and should describe the facility safety functions and their bases. If such information is available elsewhere in the submittal, the appropriate sections of the submittal can be referenced. **…**	The CAR Guide is written from the perspective of a new facility with information expected to support the PSA, whereas DOE-STD-3009 addresses an existing facility with identified historical and future uses. A description of the historical use of the facility is therefore not appropriate to the RPP-WTP. With this exception, the information under the CAR Guide is similar to that expected under DOE-STD-3009.
2.4 FACILITY STRUCTURE This section provides an overview of the basic facility buildings and structures, including construction details such as basic floor plans, equipment layout, construction materials, controlling dimensions, and dimensions	**1.2.3.3 Regulatory Acceptance Criteria** **…** The Contractor should identify and describe the following Important to Safety features: 1. The facility location and the distance from the site	DOE-STD-3009 identifies structural information pertaining to hazard and accident analysis. The CAR Guide addresses the relationship of important-to-safety facility features (including structures) to facility

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
significant to the hazard and accident analysis activity. Supply information to support an overall understanding of the facility structure and the general arrangement of the facility as it pertains to hazard and accident analyses.	boundary in all directions, including the distance to the nearest resident. 2. The layout and location of buildings on the facility site, using scaled drawings to show the plant layout, including plant structural features such as buildings, towers, tanks, and transportation right-of-ways. The relationship of specific facility features to the major processes that will be ongoing at the facility should be described. **…**	processes for use in the hazard and accident analyses conducted for the PSAR.
2.5 PROCESS DESCRIPTION This section describes the individual processes within the facility. Include details on basic process parameters, including summary of types and quantities of hazardous materials, process equipment, instrumentation and control systems and equipment, basic flow diagrams, and operational considerations associated with individual processes or the entire facility, including major interfaces and relationships between SSCs. The intent is to supply information to provide an understanding of the assessment of normal operations, the safety analysis and its conclusions, and insight into the types of operations for which a safety management program must be devised.	**1.3.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes factors that provide a basis for understanding the process and that are needed to support the hazard and accident analyses. These factors include processing operations, process equipment, process design, and process location. **1.3.3.1 Acceptability Review** **…** The Contractor should clearly describe processing tank waste supplied by the U.S. Department of Energy. As a minimum, this description should address the following process operations: separating waste into low-activity and high-level waste streams; blending, melting, and pouring the high-level and low-activity waste glass; handling and storing vitrified waste; storing and handling reagent chemicals; processing and disposing of secondary and intermediate waste steams; and conducting other pertinent processing operations. The reviewer will also determine whether the level of detail is sufficient to be able to identify hazards; analyze accidents; verify codes and implement standards; and select structures, systems, and components (SSCs) Important to Safety. If	DOE-STD-3009 states that the document provide information needed to understand the assessment "of normal operations, the safety analysis and its conclusions and insight into the types of operations for which a safety management program must be devised." The CAR Guide expects that the Contractor describe the processes to be used on the tank wastes with enough detail to identify the hazards, analyze accidents, verify implementing codes and standards, and identify Important to Safety SSCs. The CAR Guide provides more detail, but expects information similar to that required by DOE-STD-3009.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	significant deficiencies are identified in the submittal, the Contractor will be requested to submit additional information before the start of the detailed review. **4.1 Process Safety Information** **4.1.3.2 Regulatory and Contractual Requirements** The requirements for process safety information are found in the Regulatory Process document, which states that the Contractor shall provide process safety information as part of the assurance that "the radiological, nuclear, and process hazards associated with facility operation…have been adequately documented in a controlled Preliminary Safety Analysis Report (PSAR) to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope." For all processes regulated by the Occupational Safety and Health Administration (OSHA) or U.S. Environmental Protection Agency (EPA), the Contractor shall comply with process safety information requirements specified by 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals," and 40 CFR 68, "Chemical Accident Prevention Provisions," as applicable. Related regulatory and contractual requirements are found in the SRD. The following safety criterion applies directly to process safety information: Safety Criterion 3.1-2 states, in part, "A compilation of written process safety information shall be completed before conducting the process hazard analysis. The compilation of written process safety information enables the employer and the	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	employees involved in operating the process to identify and understand the hazards posed by those processes involving radioactive chemicals and process chemicals considered to pose a hazard. This process safety information shall include information pertaining to hazards of the materials used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process." In the Contractor's Integrated Safety Management Plan (ISMP), the implementing code and standard that applies to Safety Criterion 3.1-2 is Section 5.1, "Process Safety Information." **4.1.3.3 Regulatory Acceptance Criteria** The Contractor's process safety information is acceptable if the following criteria are met: 1. The Contractor provides hazardous material information, including toxicity information, permissible exposure limits, physical data, reactivity data, corrosivity data, thermal and chemical stability data, and hazardous effects of inadvertent mixing of different materials that could conceivably occur. The Contractor may reference the appropriate Material Safety Data Sheet for the hazardous materials. 2. The Contractor provides process technology information, including block flow or simplified process flow diagrams, process chemistry, maximum intended inventory, and safe upper and lower limits for parameters controlled for safety reasons (such as temperatures, pressures, flows, and compositions) and evaluates the consequences of deviations. 3. The Contractor provides process equipment information, including materials of construction,	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	piping and instrument diagrams, electrical information, relief system design and design basis, ventilation system design, design codes and standards used, material and energy balances, and safety systems (e.g., interlocks, detection systems, and suppression systems). **…** The process safety information should be sufficiently detailed to permit an understanding of the accident and hazard analysis for the proposed design.	
2.6 CONFINEMENT SYSTEMS This section identifies and describes the set of structures, systems, and components that perform confinement functions such as process vessels, glove boxes, ventilation systems, and facility walls.	**1.2.3.3 Regulatory Acceptance Criteria** **…** 3. Design information on the facility's ability to resist failures of Important to Safety structures, systems, and components (SSCs) when those failures are caused by credible external and internal events and may produce consequences of concern. Also, information pertaining to the applicable design loads and various loading combinations should be described. The loads normally applicable to structures include the following: a. Loads encountered during pre-operational testing. b. Loads encountered during normal plant startup, operation, and shutdown, including dead loads, live loads, thermal loads, hydrostatic loads, and hydrodynamic loads. c. Loads to be sustained during severe environmental conditions, including wind and design basis earthquake. (See also Section 4.6, "External Design Basis Events," in this Guide for further review criteria for this subject.) d. Loads to be sustained during extreme environmental conditions, including wind-generated missile impact and safe shutdown earthquake. (See also Section 4.6, "External Design Basis Events," in this Guide for further review criteria for this	The information expected by both documents is comparable. However, the CAR Guide contains more detail than DOE-STD-3009 and introduces the concept of Important to Safety (ITS) SSCs. This is different than safety SSCs as defined and used in the DOE Order referenced in DOE-STD-3009. However, the ITS definition applied under the RPP-WTP encompasses safety SSCs used in DOE-STD-3009. (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	subject.) Loads during abnormal plant conditions, including jet impingement and missile impact. The various combinations of the above loads that are normally postulated and reviewed include the following: a. Testing loads. b. Normal operating loads. c. Normal operating loads with severe environmental loads. d. Normal operating loads with extreme environmental loads. e. Normal operating loads with abnormal loads. f. Normal operating loads with severe environmental loads and abnormal loads. g. Normal operating loads with extreme environmental loads and abnormal loads. These loads and load combinations are generally applicable to all structures. However, other loads such as potential aircraft crashes or explosive hazards may also be applicable and should be reviewed to determine whether the loads are properly justified and evaluated. 4. Information on the following: a. The imposed design limits that serve to quantify the structural behavior of the concrete and steel structures, specifically the required strength for each load combination. b. The design strength with its strength reduction factor for flexure, tension, compression, shear, and torsion bearing on different structures. c. The minimum size and thickness requirements. d. The control of deflections. e. The development and splices of reinforcement. f. The steel embedment and its surrounding concrete.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	g. Impactive and impulsive loads with the dynamic strength increase factor and required ductility. 5. Information on the design and analysis processes used for the Important to Safety structures, including the following: a. Description of the computer software used in the design and analysis. b. Descriptions of the validation and verification of computer design analysis software. c. Assumptions on structural boundary conditions, building foundation rock, and soil properties. d. Treatment of structural stress reversal from seismic loads. e. Treatment of localized and transient structural loads. f. Treatment of the steel embedment and its surrounding concrete. g. Evaluation of the effects of variations in specified physical properties of construction materials on analytical results. h. Evaluation of the effects of various construction inspection levels on the design strength of the structural material. **…**	
2.7 SAFETY SUPPORT SYSTEMS This section identifies and describes the principal systems that perform safety support functions (i.e., safety functions not part of specific processes). State the purpose of each system and provide an overview of each system, including principal components, operations, and control function. Examples of systems under this heading might include fire protection, criticality monitoring, radiological monitoring (e.g., air monitoring, contamination prevention), chemical monitoring (e.g., hydrogen concentration monitoring), effluent monitoring, etc. NOTE: This section is designed to organize the presentation of information, not to designate any special class of equipment.	**1.2.3.3 Regulatory Acceptance Criteria** **…** 8. Information on ventilation and air cleaning systems and components, such as the following: a. Performance requirements, for example, pressures, temperatures, and flowrates. b. Contaminant concentrations. c. Required decontamination factors. d. Differential pressures between confinement areas. e. Particle and aerosol distributions under normal and accident conditions. f. Safety functions. Additional information necessary to demonstrate	The information requested is comparable accounting for a new (CAR Guide) versus existing (DOE-STD-3009) facility and accounting for PSAR (CAR Guide) versus FSAR (DOE-STD-3009) expectations. For example, the areas discussed in the CAR Guide specific to ventilation and air cleaning systems meet the criteria in DOE-STD-3009 to identify and describe "safety functions not part of a specific process." (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	that adequate safety is provided for the following: a. Service, inspection, and testing requirements for the equipment. b. Required alarms, instrumentation, and hand switches. c. Monitored variables. d. Cooling or heating requirements. e. Fire protection (including detection, suppression, and a fire hazard analysis that includes a discussion of the effects of building fire on the effectiveness of the HEPA filtration system). Flow diagrams for the air cleaning systems should be provided to show the interrelationships between various areas of the building and the air cleaning equipment that provides protection. **…**	
2.8 UTILITY DISTRIBUTION SYSTEMS This section provides a schematic outline of the basic utility distribution systems, including a description of the offsite power supplies and onsite components of the system. Details of systems are given, to the level necessary, for understanding the utility distribution philosophy and facility operation.	**1.2.3.3 Regulatory Acceptance Criteria** **…** 6. Information on electrical systems and components that are Important to Safety. Those systems and components should be listed and the design information provided, such as the following: a. The design basis events. b. Functions and protective actions. c. Permissives. d. Monitored variables. e. Environmental conditions (e.g., temperature, pressure, humidity, and radiation). f. Power supplies. g. Methods for determining safety system reliability. Information also should be provided on the system criteria, including the following: a. Single-failure criterion application. b. System quality requirements. c. Equipment qualification. d. Seismic qualification.	The information requested is comparable. The CAR Guide, however, puts the description in terms of important-to-safety SSCs, where DOE-STD-3009 addresses these SSCs "for understanding the utility distribution philosophy and facility operation." These are comparable based on DOE-STD-3009 Attachment 4.f(3)(d)4a cited at the beginning of Chapter 2 "**...** Information on the design of principal (sic) structures, components and systems should be furnished in sufficient detail to support the identification of hazards, principle safety criteria, selection of engineered safety features, and the analysis of accidents." (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	e. Testing and calibration that significantly affect design, construction, and pre-operational testing. f. Information displays. g. Access control. h. Repairability. i. Reliability. j. Human factors. k. Credible common-cause failures. 7. Information on electrical systems and components, such as the following: a. Diagrams of electrical power feeds to the plant. b. Power supplies for uninterrupted power supply systems. c. Identification of areas classified as hazardous locations (according to Article 500 of NFPA Standard 70, "National Electrical Code"). d. Power supplies to buildings. e. Control logic for nonprocess systems. **…**	
2.9 AUXILIARY SYSTEMS AND SUPPORT FACILITIES This section provides information on the remaining portions of the facility that have not been covered by the preceding sections and which are necessary to create a conceptual model of the facility as it pertains to the hazard and accident analyses.	**1.2.3.3 Regulatory Acceptance Criteria** **…** 9. Information on protecting the control room atmosphere, including identifying the following: a. The control room emergency zone, if any. b. Ventilation system criteria. c. Pressurization systems for the control room. d. Emergency standby atmosphere filtration system. e. Location of control room air inlets versus the location of release points for toxic gases and radioactive materials. 10. Information on the effluent stack, including the following: a. Design of the effluent stack. b. Ability of the stack to withstand natural phenomena hazard (NPH) events and off-normal conditions that may arise during plant operations. **…**	The information requested is comparable. The CAR Guide is more specific than DOE-STD-3009 about what areas would be classified as "remaining portions of the facility."
3. HAZARD AND ACCIDENT ANALYSES PURPOSE	**4.3 Hazard Analysis Methods** **4.3.1 Purpose of Review**	The production of hazard and accident analyses is common to both DOE-STD-3009

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(e) and 8.b.(3)(k), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)5 and 4.f.(3)(d)11, of the Order (Topics 5 and 11). Topic 11, part k of the Attachment to the Order is covered in Chapter 12, and Topic 11, part n of the Attachment to the Order is covered in Chapter 4. This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. [NOTE: The cited text from DOE 5480.23 identifies hazard analysis and classification of the facility and analysis of normal, abnormal, and accident conditions including DBA as topics to be addressed in the SAR. In Attachment 1,Topic 5, hazard analysis is the development of an inventory of hazardous materials and on the basis of that inventory assigning a hazard classification. Topic 11 provides detail on what to include in the accident analyses and states the purpose of the accident analysis is to demonstrate that: "The adequate protection of health and safety for members of the public both on and off the DOE reservation at which the facility is located; The health and safety of workers on the DOE reservation not involved in or responsible for the facility or its safety; The adequate protection of the environment from accidental contamination by the facility; and The adequate protection of facility workers, particularly as necessary to support their reliable function of safety related activities as well as individual protection."	The purpose of this review is to determine whether the Contractor's submittal adequately describes its hazard analysis methods and complies with the SRD and ISMP. This review will also provide confidence that the Contractor's hazard analysis methods will result in facility design, construction, operation, maintenance, and deactivation in a manner that protects the health and safety of the facility and co-located workers, the public, and the environment. **4.4 Hazard Analysis Results** **4.4.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately identifies hazards and potential accident/event sequences, estimates accident consequences and frequencies, and considers credible common-cause and common-mode failures. **4.5.1 Selecting Internal Design Basis Events** **4.5.1.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the methodology for selecting internal DBEs (i.e., those caused by initiating events within the facility) and describes internal DBEs according to the applicable requirements of the Contract and the SRD. The internal DBEs provide the bounding conditions/ requirements for selecting SSCs to prevent or mitigate the event consequences so that the radiological exposures to facility and co-located workers and the public do not exceed the established limits. Selecting internal DBEs provides a means to reduce the information developed in the hazard analysis to a manageable set of events to be used for the rest of	and the CAR Guide. The CAR Guide does not currently include the concept of an overall facility hazard classification (based on the inventory of hazardous materials) as identified in Attachment 1, paragraph 4.f.(3)(d)5 of DOE 5480.23. However, the Hazard Classification of the facility can be deduced from the hazard analysis information that is expected in the PSAR. A modification to the FSAR submittal requirements can be implemented. The hazard analysis philosophy of the CAR Guide is based on the identification and development of Design Basis Events which will have significance in the accident analysis based on the amount of hazardous material that potentially could be released into the environment. In DOE-STD-3009, hazard classification is addressed on the basis of the total inventory present and then classified according to the potential for offsite exposure in an unmitigated accident analysis. The level of detail in the Attachment 1, 4.f.(3)(d)11 in DOE 5480.23 states the purpose of an accident analysis in terms that are comparable to the CAR Guide. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	the accident analysis. In selecting this set, all important information from the hazard analysis must be considered. In particular, the set of internal DBEs should represent bounding events for all of the accident release mechanisms identified in the hazard analysis. **4.6 External Design Basis Events** **4.6.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has adequately described the selection and analysis of external DBEs to explain the potential hazards and accidents caused by external DBEs and how they will be acceptably mitigated. **…** The Design-Basis Events also establish the performance requirements of the structures, systems, and components whose failure under Design-Basis Event conditions could adversely affect any of the above functions."	
3.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**4.3 Hazard Analysis Methods** **4.3.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the hazard analysis methods used in the PSA. Appendix A, Section 4.0, "Hazard Evaluation," of the SRD identifies nine elements of hazard evaluation. Review of the methods used for the first five elements is addressed in this section, while the last four elements are addressed in subsequent sections in this Guide. **4.4 Hazard Analysis Results** **4.4.2 Areas of Review** The reviewer will determine whether the Contractor's submittal accurately describes hazard analysis results for five areas. Appendix A of the SRD states that the hazard evaluation shall include	Both DOE-STD-3009 and the CAR Guide include an introductory discussion of hazard analysis to help describe the analyses that follow. The CAR Guide describes a five-step process of hazards analysis in enough detail to allow reviewers to determine if the Contractor's submittal is adequate.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	results for each of the following five areas (these areas were described in Section 4.3 of this Guide): 1. **Identifying Hazards** – Hazards associated with the facility process, design, and operations are systematically identified. 2. **Identifying Potential Accident/Event Sequences** – Potential accidents are examined in a structured, systematic approach. 3. **Estimating Accident Consequences** – The consequence for postulated accidents is examined. 4. **Estimating Accident Frequencies** – Internal and external accident frequencies are estimated. 5. **Considering Common-Cause and Common-Mode Failures** – Credible common-cause events such as natural phenomena events, external man-made events, loss of electrical power, fire, internal missiles, and internal flooding are considered. In addition, uncertainties in the analyses must be clearly described and analyzed. Related information for hazard analysis methods is discussed in Section 4.3 in this Guide.	
3.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders, which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**4.3 Hazard Analysis Methods** **4.3.3.2 Regulatory and Contractual Requirements** The requirements for hazard analysis methods are found in the Regulatory Process document and apply to all parts of the methods evaluation: • Approval Condition: "Construction Authorization will be issued upon determination by the Regulatory Official that: **…**The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been *adequately assessed* [emphasis added]**…**to establish a basis for safe operation and an	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated ISM process and the results are documented in the Contractor's SRD. Thus, safety basis information pertinent to the safety analysis expected under RL/REG-99-05 is similar to that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	unambiguous definition of the safe-operating envelope." • Submittal Requirement: "The PSAR shall contain**…**an analysis of radiological, nuclear, and process hazards for the design." (This is in reference to the Contractor's HAR.) Regulatory and contractual requirements related to the hazard evaluation elements are also found in the SRD, ISMP, and the Regulatory Process document. Requirements that apply to specific elements include the following: 1. **Identifying Hazards –** Safety Criterion 3.1-1; Safety Criterion 9.1-7; and Section 3, "Identification of Work," and Section 4.1, "Identification of Hazards," of Appendix A in the SRD apply to identifying hazards. 2. **Identifying Potential Accident/Event Sequences –** Safety Criterion 3.2-1; Section 4.2, "Identification of Potential Accident/Event Sequences," of Appendix A in the SRD; and ISMP, Section 1.3.6, "Accident Analysis," apply to identifying potential accident sequences. 3. **Estimating Accident Consequences –** Safety Criterion 3.1-3; Safety Criterion 3.1-4; and Section 4.3, "Estimation of Consequences," of Appendix A in the SRD apply to estimating accident consequences. 4. **Estimating Accident Frequencies –** Section 4.4, "Estimation of Accident Frequencies," of Appendix A in the SRD applies to estimating accident frequencies. 5. **Considering Common-Cause and Common-Mode Failures –** Section 4.5, "Consideration of Common Cause/Common Mode Failures," of Appendix A in the SRD applies to credible common-cause/common-mode failures. **…**	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
3.3 HAZARD ANALYSIS This section describes the hazard identification and evaluation performed for the facility. The purpose of this information is to present a comprehensive evaluation of potential process related, natural phenomena, and external hazards that can affect the public, workers, and the environment due to single or multiple failures. Consideration will be given to all modes of operation, including startup, shutdown, and abnormal testing or maintenance configurations. As is standard industrial practice, examination of all modes of operation considers the potential for both equipment failure and human error. Hazard identification and evaluation provide a thorough, predominantly qualitative evaluation of the spectrum of risks to the public, workers, and the environment due to accidents involving any of the hazards identified. The evaluation identifies preventive and mitigative features , including identification of expected operator response to incidents (e.g., accident mitigation actions or evacuation) and provisions for operator protection in the accident environment. Hazard identification provides the basis for the final hazard categorization of the facility. That categorization is input for the graded approach for hazard evaluation. Hazard Category 3 facilities are not required to perform formal, quantitative accident analysis. Application of a graded approach is based on the judgment and experience of the analysts and results in the selection of a hazard evaluation technique such as Preliminary Hazard Analysis (PHA), HAZOP, etc. As previously noted, more elaborate techniques will generally be associated with more complex processes. Experience and capabilities of analysts are also a major consideration in efficient performance of a comprehensive hazard	**4.3.3.3 Regulatory Acceptance Criteria** The submittal is acceptable if the hazard analysis methods are performed for the following functions: feed receipt, pretreatment, low-activity waste immobilization, high-level waste immobilization, product and secondary waste handling, and the balance of facility. These functions are assessed for the following elements: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. **Identifying Hazards –** This section is acceptable if the Contractor identifies hazards that include those conceived based on analysis of the specific facility and process, incidents at similar facilities, and hazards identified in analyzing other facilities. These should include the hazards identified in the HAR, Initial Safety Analysis Report (ISAR), Design Safety Features Deliverable, and any other significant hazard identified through the design process; however, the reviewer is cautioned that previously identified hazards may no longer be applicable due to changes in the process, equipment, or design. **…** The hazard information provided should do the following: • Ensure that all hazards are identified. • Address all modes of operation including startup, normal operation, shutdown, maintenance, and deactivation. • Adequately consider initiation of, or contribution to, potential accident sequences by human error. **…** 2. **Identifying Potential Accident/Event Sequences** – This section is acceptable if the Contractor summarizes accident sequences. These sequences are commonly expected to be found in	The information requested is comparable. The DOE-STD-3009 discussion of hazard analysis is in general terms, whereas the CAR Guide is specific to the WTP, using the language of the WTP documentation. (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
evaluation. Systematic application of the chosen techniques to the operations in a facility generates a number of basic accidents based on types of events and system performance in response to the events. These accidents can be binned in accordance with predefined consequence and frequency ranking thresholds. Products of the hazard evaluation include: • Identification of planned design and operational safety improvements. • Summary of defense in depth including identification of safety-significant SSCs and other items needing TSR coverage, including relevant programs covered under TSR administrative controls. • Summary of significant worker protection features including identification of safety-significant SSCs and relevant programs covered under TSR administrative controls. • Summary of design and operational features that reduce the potential for large material releases to the environment. • Selection of a limited set of bounding accidents (i.e., DBAs) to be further developed in Section 3.4, "Accident Analysis."	sequences are commonly expected to be found in the HAR. In addition, the identified sequences must provide sufficient detail for estimating the unmitigated consequences and frequency of each accident. These estimates may be quantitative, semi-quantitative (i.e., order of magnitude), or qualitative (e.g., high, medium, low, etc., based on expert judgment). The accident sequences selected should result in consequences of at least severity levels 1, 2, or 3, as defined in Appendixes A and B in the SRD. **…** The Contractor should include the following accident sequence information: • The method for selecting potential accident sequences that link initiating events with prevention and mitigation measures and other contributing phenomena. • The methods used to bin potential accidents into appropriate categories for risk and to select specific cases that will be analyzed in more detail. • The methods for selecting accident sequences that are both comprehensive and credible. • The Contractor's evaluation of secondary events directly caused by external events (e.g., hazards from other facilities, aircraft crashes, pipeline ruptures, and truck crashes). **…** 3. **Estimating Accident Consequences –** This section is acceptable if the Contractor provides an estimate of the accident consequences. This may be a qualitative assessment based on sound engineering judgment or a traceable reference to a quantitative or semi-quantitative evaluation. One purpose of this estimate is to provide the basis for assigning the	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	potential accident sequence to the correct severity level, as defined in Appendixes A and B in the SRD. The Contractor should provide the explicit basis for unmitigated accident consequences. The basis for unmitigated accident consequences shall not take credit for any active or passive SSCs or administrative controls that could reduce the consequences of the accident. The Contractor should describe the methods for developing the source terms, transport models, and atmospheric dispersion and consequence models. For internal doses, the Contractor should ensure that the proper dose conversion factors have been used to calculate the total effective dose equivalent. Because the Contractor generally may use either quantitative or qualitative analysis methods for estimating the risk from potential accidents, but must use at least semi-quantitative methods to estimate the risks for DBEs, the guidance for reviewing DBE calculations has been consolidated into Sections 4.5 and 4.6 in this Guide. Acceptable methods that provide detailed guidance, formulas, and data to model the consequences of radiological releases can be found in Chapters 3, 4, and 5 of NUREG/CR-6410. Other acceptable methods are found in DOE-HDBK-3010-94, which provides data for estimating airborne release and respirable fractions. NUREG/CR-6410 and DOE-HDBK-3010-94 are not requirements documents for the Contractor in the SRD. The Contractor may use other methods of estimating releases. **…** The Contractor should present the method for categorizing consequences for use in binning potential accident sequences. **…** Table 3-3 of DOE-	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	STD-3009 provides a sample table to illustrate a qualitative consequence estimation technique. DOE-STD-3009 is not a requirement document for the Contractor in the SRD. The Contractor may develop an acceptable alternative if it is adequately justified. 4. **Estimating Accident Frequencies** – This section is acceptable if the Contractor provides an adequate technical basis and method to estimate accident frequencies. The Contractor may estimate the frequency of accident initiators using engineering judgment or, if reliability data exist, more formal quantitative techniques such as fault or event trees. Criteria should be provided for assigning accidents to pre-selected initiation frequency ranges. If the Contractor uses qualitative criteria to bin accident frequencies, then criteria should be provided for qualitative as well as quantitative binning. It should be recognized in the criteria that there can be greater uncertainty in the qualitative binning of frequencies. Section 3.3.2.3.5, "Accident Selection," and Table 3-4 in DOE-STD-3009 provide guidance on using qualitative estimation of frequencies. **…** The Contractor should provide an adequate basis for estimating frequencies using either engineering judgment or more formal analytical techniques. While verifiable quantitative estimates are preferred, in many cases they will not be available. Moreover, in many cases the hazard severity may not warrant quantitative analysis. Qualitative estimates of the accident frequencies are acceptable if the estimates are based on sound engineering judgment and the basis is provided. The engineering judgment should be based on conservative estimates that bound the results. The basis for the estimate should also include the reason why the qualitative estimate is	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	conservative. The methods for ensuring conservative qualitative estimates and the criteria used should be documented. 5. **Considering Common-Cause and Common-Mode Failures –** This section is acceptable if the Contractor describes methods to ensure that credible common-cause/common-mode failures from the following events are considered. At a minimum, the following common-cause events should be addressed in identifying hazards: natural phenomena events (including earthquake), external man-made events, loss of electrical power, fire, internal missiles, and human error. **…**	
3.3.1 Methodology This section presents the methodology used to identify and characterize hazards and to perform a systematic evaluation of basic accidents.	**4.3.3.3 Regulatory Acceptance Criteria** The submittal is acceptable if the hazard analysis methods are performed for the following functions: feed receipt, pretreatment, low-activity waste immobilization, high-level waste immobilization, product and secondary waste handling, and the balance of facility. These functions are assessed for the following elements: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **...**	The information expected is comparable. The CAR Guide is much more specific to the RPP-WTP.
3.3.1.1 Hazard Identification This subsection identifies the method used by analysts to identify and inventory hazardous materials and energy sources (in terms of quantity, form, and location) associated with the facility processes or associated operations (e.g., waste handling). This methodology first identifies sources of referenced information that are not an integral part of the SAR hazard identification. Possible sources of such information include fire hazard analyses, health and safety plans, job safety analyses, occurrence reporting histories, etc. The SAR covers worker safety issues related to hazards in processes and associated activities. It is not the intention	**4.3.3.3 Regulatory Acceptance Criteria** The submittal is acceptable if the hazard analysis methods are performed for the following functions: feed receipt, pretreatment, low-activity waste immobilization, high-level waste immobilization, product and secondary waste handling, and the balance of facility. These functions are assessed for the following elements: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. **Identifying Hazards –** This section is acceptable if the Contractor identifies hazards that include those conceived based on analysis of the specific facility and process, incidents at similar facilities,	The information requested in the hazard analysis is comparable. The CAR Guide exceeds expectations of DOE-STD-3009 in many areas. DOE-STD-3009 provides for screening out certain hazards during the process of identifying hazards, while the CAR Guide does not. The emphasis in the CAR Guide is to ensure that "all potential hazards from both natural and man-made sources originating from outside and inside the facility are addressed." The CAR Guide includes goals that will be met on the basis of the hazard information (ensuring that: all hazards are identified, hazards from all

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
of the SAR to cover safety as it relates to the common industrial hazards that make up a large portion of basic OSHA regulatory compliance. It is important not to expend SAR resources on those hazards for which national consensus codes and/or standards (e.g., OSHA regulations) already define and regulate appropriate practices without the need for special analysis. As noted in this Standard's definition of "hazard," standard industrial hazards are identified only to the degree they are initiators and contributors to accidents in main processes and activities. As part of the identification process, the basis that was used in the hazard screening to remove standard industrial hazards or insignificant hazards from further consideration needs to be presented as well. For these cases, the SAR hazard analysis process interfaces with other programs such as specific topics of OSHA compliance or general industrial safety. These interfaces must be identified. Some of these compliance issues, while not presented in the SAR as such, may be a portion of a safety management program committed to by the facility. This subsection also indicates the sources from which information was obtained, such as flowsheet inventories, maximum historical inventories, vessel sizes, contamination analyses, etc. The interpretation of the data used to derive conservative inventory values needs to be provided.	and hazards identified in analyzing other facilities. These should include the hazards identified in the HAR, Initial Safety Analysis Report (ISAR), Design Safety Features Deliverable, and any other significant hazard identified through the design process; however, the reviewer is cautioned that previously identified hazards may no longer be applicable due to changes in the process, equipment, or design. The Contractor shall compile, based on the identified work, a list of hazardous materials and energy sources associated with the facility processes, design, and operations. This compilation provides information used to identify potential accidents resulting in the uncontrolled release of hazardous material or energy to the facility and co-located workers, the public, and the environment. The Contractor should use a systematic approach to ensure that all potential hazards from both natural and man-made sources originating from outside and inside the facility are addressed. The chemical characteristics of chemicals and potential process byproducts should be addressed. The process for identifying hazards should include developing a chemical interaction matrix to determine the compatibility of the process reagents with each other, with the waste streams, and with process byproducts. The hazard identification should also list the hazards of holding chemicals for long periods, considering the effects of temperature, humidity, pressure, and deterioration of vessels, seals, and piping. A hazard map, or equivalent tool, should be used to ensure comprehensive coverage of processes, systems, and operations across multiple locations.	modes of operation are addressed, and human error is addressed).

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	The applicable hazard analysis results should be mapped to each specific facility, cell, or equipment location. Information should be provided concerning chemical inventory, equipment capacities, energy sources, unique characteristics associated with the facility or equipment location (e.g., temperature, organic material, and pressure), and unique configuration (e.g., interfaces, existence of ventilation, and controls). The hazard information provided should do the following: • Ensure that all hazards are identified. • Address all modes of operation including startup, normal operation, shutdown, maintenance, and deactivation. • Adequately consider initiation of, or contribution to, potential accident sequences by human error. **...**	
3.3.1.2 Hazard Evaluation This subsection presents, in summary fashion, the basic approach and guidance used for generating the largely qualitative consequence and likelihood estimates in hazard evaluation. Reference detailed guidance as necessary. Additionally, present any screening logic used for binning accidents. The appropriateness of the overall methods used to evaluate hazards is presented and justified. This justification focuses on the selection of a technique for given processes, not justification from first principles of standard analysis methods, such as HAZOP.	**4.3.3.3 Regulatory Acceptance Criteria** The submittal is acceptable if the hazard analysis methods are performed for the following functions: feed receipt, pretreatment, low-activity waste immobilization, high-level waste immobilization, product and secondary waste handling, and the balance of facility. These functions are assessed for the following elements: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1.**Identifying Hazards ...** The Contractor has identified the hazard and operability analysis (HAZOP) methodology as its choice for identifying hazards The HAZOP should be performed according to commonly accepted industry guidelines. SRD Safety Criterion 3.1-1 requires that the HAZOP methodology used conform to that outlined in the American Institute of	The information expected for the hazard analysis is comparable. The CAR Guide exceeds expectations of DOE-STD-3009 in many areas. The CAR Guide expects a detailed description of how the attributes of identified hazards are the basis for subsequent hazard evaluation and accident analysis.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Chemical Engineers (AIChE), *Guidelines for Hazard Evaluation Procedure*s. **…**	
3.3.2 Hazard Analysis Results		
3.3.2.1 Hazard Identification This subsection presents the results of the hazard identification activity, either by direct inclusion of or by reference to the hazard identification data sheets. As a minimum, provide a summary table identifying hazards by form, type, location, and total quantity. The attributes of hazards identified in this section are the basis for subsequent hazard evaluation and accident analysis. Include in the basic set of hazards identified radionuclides, hazardous chemicals, flammable and explosive materials used or potentially generated in facility processes, and any mechanical, chemical, or electrical source of energy that may influence accident progression involving such materials. To provide a perspective on facility hazards, summarize in this subsection the major accidents or hazardous situations (e.g., fires, explosions, loss of confinement) that have occurred in the facility's operating history. Specific details on each occurrence are not required. A general summary by type with emphasis on the major occurrences will suffice.	**4.4 Hazard Analysis Results** **4.4.3.3 Regulatory Acceptance Criteria** The hazard analysis results submittal, including accident sequences, is acceptable if the criteria described below are met. (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) The Contractor may document the required information in two tables. One table would document the accident sequences and the second table would document the required information for the hazards evaluation. The accident sequence table may include information such as accident number, location, accident description, consequences, significant causes or energy sources, credited prevention, receptors, credited mitigation, accident frequency, and accident consequence. Typically, the information is arranged by accident sequence. The hazards evaluation table would contain similar categories organized by hazards, with less detailed information about particular accident sequences. The Contractor may use a risk matrix similar to that found in the AIChE *Guidelines for Hazard Evaluation Procedur*e, Figure 7.1, to assign hazard severity bin categories. At a minimum, the Contractor should provide the following information as a result of the hazard analysis: 1. **Identifying Hazards –** This section is acceptable if the Contractor provides a complete list of hazards, potential consequences, possible causes, and estimated frequencies in a table. An example of a typical HAZOP table and the documentation is provided in Section 6.7, Table 6.16, and Section 14.3, Table 14.2, of the *AIChE Guideline*s. The	The information requested for the hazard analysis is comparable. The CAR Guide exceeds expectations of DOE-STD-3009. The CAR Guide identifies as part of the potential accident/event sequences the following information to be provided by the Contractor: documentation of the chain of events and actions developing into the accident, rationale for sorting hazardous situations and selecting cases to be analyzed, and identification of secondary events directly caused by external events. DOE-STD-3009 addresses the types of hazards contributing to major accidents or hazardous situations, including previous events in the facility's operating history. (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	information in this section is also a necessary component of process safety information and should be cross-referenced in the submittal and coordinated with the review of "Process Safety Information," Section 4.1 in this Guide. 2. **Identifying Potential Accident/Event Sequences –** This section is acceptable if the Contractor summarizes the accident sequences identified in the HAR. The identified sequences must be detailed enough to provide an adequate basis for estimating each accident's consequences and frequency. The accident sequences selected for detailed consideration as potential design-basis accidents should result in consequences of at least severity levels 1, 2, or 3 as defined in Appendix A of the SRD. The Contractor should also combine into one accident scenario accidents with common consequences to ensure that the risk of potential higher frequency events are properly evaluated. Numerical estimates are not required or expected for all accident sequences. The level of precision required is that necessary to ensure that the RES, chemical risk exposure standards, and safety objectives are met, as well as the associated risk goals. Where reliable data are not available to support this determination, conservative application of defense in depth and engineering judgment to complete the estimate is expected. The Contractor may use tables to provide the necessary information such as accident number, location, accident description, consequences, significant causes or energy sources, credited prevention, receptors, credited mitigation, receptor, accident frequency, and accident consequence. • The Contractor also should provide the following information: 1) the accident sequences that link initiating events with	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	prevention and mitigation measures and other contributing phenomena, noting each response, action, or indication required to initiate action that is relevant to the accident sequence progression; 2) rationale for sorting hazardous situations into accident groups or categories (i.e., liquid spills and chemical reactions) and for selecting specific cases that will be analyzed in more detail; 3) the selection of accident sequences that are both comprehensive and credible; and 4) an evaluation of secondary events directly caused by external events (such as hazards from other facilities, aircraft crashes, pipeline ruptures, and truck crashes).	
3.3.2.2 Hazard Classification This subsection presents the results of the final hazard classification activity specified in DOE-STD-1027-92. Include the facility hazard classification and, where segmentation has been employed, the segment boundaries and individual segment classifications. Justify any segmentation in terms of independence. Where facility segmentation is used, provide the hazard breakdown by segment in the summary table required in Section 3.3.2.1.	None.	The CAR Guide does not currently expect a facility hazard classification. However, Hazard Classification of the facility can be deduced from the hazard analysis information that is expected in the PSAR. A contract modification will be implemented to require Hazard Classification information to be explicitly included in the FSAR.
3.3.2.3 Hazard Evaluation Hazard evaluation characterizes the identified hazards in the context of the actual facility and process. For example, a simple hazard identification would be that 2000 grams of plutonium oxide are in a steel container under a hood waiting for entry into a glove box. One accident, which places this hazard in the actual context of facility parameters, involves spilling the container on the room floor. The hazard evaluation would qualitatively consider the action of moving the container into the glove box to evaluate the likelihood of spilling the contents. It would also consider mitigative features that would affect	**4.4 Hazard Analysis Results** **4.4.3 Acceptance Criteria** **4.4.3.3 Regulatory Acceptance Criteria** The hazard analysis results submittal, including accident sequences, is acceptable if the criteria described below are met. (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) The Contractor may document the required information in two tables. One table would document the accident sequences and the second table would document the required information for the hazards evaluation. The accident sequence table may include information such as accident number, location,	The information requested for the hazard evaluation is comparable. The CAR Guide exceeds expectations of DOE-STD-3009 in several areas related to conducting the hazard analysis. The CAR Guide requires "an adequate basis for estimating each accident's consequences and frequency" and the use of severity levels as defined in the SRD. The CAR Guide requires a level of precision that is necessary to ensure that the dose standards (RES), chemical risk exposure standards, safety objectives and risk goals are met. The CAR Guide provides a more comprehensive basis for the hazards evaluation than required

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
potential consequences. Public and worker safety issues are the traditional focus of hazard evaluations. The SAR hazard evaluation also examines the potential for large scale environmental contamination. The information on environmental contamination may be used in a separate cost-benefit analysis, not related to the SAR effort, to determine if additional preventive or mitigative features are needed in the facility. Tables 3-1 and 3-2 provide two examples of hazard analysis output. Hazard evaluation presents potential accidents in terms of hazards, energy sources, causes, preventive and mitigative features, consequence estimates, and frequency estimates. Where a large number of scenarios are involved, present simple summaries in the text of this chapter with detailed tables generated in the performance of the hazard evaluation included as an appendix to the SAR.	accident description, consequences, significant causes or energy sources, credited prevention, receptors, credited mitigation, accident frequency, and accident consequence. Typically, the information is arranged by accident sequence. The hazards evaluation table would contain similar categories organized by hazards, with less detailed information about particular accident sequences. The Contractor may use a risk matrix similar to that found in the AIChE *Guidelines for Hazard Evaluation Procedur*e, Figure 7.1, to assign hazard severity bin categories. At a minimum, the Contractor should provide the following information as a result of the hazard analysis: 1. **Identifying Hazards –** This section is acceptable if the Contractor provides a complete list of hazards, potential consequences, possible causes, and estimated frequencies in a table. An example of a typical HAZOP table and the documentation is provided in Section 6.7, Table 6.16, and Section 14.3, Table 14.2, of the *AIChE Guideline*s. The information in this section is also a necessary component of process safety information and should be cross-referenced in the submittal and coordinated with the review of "Process Safety Information," Section 4.1 in this Guide. 2. **Identifying Potential Accident/Event Sequences –** This section is acceptable if the Contractor summarizes the accident sequences identified in the HAR. The identified sequences must be detailed enough to provide an adequate basis for estimating each accident's consequences and frequency. The accident sequences selected for detailed consideration as potential design-basis accidents should result in consequences of at least severity levels 1, 2, or 3 as defined in Appendix A of the SRD. The Contractor should also combine	by DOE-STD-3009.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	into one accident scenario accidents with common consequences to ensure that the risk of potential higher frequency events are properly evaluated. Numerical estimates are not required or expected for all accident sequences. The level of precision required is that necessary to ensure that the RES, chemical risk exposure standards, and safety objectives are met, as well as the associated risk goals. Where reliable data are not available to support this determination, conservative application of defense in depth and engineering judgment to complete the estimate is expected. The Contractor may use tables to provide the necessary information such as accident number, location, accident description, consequences, significant causes or energy sources, credited prevention, receptors, credited mitigation, receptor, accident frequency, and accident consequence. **…**	
3.3.2.3.1 Planned Design and Operational Safety Improvements If the SAR preparer wants to make commitments to planned improvements not yet implemented (as a result of the hazard evaluation), this section will identify those major design and operational improvements. Summarize the basis for committing to the improvement and, if needed, any interim controls proposed until the improvement is implemented. Provide a general outline of the improvement intended to the degree it has been conceptually finalized. Due to capital costs, need for further study (e.g., technical issues, cost benefit), procurement lead times, or other complications, it may not be feasible to implement such design or operational improvements prior to SAR submittal. DOE does not desire to unduly delay SAR completion for such items, and numerous safety precedents acknowledge accepting work in progress.	**4.7 Hazard Controls** **4.7.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the hazard control strategies and related design provisions to ensure facility safety according to the applicable requirements of the Contract (including the SRD). **4.7.2 Areas of Review** The reviewer will verify whether the Contractor has adequately determined the following: • Unmitigated DBE consequence and likelihood requirements. • Operating environment requirements for hazard control provisions. • SSC design requirements. • Human-action requirements.	The information presented by both documents is comparable. The purpose of the hazard evaluation is to define hazard control strategies and design provisions to ensure facility safety and to meet the applicable requirements of the Contact, including the SRD. The CAR Guide describes a 10-point evaluation criterion to evaluate the Contractor defined hazard controls for a new facility. This approach exceeds the DOE-STD-3009 guidance of providing commitments to future planned improvements for existing facilities as identified by the hazard evaluation. (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
Accordingly, the facility operator may choose to commit to implementation of an improvement that is not reflected in current design or facility operations.	• As-designed requirements for SSCs Important to Safety. • As-designed requirements for human actions Important to Safety. • Specific analysis assumptions. • SSC reliabilities and uncertainties. • Mitigated consequence analysis results and uncertainties. • Effectiveness of hazard control provisions. **...** The reviewer should refer to Section 5.0, "Development of Control Strategies," in Appendix A of the SRD and to Appendix B, "Implementing Standard for Defense in Depth," of the SRD to follow the logic used by the Contractor in selecting the hazard control strategies.	
3.3.2.3.2 Defense in Depth This section summarizes significant aspects of defense in depth, and identifies associated safety-significant SSCs and other items needing TSR coverage. Include both the facility design and administrative features of defense in depth. Facility design germane to defense in depth typically includes SSCs that function as: • Barriers to contain uncontrolled hazardous material or energy release (e.g., metal dissolver vessel). • Preventive systems to protect those barriers (e.g., hydrogen detection, air purge, and shutdown systems for metal dissolver). • Systems to mitigate uncontrolled hazardous material or energy release upon barrier failure (e.g., ventilation zone confinement). Administrative features are typically linked to the overall safety management programs that directly control	**4.7 Hazard Controls** **4.7.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the hazard control strategies and related design provisions to ensure facility safety according to the applicable requirements of the Contract (including the SRD). **…** **4.7.2 Areas of Review** **…** The reviewer will ensure that when the term "Important to Safety" is used in the Contractor's submittal, it adheres to the following Contract definition: "Important to Safety. Structures, systems, and components that serve to provide reasonable assurance that the facility can be operated without undo risk to the health and safety of the workers and the public. It encompasses the broad class of facility	The concept described in these two sections is consistent, although the terminology and regulatory basis used in the two documents is different. This conclusion is based on comparing the bullets under defense in depth and administrative features in DOE-STD-3009 and the CAR Guide expansion of the term Important to Safety. "This definition includes not only those structures, systems, and components that perform safety functions and traditionally have been classified as safety class, safety-related or safety-grade, but also those that place frequent demands on or adversely affect the performance of safety functions if they fail or malfunction, **…**" In contrast to the explicit assignment of defense-in-depth control strategies to safety

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
operations. Administrative features include the following aspects of operator interfaces: • Procedural restrictions or limits imposed. • Manual monitoring of critical parameters. • Equipment support functions. • Responses or actions counted on to limit abnormal conditions, accident progression, or potential personnel exposure. The individual features that comprise defense in depth are identified in "Hazard Evaluation," Section 3.3.2.3. The raw information in the hazard evaluation tables will be examined and distilled into an organized discussion of the elements of defense in depth. Relevant accidents may be used to frame and focus the discussion, but the hazard evaluation already provided in or appended to the SAR in tabular form should not be duplicated. Organize the presentation in a systematic manner (i.e., inner to outer) to clearly identify the layers of defense. Note that there is no requirement to demonstrate any generic, minimum number of layers of defense. The intent is to support the conclusion that defense in depth for a given hazard is commensurate with industrial practices for the relevant type of activity. Identify the broad purpose and importance of defense-in-depth features, not the details of their design or implementation. ***Safety-Significant SSCs*** Distinguish safety-significant SSCs from among those structures, systems, and components contributing to defense in depth. To effectively use the graded-approach concept, focus on the most important items of defense in depth whose failure could result in the most adverse uncontrolled releases of hazardous material. This Standard maintains that all SSCs with a safety function do not	features addressed (not necessarily explicitly) in the top-level radiological, nuclear, and process safety standards and principles that contribute to the safe operation and protection of workers and the public during all phases and aspects of facility operations (i.e., normal operation as well as accident mitigation). This definition includes not only those structures, systems, and components that perform safety functions and traditionally have been classified as safety class, safety-related or safety-grade, but also those that place frequent demands on or adversely affect the performance of safety functions if they fail or malfunction, i.e., support systems, subsystems, or components. Thus, these latter structures, systems, and components would be subject to applicable top-level radiological, nuclear, and process safety standards and principles to a degree commensurate with their contribution to risk. In applying this definition, it is recognized that during the early stages of the design effort all significant systems interactions may not be identified and only the traditional interpretation of Important to Safety, i.e., safety-related may be practical. However, as the design matures and results from risk assessments identify vulnerabilities resulting from non-safety-related equipment, additional structures, systems, and components should be considered for inclusion within this definition." The reviewer should refer to Section 5.0, "Development of Control Strategies," in Appendix A of the SRD and to Appendix B, "Implementing Standard for Defense in Depth," of the SRD to follow the logic used by the Contractor in selecting	significant SSCs described in DOE-STD-3009, provisions for defense-in-depth are required for all ITS SSCs. In particular, Section 4.0 of DOE/RL-96-0006 provides a description of defense-in-depth principles that must be applied to the RPP-WTP facility design. These include defense-in-depth, prevention, control, mitigation, use of automatic systems, and human-aspects considerations. Section 4.1.1 elaborates on each of these defense-in-depth principles. The Contractor has committed to these principles in the RPP-WTP SRD via safety criteria 1.0-2, 1.0-7, 4.1-1, 4.2-1, 4.3-1, 4.3-4, and 4.3-6. Implementation of these defense-in-depth principles for the RPP-WTP is further detailed in the SRD, Appendix B, "Implementing Standard for Defense-in-Depth." Also, DOE O 420.1 (Section 4.1.1.2) is one of the implementing standards invoked by the SRD, Appendix B. (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
maintains that all SSCs with a safety function do not require categorization as equipment requiring detailed description in the SAR (i.e., safety-class SSCs and safety-significant SSCs). As noted in the Introduction, this is one of the principle reasons for the emphasis on programmatic commitments. The major features of defense in depth typically comprise the outer or predominant means of mitigating uncontrolled release of hazardous materials (e.g., ventilation system directing airflow to HEPA filters, overall building structure), any preventive features that are designed to preclude highly energetic events that potentially threaten multiple layers of defense in depth or essentially defeat any one layer (e.g., a hydrogen detector and purge flow interlock on a vessel that prevents a large hydrogen explosion, a sprinkler system that prevents a large fire that is physically possible for a type of operation), or any SSCs needed to insure the availability of such preventive or mitigative functions (e.g., electrical power sources for ventilation). The total layers of defense in depth available are also key considerations in designating safety-significant SSCs. If many effective barriers are available, the significance of any one barrier is limited. If only one or two barriers can be realistically counted on, their individual significance increases. Likewise, if total hazardous material inventory is distributed over a hundred containers (e.g., waste drum storage pad, plutonium storage vault), the failure of any one container does not constitute a major uncontrolled hazardous material release. If all material is held in one container (e.g., 3000 gallon hydrogen fluoride storage tank), the failure of that container is of major concern in controlling the release of hazardous material. A principle reason for designating such major features as safety-significant SSCs is that they typically represent	the hazard control strategies.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
facility specific systems as opposed to more generic systems. While all glovebox line facilities use zone systems of ventilation for confinement, there is an enormous variation in the DOE complex with regard to specific design parameters such as number and types of exhaust systems, means of flow control, etc. Accordingly, more detailed descriptions of such equipment in a SAR is considered both appropriate and necessary for Hazard Category 2 facilities. Such description would not provide the same utility for relatively generic confinement items such as 55-gallon waste drums. The need for designation as a safety-significant SSC would also be superseded if that SSC was designated as a safety-class SSC in accident analysis.		
TSRs Summarize those safety-significant SSCs and other aspects of defense in depth that require TSR coverage in accordance with the screening criteria of DOE 5480.22, "Technical Safety Requirements." The scope of the TSR coverage is determined by the degree to which barriers or the facility-safety basis are seriously challenged. Vital, passive components such as piping, vessels, supports, structures, and containers would typically be considered design features. These components are discussed in the Design Features Appendix of the TSR document to the degree they are not covered in the SAR. DOE 5480.22 provides basic screening criteria to identify defense-in-depth features that may require actual TSR coverage. Such features include instrumentation designed to detect significant barrier degradation; equipment that actuates or controls so as to reduce the likelihood of significant barrier challenges; process variables controlled for that purpose; and active controls that prevent criticality. Every control or indicator does not require specific TSR coverage. Likewise, every design feature	**4.8 Technical Safety Requirements** The technical safety requirements (TSRs) consist of two areas: 1) potential safety limits, and 2) other draft TSRs. These areas are discussed in the following sections. **4.8.1 Potential Safety Limits** **4.8.1.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes appropriate safety limits for the hazard control provisions and strategies for the Contractor's facility according to the applicable requirements of the Contract (including the SRD). The review will also determine whether the Contractor's submittal adequately provides the basis for developing safety limits to ensure that the facility will operate within the analyzed safety basis. **4.8.1.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the proposed potential safety limits. Both "safety limits"	The information requested is comparable. It is noted that under DOE-STD-3009, for existing facilities, it is appropriate to identify a set of TSRs for comparison to the performance of existing components. For a new facility, the design process and accident analysis results should drive the TSR selection process. In the CAR Guide, TSRs are developed in terms of "safety limits" and "operating limits" for safety-significant SSCs while in DOE-STD-3009, "TSR coverage is determined by the degree to which barriers or the facility-safety basis are seriously challenged." The CAR Guide goes on to list the regulatory and contractual requirements from the Contractor's SRD relevant to TSRs and the establishment of safety and operating limits, appropriate to the design of a new facility.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
malfunction or abnormal condition does not constitute a major barrier or facility safety basis degradation/challenge. Significant challenges to the facility safety basis are typically those events which have a genuine potential to seriously damage safety SSCs, require actuation of safety SSCs not on line as part of normal operations, or approach conditions TSR controls are designed to prevent. Significant barrier degradation is generally considered to mean substantial loss of barrier function resulting in significant hazardous material release to areas of personnel occupancy, or the occurrence of highly energetic events with the potential to damage multiple barriers.	and "operating limits" (as discussed below under "Regulatory and Contractual Requirements") comprise this portion of the TSRs. Because the PSAR only defines potential safety limits and safety limits that may change as the design process and safety analysis continue beyond the start of construction, it is not possible to demonstrate that application of these limits will ensure facility operations within the analyzed safety basis. Such a demonstration is required in the FSAR. At the CAR stage of design, it is adequate to demonstrate that the selection of potential safety limits complies with related standards in the SRD. **4.8.1.3 Acceptance Criteria** **4.8.1.3.2 Regulatory and Contractual Requirements** The requirements for potential safety limits are found in the Regulatory Process document, which states the following two general contractual requirements: • Approval Condition: "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been…*sufficiently controlled/mitigated* [emphasis added]…to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope." • Submittal Requirements: *"Potential safety limits and the justification for their selection*," and a PSAR containing: **…***"Analysis of the safety basis* for the facility in terms of physical design, structures with prescribed safety functions, systems with prescribed safety functions, equipment with prescribed safety functions, operating modes, operating conditions, off-	(See Endnote 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	normal internal events considered, external events considered, assumptions made, uncertainties in data and analyses, *safety limit*s, and *operating limit*s." [emphases added] Related regulatory and contractual requirements are found in the SRD. Specific safety criteria that apply to potential safety limits include the following: Safety Criterion 9.2-1, which states, "Technical safety requirements shall be prepared and submitted for approval, and the facility shall be operated in accordance with the approved technical safety requirements." The implementing standards are from the ISMP, Section 1.3.15, "Operations," and Section 3.3.1.4, "Technical Safety Requirements." Safety Criterion 9.2-3 (items 1 and 2a) describes the standard for TSRs, consisting of "Safety Limits (item 1)," and "Limiting Control Settings (item 2a)." Each of these items is further defined in the SRD. The implementing standard is from the ISMP, Section 3.3.1.4, "Technical Safety Requirements." Safety Criterion 9.2-4, which states, "Technical safety requirements shall be kept current at all times so that they reflect the facility as it exists and as it is analyzed in the SAR." The implementing standards are from the ISMP, Section 3.3.1.4 and Section 4.2.3.4, both entitled "Technical Safety Requirements." **4.8.1.3.3 Regulatory Acceptance Criteria** The Contractor's selection of potential safety limits is acceptable if "safety limits" and "operating limits" comply with Safety Criterion 9.2-3.	
3.3.2.3.3 Worker Safety This section summarizes the major features protecting workers from the hazards of facility operation, exclusive of standard industrial hazards. Summary products	• The requirements for worker safety are included throughout RL/REG-99-05. For example:	The RPP-WTP maintains an overall commitment to protect the health and safety of workers, co-located workers, the public,

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
germane to worker safety typically include: • General overview of worker safety in terms of SSCs and administrative features. • Identification of any safety-significant SSCs. • Identification of any safety management programs that will be assigned TSR coverage in the form of administrative controls for adequate worker safety. General prioritization of the features needs to be included and expressed in terms of the magnitude of process hazard, number of potentially affected employees, pertinent aspects of operation history, and projected lifetime of the process. Only a summary level discussion is required, not a detailed discussion or defense of the prioritization logic. The safety features to be addressed in this section fall into one of two categories: • Structures, systems, and components. • Administrative features. This subsection is derived from examining the raw information in the hazard evaluation and distilling it into a clear overview of worker safety features at the facility. This presentation may use relevant accidents to frame and focus the discussion, but need not duplicate the hazard evaluation already provided in or appended to the SAR in tabular form. If the basic function of a worker safety feature has already been discussed in Section 3.3.2.3.2, "Defense in Depth," that feature may simply be identified by name and referenced. Identify structures, systems, and components as safety-significant SSCs where appropriate. As a general rule of thumb, safety-significant SSC designations based on worker safety are limited to those systems, structures, or components whose failure is estimated to result in an acute	2.0 ORGANIZATION AND ADMINISTRATION 2.1 Purpose of Review The purpose of this review is to determine whether the Contractor's submittal adequately describes management systems and structures and the qualifications for key management positions. The review will also assess whether the Contractor plans, implements, and controls site activities in a manner that protects the safety of the facility and co-located **workers**, the public, and the environment. 3.0 MANAGEMENT CONTROL SYSTEMS Management control systems refer to activities that the Contractor must perform to ensure the safety of the facility and co-located **workers**, the public, and the environment. Those activities are sometimes referred to as "conduct of operations." 3.6 AUDITS AND ASSESSMENTS 3.6.1 Purpose f Review The purpose of this review is to determine whether the Contractor has implemented an acceptable audits and assessments program for items and activities important-to-safety that will adequately protect the health and safety of the facility and co-located **workers**, the public, and the environment for the design, construction, and life of the facility. 3.9 PROCEDURES 3.9.1 Purpose of Review The purpose of this review is to determine whether the Contractor has implemented an acceptable procedures program that includes a commitment to developing, reviewing, controlling, and implementing written procedures that adequately protect the facility and co-located **workers**, the public, and the environment.	and the environment. The commitment to worker safety is found in the Contract and all of the authorization basis documents, and is consistent with the expectations of DOE-STD-3009. As a result, worker safety is an integral part of the design, operation, and decommissioning of the RPP-WTP. The partial citations from RL/REG-99-05 in the second column reflect the commitment to worker safety in Administration, Management Control Systems, the conduct and documentation of the Hazards/Safety Analysis, identification of Hazards Controls, Nuclear Criticality Safety, Chemical Process Safety (including fire protection), Emergency Management, and Deactivation and Decommissioning.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
components whose failure is estimated to result in an acute worker fatality or serious injuries to workers (see definition of safety-significant SSCs for further clarification). Categorize administrative features in terms of the programmatic elements covered in later chapters of the SAR. With the exception of safety-significant SSCs, TSR designation is made in the form of administrative controls for overall programs only for worker safety. Typical safety-management programs include criticality protection, radiation protection, hazardous material protection, institutional safety provisions, procedures and training, operational safety, and emergency preparedness. Specifically note programs that will be provided TSR coverage as administrative controls in Chapter 5, "Derivation of Technical Safety Requirements." This subsection provides documented evidence that worker safety features are an integral part of facility design and operation, that basic facility operations for worker safety are adequate, and that workers are protected by a number of means including programs described elsewhere in the SAR (e.g., Chapters 7 and 8). It is emphasized again that this subsection is written at a summary level. Identify the broad purpose of features, but not the details of their design.	The following review areas contain similar requirements for consideration of worker safety: 4.2 TRAINING AND QUALIFICATION OF THE PRELIMINARY SAFETY ANALYSIS TEAM 4.3.HAZARD ANALYSIS METHODS 4.5 INTERNAL DESIGN BASIS EVENTS 4.5.1 Selecting Internal Design Basis Events 4.5.1.1 purpose of Review 4.6 EXTERNAL DESIGN BASIS EVENTS 4.7 HAZARD CONTROLS 5.0 RADIOLOGICAL CONTROLS 6.0 NUCLEAR CRITICALITY SAFETY 7.0 CHEMICAL PROCESS SAFETY 9.0 EMERGENCY MANAGEMENT 11.0 DEACTIVATION AND DECOMMISSIONING	
3.3.2.3.4 Environmental Protection This subsection summarizes the design and operational features that reduce the potential for large material releases to the environment. Document pathways for uncontrolled release of large amounts of hazardous materials to the environment identified in the hazard evaluation. Estimate potential consequences and preventive and mitigative features associated with specific pathways. If specific pathways have previously been addressed (e.g., Section 3.3.2.3.2, "Defense in Depth"), a	**10.3.3.2 Draft Environmental Radiological Protection Program** The Contractor's submittal for the draft ERPP is acceptable if the following criteria are met: 1. **Radiation Protection for the Public and the Environment** – According to SRD Safety Criteria, Section 5.3, "Environmental Radiation Protection," and Section 5.4, "Environmental Radiological Monitoring," the Contractor must implement an ERPP. The review of the ERPP will focus on the	The focus of the CAR Guide is nuclear and process safety, and as a result, it is more directed than the general statements found in DOE-STD-3009. The Contractor's commitment to the development and maintenance of an ERPP provides assurance not found in DOE-STD-3009. In addition to the design process for process chemicals, the Contractor must comply with all applicable regulations per the Contract.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
reference is sufficient. This subsection should conclude that no large release with the potential to cause significant environmental insult exists that an obvious and easily implemented design or operational change could minimize. For example, consider widespread river or groundwater contamination due to spills from the contents of a tank. It would not be an appropriate conclusion to accept such a risk if a simple dike around the tank would alleviate the problem and yet had not been installed. Conversely, consider the handling of plutonium in a facility with gloveboxes, ventilation zones of confinement, and HEPA filters. These measures would be adequate for closure of environmental contamination concerns for process accidents. In the majority of instances, process related TSRs and safety SSCs assigned for defense in depth will be sufficient to address environmental concerns. This subsection is not intended to present detailed, cost-benefit conclusions about the adequacy of design related to potential environmental contamination. It may serve as input to separate cost-benefit analysis to determine if additional preventive or mitigative features are to be added to the facility. However, such analyses are not related to the SAR effort. The numerical Evaluation Guidelines and legal limits on normal operations (i.e., EPA regulations) inherently place an upper bound on potential environmental releases. Further, issues of environmental contamination are not direct safety issues. Safety SSC designations are not required for issues solely related to environmental protection. In accordance with DOE 5480.22, TSR designations are not required for such issues either. TSR designation associated with prevention of uncontrolled release of hazardous materials would typically be assigned	Contractor's methods to maintain public doses in conformance with the dose standards in SRD Safety Criterion 2.0-1, Table 2-1, and to maintain effluents and their resultant impacts to the environment and the public ALARA during normal operation and as a result of accidents. The Contractor's submittal on radiation protection for the public and the environment is acceptable if the following criteria are met: a. Conformance with Requirements – The Contractor makes a clear statement to conform to the dose standards in Safety Criteria 2.0-1, 2.0-2, and 2.0-3. The Contractor provides sufficient information in the Preliminary Safety Analysis Report (PSAR), Radiation Protection Program, and ERPP to demonstrate that the dose standards in Safety Criteria2.0-1, 2.0-2, and 2.0-3 will be met. b. ALARA Goals – The Contractor provides an adequate ERPP ALARA program that is sufficient in scope and content to demonstrate that the Contractor will manage and control effluents and the release of radioactive material to the environment such that the impacts on the environment and exposures to the public are kept ALARA and within prescribed limits during normal operations and as a result of accidents [Safety Criteria 5.3-1(5) and 5.3-2]. The Contractor uses WAC 246-247-120, Appendix B, "Best Available Radiation Control Technology" (BARCT), compliance demonstration to choose control technologies for mitigating emissions of radioactive material from new emission units. The BARCT demonstration includes both the abatement technology and the indication devices that monitor the effectiveness of the abatement technology from entry of radionuclides into the ventilated vapor	The information requested for the hazards and accident analyses are comparable.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
for defense-in-depth considerations.	space to release to the environment. The Contractor shall evaluate available control technologies that can reduce the level of radionuclide emissions (WAC 246-247-120, Appendix B). The Contractor's ERPP ALARA program addresses environmental policy elements of ANSI/ISO 14001, Section 4.2, "Environmental Policy." c. Engineering and Administrative Controls – The Contractor provides adequate engineering controls to monitor and maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations, including anticipated operational occurrences, to reasonably ensure that the dose standards will not be exceeded and that effluents, environmental impacts, and doses to the public will be kept ALARA (Safety Criterion 5.3-4). The Contractor proposes adequate administrative controls for situations where engineering controls are shown not to be ALARA by an appropriate and supportive cost-benefit analysis [Safety Criterion 5.3-1(5)].	
3.3.2.3.5 Accident Selection Accident analysis entails the formal quantification of a limited subset of accidents (i.e., DBAs). These accidents represent, as noted in DOE 5480.23, "a complete set of bounding conditions." The identification of DBAs results from the hazard evaluation ranking of the complete spectrum of facility accidents. The approach used at any specific facility is based on the detail needed for a given facility and the experience of the analysts. The ranking schemes are designed to separate the lower risk accidents that are adequately assessed by hazard evaluation from higher risk accidents that may warrant additional quantitative analysis if the phenomena involved are not simplistic. A limited number of moderate risk accidents between the two extremes may also be	**4.5 Internal Design Basis Events** This section addresses the selection and analysis of internal DBEs. The Regulatory Process document defines DBEs as follows: "Postulated events providing bounding conditions for establishing the performance requirements of structures, systems, and components that are necessary to: 1) ensure the integrity of the safety boundaries protecting the worker; 2) place and maintain the facility in a safe state indefinitely; or 3) prevent or mitigate the event consequences so that the radiological exposures to the general public or the workers would not exceed appropriate limits. The Design-Basis Events also establish the performance requirements of the structures, systems and components whose failure under Design-Basis	The information requested for the accident analysis is comparable. The process of internal accident selection, with the identification of a limited number of accident bins for the assessment is consistent across the two documents. However it is noted that CAR Guide Section 4.5.1.3.3 provides detailed acceptance criteria in the general areas of criticality, explosions/ over-pressurization, fires, dropped or spilled materials, ruptured tanks or process vessels, leaks and loss of cooling not found in the DOE standard. The CAR Guide also allows the Contractor the flexibility to define a method for identifying and selecting internal DBEs in a manner that appropriately reduces

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
identified for assessment. Ranking should use broad bins. For example, frequency bins should typically cover two orders of magnitude. Although the exercise of binning is essentially qualitative, analysts often use a simple numerical basis for judgments to provide consistency. For example, a simple methodology for frequency binning would be to assign a probability of 1 to nonindependent events, 0.1 to human errors, and 0.01 to genuinely independent failures. Another methodology would be to use a summary of historical data. Likewise, before beginning the evaluation, a conservative Gaussian plume estimation of the amount of material needed outside the building to cause a certain dose might be performed to aid in defining thresholds of significance. Briefly discuss or reference any such guidelines in Section 3.3.1.2, "Hazard Evaluation." Note, however, that the ranking of frequency and consequence into such broad categories is more of a qualitative than a quantitative exercise. This effort does not constitute the need for, or expectation of, a probabilistic/quantitative risk assessment. An important factor in estimating binning thresholds for public consequences is to tie the thresholds to Evaluation Guidelines so that accidents that could challenge guidelines are correctly identified for formal accident analysis. The binning requirement of this subsection does not preclude the use of other sorting mechanisms in addition to risk sorting if an analyst finds such mechanisms useful. This accident selection activity identifies the process and criteria used to select the unique and representative potential accidents (i.e., DBAs) to be included in accident analysis. Unique accidents are those with sufficiently high-risk estimates that individual examination is needed	Event conditions could adversely affect any of the above functions." Selection of external DBEs and the rationale for their selection are discussed in Section 4.6, "External Design Basis Events," in this Guide. This section will address three separate aspects of internal DBEs: 1) selecting internal DBEs, 2) analyzing internal DBEs, and 3) defining operating environments and performance requirements. **4.5.1 Selecting Internal Design Basis Events** **4.5.1.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the methodology for selecting internal DBEs (i.e., those caused by initiating events within the facility) and describes internal DBEs according to the applicable requirements of the Contract and the SRD. The internal DBEs provide the bounding conditions/ requirements for selecting SSCs to prevent or mitigate the event consequences so that the radiological exposures to facility and co-located workers and the public do not exceed the established limits. Selecting internal DBEs provides a means to reduce the information developed in the hazard analysis to a manageable set of events to be used for the rest of the accident analysis. In selecting this set, all important information from the hazard analysis must be considered. In particular, the set of internal DBEs should represent bounding events for all of the accident release mechanisms identified in the hazard analysis.	the information in the hazards analysis to a manageable set of events, while capturing the bounding events for all significant mechanisms identified.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
(e.g., a single fire whose specific parameters result in approaching Evaluation Guidelines). Representative accidents bound a number of similar accidents of lesser risk (e.g., the worst fire for a number of similar fires). Representative accidents are examined to the extent they are not bounded by unique accidents. In any case, at least one bounding accident from each of the major types determined from the hazard analysis (e.g., fire, explosion, spill, etc.) should be selected unless the bounding consequences are "Low." Accidents are identified and listed by accident category (i.e., internally and externally initiated) and type (e.g., fire, explosion, spill, etc.). Since the hazard analysis activity is considered sufficient for Hazard Category 3 facilities, SARs for these facilities need simply summarize the maximum consequences expected from facility operation and state that detailed accident quantification is not necessary because potential consequences are well below Evaluation Guidelines. The one possible exception to this case, as previously noted, is a facility with Hazard Category 3 quantities of radionuclides but possessing large amounts of toxic chemicals that could result in accident scenarios challenging Evaluation Guidelines. Such facilities need to summarize the maximum radiological consequences expected and identify the chemical accidents selected for accident analysis.	**4.5.1.2 Areas of Review** The reviewer will determine whether the Contractor's submittal accurately describes the appropriate initiating conditions for internal DBEs. As an example, Table 1.3 from the AIChE *Guidelines For Hazards Evaluation Procedures, Second Edition with Worked Examples* lists possible initiating events, propagating events, risk reduction factors (controls), and "incident" (i.e., accident) outcomes. The initiating events for internal DBEs can originate from process upsets, management system failures, and human errors. Potential propagating events include equipment failure, ignition sources, management system failure, human error, domino effects (other containment failures or material releases), and external conditions. The reviewer will evaluate the internal DBEs identified in the PSAR to determine if they would be effective for establishing a range of design parameters for SSCs required to perform the stated safety function. The reviewer will also examine the method used in selecting the internal DBEs. Each type of event (e.g., criticality, explosions, and spills) should have a frequency range of associated accident initiating events and a spectrum of consequences for each receptor group. The reviewer will verify that applying the Contractor's DBE selection method would result in a set of DBEs that bound the consequences and risk for each receptor group and type of event. (Because the highest risk event is not necessarily the same as the highest consequent event, the Contractor must consider both risk and consequence in the selection of DBEs.) As a part of this review, the reviewer will evaluate any justification the Contractor provides to demonstrate	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	that the internal DBEs are bounding. **4.5.1.3 Acceptance Criteria** **4.5.1.3.2 Regulatory and Contractual Requirements** The requirements for selecting internal DBEs are found in the following two general contractual requirements from the Regulatory Process document: • Approval Condition: "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have bee*n*…sufficiently controlled/mitigated**…** *to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope* [emphasis added]." • Submittal Requirement: "Description of the range of off-normal events and postulated accidents that could initiate internal to the Contractor's facility, *the selected design-basis internal events* [emphasis added], and the rationale for their selection." **…**	
3.4 ACCIDENT ANALYSIS This section presents the formal development of the potential accidents identified in Section 3.3.2.3.5, "Accident Selection," beginning with a formal sequence of developing connecting initiating events to preventive feature and mitigative feature responses. The principal purpose of the accident analysis is to identify any safety-class SSCs and TSRs needed for protection of the public. Each accident sequence needs to be analyzed through the use of a documented, deterministic, DBA. Whenever possible, DBAs are analyzed using the simplest applicable deterministic, phenomenological calculations (e.g.	**4.5.2 Analyzing Internal Design Basis Events** **4.5.2.3 Acceptance Criteria** **4.5.2.3.2 Regulatory and Contractual Requirements** The requirements for analyzing internal DBEs are found in the following two general contractual requirements from the Regulatory Process document: • Approval Condition: "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been**…***sufficiently controlled/mitigate*d**…** *to establish a basis for*	The information requested for the accident analysis is comparable. The objective of the accident analysis is to demonstrate that the hazards associated with facility operation are sufficiently controlled/mitigated to establish a basis for safe operations. The CAR Guide goes on to describe a detailed process for accident analysis.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
pressure estimates from a simple ideal gas law calculation, hand calculated Gaussian plume dispersions). The nondeterministic aspects of DBA analysis are simplified by estimating overall sequence frequencies in broad frequency ranges in hazard analysis. This process is considered sufficient for SAR purposes and accident analysis need only document the basis for the binning performed in hazard analysis. Detailed probabilistic calculations are neither expected nor required. Natural phenomena and external events are special cases. Natural phenomenon DBAs are those events with a phenomenon initiating frequency as specified in DOE 5480.28 and its applicable standards. External events are not typically design bases for facilities. However, they will be referred to as DBAs and analyzed as such if frequency of occurrence is estimated to exceed 10^{-6} /yr conservatively calculated, or 10^{-7} /yr realistically calculated. Accident analysis typically starts with formal descriptions of accident scenarios. Such descriptions may be supported by basic event trees. All major assumptions in scenarios must be identified. The next step is determination of accident source terms. Source terms for accidents are obtained through phenomenological and system response calculations. Once a source term has been determined, consequences due to atmospheric dispersion or other relevant pathways of concern are determined. As with every phase of the analysis, the effort expended is a function of the estimated consequence. If the source term is small, a simple, dispersion hand calculation for consequences would be sufficient. If source terms are large, computer modeling to determine consequences may be required. The consequences finally determined are compared to Evaluation Guidelines (see Appendix A). From this activity, it is determined if safety-class SSC designation is	*safe operation and an unambiguous definition of the safe-operating envelope* [emphasis added]." • Submittal Requirement: "Analysis of hazards-control features during all expected facility operating modes, off-normal conditions, and design basis internal and external events." Related regulatory and contractual requirements are found in Section 4.3.2, "Accident Analysis," of Appendix A in the SRD. **4.5.2.3.3 Regulatory Acceptance Criteria** Internal DBEs are analyzed by considering unmitigated and mitigated accidents, which are defined as follows: a. **Unmitigated Accident**. An unmitigated accident involves 1) an initiating event that could lead to a release from the primary confinement barrier, 2) failure of all elements of the control strategy that would prevent the initiating event from developing into a release from the primary confinement barrier, and 3) failure of all elements of the control strategy that would mitigate the consequences of the release. For an unmitigated accident, the frequency and consequences of accident sequences associated with a DBE are calculated without taking credit for design features or facility controls that would prevent the accident or lower its consequences. Results of the analysis are used to rank the accident consequences according to the severity level scheme described in the SRD. b. **Mitigated Accident**. A mitigated accident involves 1) an initiating event that could lead to a release from the primary confinement barrier, 2) failure of all elements of the control strategy that would prevent the initiating event from developing	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
needed. The need for accident specific TSRs to meet Evaluation Guidelines will also be determined. Detailed description of safety-class SSCs and TSRs are presented in Chapter 4, "Safety Structures, Systems, and Components," and Chapter 5, "Derivation of Technical Safety Requirements." The nature of the accidents to be analyzed will vary depending upon the facility and processes considered. However, it is anticipated that for most facilities or processes, the number of accidents requiring formal analysis will not be large. The categories of DBAs examined are: • Operational accidents (caused by initiators internal to the facility). • Natural phenomena events (e.g., earthquakes, tornadoes). • External events (caused by man-made initiators external to the facility). All assumptions made in the accident analysis (i.e., defining points in scenario progression) are to be validated as part of the accident analysis activity. The SAR needs to present information at a level that is considered sufficient for review and approval of the SAR. Referencing an auditable trail of information as part of the controlled supporting documentation is acceptable.	into a release from the primary confinement barrier, and 3) mitigation of the consequences of the release as provided by the control strategy. Determining the mitigated accident consequences for the PSAR involves iteration. The iteration uses the results of the unmitigated analysis to determine facility design features and administrative controls required to reduce the consequences and frequency of the unmitigated accident to acceptable levels according to the acceptance criteria in the SRD. The PSAR should document the results of the mitigated analysis to ensure that the mitigated consequences are within all SRD radiological and chemical exposure limits. The Contractor should discuss the accident analysis and the process used to analyze the consequences. (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) In general, the accident analysis may consist of four steps: 1) describing the accident sequence, 2) determining the accident initiating event frequency, 3) evaluating the source term, and 4) calculating accident consequence, as described below. Only steps 1 and 2 are expected to be provided for the unmitigated analysis and are described in this section. The details of steps 3 and 4 are described in the discussion of the mitigated analysis **…**	
3.4.1 Methodology This section summarizes the methods used to quantify the consequences of operational accidents, natural phenomena events, and external events selected in Section 3.3.2.3.5, "Accident Selection." Identify and describe any computer programs used to implement methods discussed below. Include in the description the origin of the code, its precedent for use, input data, the range of variables	**4.5.2.3.3 Regulatory Acceptance Criteria** **…** information from all four steps will be included in the PSAR. 1. **Unmitigated Accident Analysis –** The purpose of the unmitigated analysis is to support the design process as follows: 1) providing scoping level information to confirm the assignment of severity levels by the hazard evaluation team, 2) defining the	The information requested for the accident analysis is comparable. The CAR Guide provides details for the five-step process for accident analysis not found in DOE-STD-3009. The third step of the analysis is the source term evaluation, which references the five factor formula found in the DOE and NRC literature.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
investigated, the basic analytical models, their interrelationships, and the progression of the analysis. Briefly summarize and reference detailed information on algorithms, computational and analytical bases, and software quality assurance measures. Documentation of methodology should include the following: • Methods used to estimate radiological or other hazardous material source terms for DBAs including: (1) basic approach for estimating physical facility damage from DBAs; (2) general basis for assigning material-at-risk quantities not directly derived from hazard identification, if differing values are used; and (3) basis for material release and respirable fractions or release rates used. • Methods used to estimate dose and exposure profiles including assumptions on variables such as meteorological conditions, time dependent characteristics, activity, and release rates or duration for radioactive or other hazardous materials that could be released to the environment.	extent of hazards controls that will be required, and 3) setting the necessary defense-in-depth requirements, as discussed in Appendix B of the SRD. • *Step 1 – Describing the Accident Sequence*: The Contractor describes the unmitigated accident analysis leading to the grouping of events for selecting internal DBEs. For each unmitigated accident, the initiating event and its causes should be described. The initial conditions should be described in terms of the physical configuration of the systems that are impacted and their operating environment, relevant operating parameters, other environmental conditions, and the physical properties of the material at risk. Where a range of possible initial conditions, physical properties, or environmental conditions exist, the range and any bounding, unmitigated conditions should be specified. The accident sequence description should begin when the event is initiated and continue until a safe state is achieved. The sequence should include the time that important safety parameters (e.g., pressure for a tank over pressurization event) reach their most limiting value, the duration of the accident, and the ultimate achievement of a safe state. The Contractor should include the acceptability of other assumptions important to the analysis, including system operability and performance. The bounding, unmitigated response of structures or plant components to the accident sequence conditions should be determined (with respect to hazardous material release) from the	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	initiating event. If a simplified worst-case model is found to be excessively pessimistic, more complex models may be applied if they are shown to place an unmitigated upper bound on accident consequences. The unmitigated scenario assumes release from the first confinement barrier concurrent with failure of any systems or administrative controls that would mitigate or prevent the release but which are impacted by the accident conditions. Mitigation of the release by the building itself (i.e., leak path factors or building wake effects) may be assumed if the accident phenomena do not affect these structures. All the systems assumed to fail and their failure modes shall be clearly identified. Similarly, any systems or structures assumed to remain intact shall be clearly identified. • *Step 2 – Determining the Accident Initiating Event Frequency*: The accident scenario description is first used to estimate the frequency of the internal accident initiating event. For each accident or group of accidents, the frequency of the initiating event must be categorized into one of the broad frequency ranges described in Appendix A in the SRD. The frequency of all independent events that could cause the initiating event must be summed. Where possible, actual failure data for similar facilities and analogous systems or components should be used to estimate the frequency of the initiating events. In the absence of reliable data, complex system failure probabilities may be developed from fault trees. Estimates of the frequency of the initiating	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	events should represent an upperbound on the failure probability. Therefore, uncertainties in the fault tree or failure data should be treated with that goal in mind. **Mitigated Accident Analysis –** As compared with the unmitigated analysis, the mitigated or DBE accident analysis should take credit for accident mitigation features that are designed to prevent the accident from occurring or that reduce the consequences of the accident if it occurs. The DBE analysis is an iterative process between the selection of control strategies described in Section 4.7, "Hazard Controls," in this Guide and re-analysis of accident sequence frequency and consequence, taking credit for the mitigating features. However, the final documentation in the PSAR should verify that the reduction in the accident consequences (assuming the mitigating feature works as designed) and the failure frequency for each mitigating feature credited for reducing the consequences of the DBE will produce results consistent with the safety criteria defined in Appendix B of the SRD. Assumptions regarding the reliability of mitigating features should be justified by the Contractor's analysis to ensure that a correct set of internal DBEs has been identified. The accident consequences should be determined using methods described below for estimating source terms and the accident consequence calculation. The Contractor should specify the preferred control strategy for limiting radiological and hazardous exposures to values prescribed in the SRD and also describe if defense in depth has been achieved. • *Step 3 – Evaluating the Source Ter*m: Based on the phenomena described in the DBE accident	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	scenario description, the accident analysis should determine an appropriate source term for the scenario. The source term is defined as the quantity of hazardous material released to the air by the physical forces present during the accident sequence. For releases of radioactive material, the respirable airborne source term for accidents is typically estimated by the following five-component linear equation: Source Term = MAR x DR x ARF x RF x LPF Where: MAR = material at risk (curies or grams) DR = damage ratio ARF = airborne release fraction (or rate) RF = respirable fraction LPF = leak-path factor. The MAR is the waste quantity identified for each off-normal event and the radionuclide inventory. The DR is the fraction of the material at risk actually impacted by the accident-generated conditions and generally reflects the nature of the waste and waste form. Although this fraction could range from 1.0 to values less than 0.1, as a conservative basis for the unmitigated analysis, all damage ratios are typically assumed to equal 1. Where they are assumed to be less than 1 in the DBE analysis, a justification must be provided. The justification may reference the response of a control feature or SSC in limiting the MAR available under accident conditions. The ARF is the factor used to estimate the amount of radioactive material suspended in air as an aerosol and thus available for facility and co-located worker exposure or environmental release. The RF is the fraction of airborne particles that can be	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	inhaled into the human respiratory system (commonly assumed to include particles 10 μm Median Aerodynamic Equivalent Diameter or less). Although the respirable fraction is typically assumed to be 1.0, a more accurate representation of this factor for the DBE analysis can reduce the level of conservatism in the dose estimates, if it is justified based on the response of safety control features. The leak-path factor is the fraction of the initial aerosol that is transported (leaks) through the filter media. This fraction is assumed to be consistent with the effectiveness of the building design or the function of a discrete building system, such as the ventilation system, that may be unaffected by the accident. For indoor events involving loss of filtration or damage to the ventilation system, the value of the leak-path factor is typically assumed to be 1, reflecting the absence of filtration and ventilation systems. For the DBE analysis, the effect of controls or systems should be included to provide a credible source term analysis. Parameter selection to conduct the DBE analysis typically relies on judgment regarding the type of off-normal event and the radionuclide inventory encountered. Example data for this type of analysis can be obtained from a DOE handbook entitled *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilitie*s. These data provide both bounding and reasonable values that can be used in accident analysis. The Contractor should describe the parameter selections appropriate for the accident sequence and the control systems that are applied. If the methods used in the typical approach or in the	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	DOE handbook are not applicable, alternative methods for estimating the source term may be applied if the Contractor can provide sufficient justification and documentation. These include the use of airborne release rates (ARRs) for estimating releases from resuspended liquid materials over time (as described in the DOE handbook) and release estimates based on mass loading factors in air. The mass loading approach relates the mass of airborne material in the air space in a room or cell (typically mg/m^3) times the total volume of air released during the accident duration (m^3) to estimate the mass of material released. The source term from a chemical release is similar to radioactive material releases. However, a comparable reference document to DOE Handbook 3010 for radiological releases does not exist that covers all types of chemical release events and provides release fractions and respirable fractions. While DOE Handbook 3010 does contain airborne release fractions and respirable fractions for some solid and liquid spills, the user should ensure that the data apply to the specific situation. The chemical release rate can be calculated from first principles based on how long the release occurs. A scenario that releases less than the entire quantity of the tank, vessel, or piping should be justified based upon credible controls. The source term calculated from the chemical release will highly depend on the chemical state (solid, liquid, gas), pressure, temperature, volatility, reactivity, etc., as well as on how it is released. For example, a pressure vessel storing anhydrous ammonia at ambient conditions could potentially release ammonia from such events as a leaky valve or	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	flange, a cracked instrument line, a pressure safety valve opening, or a vessel rupture. The last event is very unlikely or incredible but would lead to a large release rate. The other initiators are more credible and could lead to small or medium release rates. Another consideration in characterizing chemical releases is the state of the chemical in storage (i.e., liquid or gas). The possible types of releases include 1) liquids stored below their boiling point, 2) refrigerated liquid in a vessel, 3) gas liquified under pressure, 4) releases from a vapor space of a pressurized vessel or piping, and 5) instantaneous releases. Many of these release mechanisms could form aerosols from different mechanisms, such as the following: • Liquid that is normally gaseous under ambient conditions (such as anhydrous ammonia) could flash, leading to a vapor and liquid release with the entrainment of the liquid. • Liquid that is pressurized could lead to the breakup of the liquid to form an aerosol. • Vapor released at high pressures could expand and cool (autorefrigeration), causing condensation to occur and possible rainout of liquid. Many potential models can be used to estimate the source terms for different release scenarios. Because these models only approximate the release quantities, conservative parameters should be used to prevent underestimating the source term. A brief discussion of source term modeling is provided in NUREG/CR-6410, *Nuclear Fuel Cycle Facility Accident Analysis Handboo*k.19 Detailed modeling information can be found in the following	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	documents: • *Guidelines for Chemical Process Quantitative Risk Analysis* • *Guidelines for Consequence Analysis of Chemical Release*s. Alternative models also may be acceptable if they are generally accepted (as indicated in consensus codes or published literature) and are adequately justified. • *Step 4 – Calculating Accident Consequenc*e: The DBE accident analysis should calculate the consequences of the accident scenario using the scenario description and the source term calculated for the accident. The radiological exposure by inhalation to a receptor should be calculated using the 50-year committed effective dose equivalent (CEDE) to the receptor. The general equation for estimating the CEDEs to facility and co-located workers from airborne materials resulting from off-normal events is as follows: [CEDE for Inhalation] = [Exposure Duration] x [Breathing Rate] x [Respiratory Protection Factor] x [Inhalation Dose Factor] x [Air Concentration] The exposure duration is defined by the type of accident, the predicted severity, and the predicted worker response. The breathing rate is typically assumed to be 3.47×10^{-4} m^3 /s, consistent with information provided by the International Commission on Radiological Protection (ICRP) for "light activity." The respiratory protection factor	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	accounts for the potential use of respiratory protection (face masks or supplied air) and an assigned efficiency for removing airborne particulate materials. The inhalation dose conversion factors are those accepted by DOE in *Federal Guidance Report No. 11*. When the chemical form of specific radionuclides are not known or well defined, the clearance class resulting in the highest inhalation dose should be used. When the chemical form is known, the clearance class associated with that chemical form should be used. The inhalation CEDEs to the co-located worker and the closest resident from off-normal releases from the facility are estimated using information consistent with the procedures used for conducting safety analysis. The general equation typically used is as follows: [CEDE for Inhalation] = [Exposure Duration] x [Breathing Rate] x [Inhalation Dose Factor] x [Air Concentration] The exposure duration is defined by the type of accident and the predicted severity, as dictated by the accident scenario considered. The breathing rate is typically assumed to be 1.2 m^3 /h, consistent with information provided by the ICRP for a healthy adult during a period of light activity. The inhalation dose conversion factors are those accepted by the DOE in *Federal Guidance Report No. 11*. When the chemical form of specific radionuclides are not known or well defined, the clearance class resulting in the highest inhalation does should be used. When the chemical form is known, the clearance class associated with that chemical form should be used. The air concentration is estimated at the downwind	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	locations of the co-located worker and the nearest resident, typically using a simple Gaussian plume model. Atmospheric dispersion calculations are made for both the 99.5% sector specific and the 95% overall-site meteorological data. Plume rise or building wake corrections can be considered, when justified. To estimate radiological exposure, the most limiting meteorological data will be used. Dose consequences for the facility worker should also include direct radiation dose from sources near the worker. Consequences for the co-located worker should include cloud shine where it is significant. Chemical accident consequence calculations will consider many of the same factors of concern as radiological calculations such as dose, exposure duration, and air concentrations. When identifying chemical accidents, an evaluation of the potential for radiological releases resulting from chemical accidents should be included in the overall analysis. However, for accidents only involving chemicals, the consequence of concern will be a value such as ERPG-1, -2, -3 limits (Safety Criterion 2.0-2) or some equivalent limit such as Temporary Emergency Exposure Limits. Chemicals of concern will probably be liquid or gas because most solids (even if procured as powders) cannot lead to consequences of concern outside of a small localized area. However, solids should be evaluated to determine whether the material is pyrophoric, combustible, reactive, or a health hazard. Liquids and gases should also be subjected to the same evaluation, but consequences are also possible downwind from release points. The accident consequence calculation can be	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	performed using hand calculations, or possibly, computer models. However, each computer model has limitations and must be used within the constraints of the model. For example, ALOHA (a common model approved by DOE and EPA) uses a Gaussian plume model, which is appropriate for neutrally buoyant gases but is not appropriate for a heavy gas such as anhydrous hydrogen fluoride. Modeling chemical release of anhydrous ammonia is a unique case because of its flashing in an uncontrolled release. The release would form a cold gas cloud with entrained liquid particles. This gas cloud would initially resemble a heavy gas, but as the cloud warmed it would transition to a buoyant gas and rapidly disperse. Heavy gas models include HGSYSTEM, DEGADIS, and others. The reviewer should determine whether the computer model used by the Contractor is appropriate and should consider validation checks to determine whether the results in the PSAR are consistent with other tests. Examples of detailed modeling information can be found in the following documents: • NUREG/CR-6410 • *Guidelines for Chemical Process Quantitative Risk Analysis* • *Guidelines for Consequence Analysis of Chemical Releases* • *Guidelines for Use of Vapor Cloud Dispersion Model*s. Alternative models also may be acceptable if they are generally accepted by industry and are adequately justified.	
3.4.2 Design Basis Accidents This section analyzes DBAs for each of the major	**4.5 Internal Design Basis Events** This section addresses the selection and analysis of	The information requested for the accident analysis is comparable. The CAR Guide has

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
categories to quantify consequences and compare them to Evaluation Guidelines. The major categories are: internally initiated operational accidents (e.g., fires, explosions, spills, criticality); natural phenomena events for the site (e.g., earthquakes, tornadoes) that could affect the facility; and externally initiated, man-made events such as airplane crashes, transportation accidents, adjacent facility events, etc., that can either cause releases at the facility under examination or have a major impact on facility operations. Beyond DBAs are discussed in Section 3.4.3, "Beyond Design Basis Accidents." Quantification methods are typically limited to calculating the dose/exposure profile of a release. The process is iterative, starting by taking no credit for mitigative features and comparing results to Evaluation Guidelines. Continue taking credit for additional mitigative features incrementally and comparing results to Evaluation Guidelines until below the guidelines. This iterative process, however, does not require denying the physical design of facility structures, systems, and components. For example, if liquid hazardous material is brought into a facility in steel piping and stored in steel tanks, it is not meaningful to disregard the existence of these physical features in analysis. Simply admitting they exist does not require safety-class SSC designation either. Stated another way, facilities should be analyzed as they exist when quantifying meaningful release mechanisms. NOTE: The following format is repeated sequentially for each ("X") DBA. **3.4.2.X [Applicable DBA]** Identify the DBA by individual title, category (i.e., operational, natural phenomena, external) and general type (e.g., fire, explosion, spill, earthquake, tornado).	internal DBEs. The Regulatory Process document defines DBEs as follows: "Postulated events providing bounding conditions for establishing the performance requirements of structures, systems, and components that are necessary to: 1) ensure the integrity of the safety boundaries protecting the worker; 2) place and maintain the facility in a safe state indefinitely; or 3) prevent or mitigate the event consequences so that the radiological exposures to the general public or the workers would not exceed appropriate limits. The Design-Basis Events also establish the performance requirements of the structures, systems and components whose failure under Design-Basis Event conditions could adversely affect any of the above functions." Selection of external DBEs and the rationale for their selection are discussed in Section 4.6, "External Design Basis Events," in this Guide. This section will address three separate aspects of internal DBEs: 1) selecting internal DBEs, 2) analyzing internal DBEs, and 3) defining operating environments and performance requirements. The CAR Reviw Guide provides extensive details regarding analysis of Section 4.5, "Internal Design Basis Events." These are included in this table in comparison of Sections 3.3.2.3.5, "Accident Selection," and 3.4, "Accident Analysis," of DOE-STD-3009 and are not included again at this point to avoid lengthy repetition. **4.6 External Design Basis Events** **4.6.1 Purpose of Review**	sections that specifically cover Internal and External Design Basis Events. The CAR Guide does not use the format recommended by DOE-STD-3009 since a different process for DBE selection is followed. However, the CAR Guide clearly requires that the Contractor's documentation justify the selection and analysis of DBEs.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
3.4.2.X.1 Scenario Development This subsection describes accident progression linking initiating events with preventive and mitigative events and other contributing phenomena to formally define the accidents identified in Section 3.3.2.3.5, "Accident Selection." Note each response, action, or indication required to initiate action that is relevant to the scenario progression. Document the rationale used in hazard analysis for binning the DBA in a broad frequency range. When summarizing the initiating event for a given natural phenomena DBA, use DOE 5480.28 and its applicable standards (i.e., DOE-STD-1020 through -1024) to determine the natural phenomena DBAs for the facility. Design basis guidelines include, among others, load factors, return periods, amplification factors for the facility, etc. Summarize facility and equipment response (emphasizing preventive or mitigative equipment) to the loads postulated to be present at the time the given natural phenomena event occurs. Reference the facility documentation of this evaluation and summarize relevant assumptions. Discuss the degree of conservatism of the evaluation. Evaluate secondary events directly caused by natural phenomena, such as earthquake induced fires, based on their physical possibility for facility conditions (i.e., the induced accident must already potentially exist in the absence of the seismic event). For example, seismic induced fires should be considered DBAs where significant accumulations of flammable material are exposed to fire initiators by seismic damage to the facility. If minimal combustible material is present in a given location, a large seismic induced fire in that location would not be a DBA as the potential is not physically possible.	The purpose of this review is to determine whether the Contractor has adequately described the selection and analysis of external DBEs to explain the potential hazards and accidents caused by external DBEs and how they will be acceptably mitigated. **…** "**...**The Design-Basis Events also establish the performance requirements of the structures, systems, and components whose failure under Design-Basis Event conditions could adversely affect any of the above functions." **4.6.3.3 Regulatory Acceptance Criteria** This section will be discussed in two parts: 1) regulatory acceptance criteria for seismic events, and 2) regulatory acceptance criteria for other external DBEs. **4.6.3.3.1 Regulatory Acceptance Criteria for Seismic Events** The Contractor's submittal on seismic events is acceptable if the following information is provided: 1. The criteria for selecting performance categories and the performance categorization of Important to Safety SSCs according to Safety Criteria 4.1-3 and 4.1-4. This relates to Important to Safety SSCs that require qualification against seismic events. The technical basis for selecting SSC performance categories should be based on the safety standards and requirements identification process and the facility's preliminary design, including the RES. 2. The selection of seismic design criteria, including development of the seismic hazard curve and response spectra. A design-basis earthquake should be developed for each performance category, as applicable.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
Although external events are not typically design bases, this Standard considers them as DBAs if the frequency of occurrence is estimated to exceed 10^{-6} /yr conservatively calculated, or 10^{-7} /yr realistically calculated. The specific use of this NRC frequency precedent is limited to external events only due to their unique nature. External events are presented because frequency criteria for inclusion are met. Accordingly, the analysis that substantiates frequency need only be referenced. **3.4.2.X.2 Source Term Analysis** This subsection determines the accidental material or energy released through the pathways of concern. Define all parameters and phenomenological models used to derive the source term. As a minimum, this definition includes the material at risk (as derived from the hazard identification), the release fraction or rate that determines the initial source term, and the overall facility leakpath factors that determine the final source term released external to the facility. The degree of conservatism believed to be present in the calculation needs to be consistent with Evaluation Guideline definitions. Detailed quantification of uncertainty is not required. **3.4.2.X.3 Consequence Analysis** This subsection determines the receptor doses/exposures associated with the relevant pathways. Derive the exposures and doses in accordance with the definition of Evaluation Guidelines. The information derived from the hazard and accident analyses related to protection of the public and potential insights gained for environmental contamination issues needs to be compared to the facility National Environmental Policy Act documentation to ensure that no significant discrepancies exist between the SAR and that	3. The facility's preliminary seismic analysis to demonstrate that the preliminary design will meet applicable requirements for load when subjected to the design-basis earthquake. This analysis should include the modeling approach for the dynamic analysis of the facility. The modeling approach should describe the treatment of live load mass, the proposed damping value, and stiffness modeling assumptions for structural elements and connections. The applicable software selected for soil structure interaction, structure analysis, and development of in-structure spectra should be identified. The modal combination method and directional combination method used and the treatment of inelastic behavior and seismic spatial interactions should be discussed. The components that will be qualified by testing and the testing approach should be identified. Comparisons of the seismic design requirements with those in related guidance from the U.S. Nuclear Regulatory Commission (NRC) may also be included but are not required. These include damping values for SSCs, soil-structure interaction, development of floor response spectra and effects of parameter variation on floor responses, procedures for combining the three components of earthquake motion, combination of modal responses, interaction with nonseismic structures, methods used to account for torsional effects, and determination ofstructure overturning moments. 4. Seismic acceptance criteria, including the process to compare the calculated seismic demand on Important to Safety SSCs from the seismic analysis with the corresponding seismic capacity derived from the acceptance criteria of industrial codes and standards (Safety Criterion 4.1-3). The seismic	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
documentation. **3.4.2.X.4 Comparison to Guidelines** This subsection compares the receptor dose/exposure for the accident sequence to the Evaluation Guidelines. If Evaluation Guidelines cannot be met, provide a summary assessment of the significance of the failure to meet Evaluation Guidelines and administrative and/or engineered controls whose implementation would allow guidelines to be met. Detailed cost-benefit analyses to evaluate potential changes are beyond the scope of the SAR. **3.4.2.X.5 Summary of Safety-Class SSCs and TSR Controls** This subsection identifies the safety-class SSCs and assumptions judged to require TSR coverage to meet Evaluation Guidelines. Any TSR assumption not directly related to exceeding of Evaluation Guidelines should be defined in section 3.3.2.3.2, "Defense in Depth." For details, refer to Chapter 4, "Safety Structures, Systems, and Components," and Chapter 5, "Derivation of Technical Safety Requirements."	acceptance criteria should also be identified if certain SSCs are qualified by testing. The reviewer will verify that all Important to Safety SSCs have been shown to have adequate seismic capacity for the design-basis earthquake. 5. Detailing requirements, including the approach for connections, anchorage (both embedded and expansion anchors), bracing, and pipe supports. 6. The selection of beyond-the-design-basis earthquake seismic events for accident analysis, including descriptions and technical basis for selecting beyond-the-design-basis earthquake events. The objective is to demonstrate that the radiation exposure standards for facility and co-located workers and the public will not be exceeded based on the facility design even if seismic events beyond-the-design-basis earthquake occur. If the radiation exposure standards (Safety Criterion 2.0-1) are exceeded, the performance categorization of Important to Safety SSCs should be re-evaluated, and additional accident prevention and mitigating features should be identified. If a simplified worst-case model is found to be excessively pessimistic, a more realistic model such as PRA may be applied. 7. Calculational methods used to assess DBEs. These methods were discussed in Section 4.5.2, "Analyzing Internal DBEs," in this Guide. The same calculational methods should be applied to external DBEs as were applied to the internal DBEs. 8. Accident prevention and mitigating features, including facility features that are relied on or required for seismic safety. The information should describe specific safety functions and the operability of each feature and provide the basis for establishing that each feature can perform its intended safety function.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	4.6.3.3.2 Regulatory Acceptance Criteria for Other External DBEs The Contractors submittal on other external DBEs is acceptable if the information provided includes the following: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. The selection of design criteria for wind to show that the facility, as designed, will withstand the effects of design-basis winds. The analysis should demonstrate that the facility's preliminary design will meet the applicable requirements for load when subjected to the design-basis wind. The submittal should describe the modeling approach used as well as any software used in the calculation. 2. The selection of design criteria for missiles propelled by wind to show that the facility, as designed, will withstand the effects of a projectile impacting it. The analysis should show that the facility's preliminary design will meet the applicable requirements for withstanding missiles due to wind. The submittal should describe the modeling approach used as well as any software used in the calculation. 3. The selection of design criteria for flooding for the facility to show that the facility, as designed, will withstand the effects of flooding. The analysis should show that the facility's preliminary design will meet the applicable requirements for withstanding a design-basis flood. The submittal should describe the modeling approach used as well as any software used in the calculation. 4. The selection of design criteria for loads due to volcanic ash to show that the facility, as designed, will withstand the maximum anticipated load from volcanic ash. The analysis should show that the facility's preliminary design will meet the	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	applicable requirements for withstanding loading due to volcanic ash. The submittal should describe the modeling approach used as well as any software used in the calculation. 5. The selection of design criteria for loads due to snow to show that the facility, as designed, will withstand the maximum anticipated load from snow. The analysis should show that the facility's preliminary design will meet the applicable requirements for withstanding loading due to snow. The submittal should describe the modeling approach used as well as any software used in the calculation. 6. The selection of design criteria should show that the facility, as designed, will withstand man-made external accident events, such as aircraft crashes. The analysis should show that the facility's preliminary design will meet the applicable requirements for withstanding man-made external accident events. The submittal should describe the modeling approach used as well as any software used in the calculation. A full description of calculational methods used to assess DBEs can be found in Section 4.5.2, "Analysis of Internal DBEs," in this Guide. The same calculational methods should be applied to external DBEs.	
3.4.3 Beyond Design Basis Accidents DOE 5480.23 requires the evaluation of accidents beyond the design basis to provide a perspective of the residual risk associated with the operation of the facility (see Attachment 1, paragraph 4.f.(3)(d)11c, of the Order). Such beyond DBAs are not required to provide assurance of public health and safety. Accordingly, they serve as bases for cost-benefit considerations if consequences exceeding Evaluation Guidelines are identified in the	**4.6.3.3.1 Regulatory Acceptance Criteria for Seismic Events** The Contractor's submittal on seismic events is acceptable if the following information is provided: 1. The criteria for selecting performance categories and the performance categorization of Important to Safety SSCs according to Safety Criteria 4.1-3 and 4.1-4. This relates to Important to Safety SSCs that require qualification against seismic events. The	In addition to RL/REG-99-05 discussion of beyond design basis earthquake seismic events, the RPP-WTP requires consideration of risk goals that are intended to protect workers, co-located workers, and the public. These risk goals are found in DOE/RL-96-0006 and clarified in RL/REG-2000-08, *Regulatory Unit Position on Conformance with Risk Goals in DOE/RL-96-0006*. The

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
beyond DBA range. However, such cost-benefit analysis would be performed outside the SAR with the concurrence of DOE. It is expected that beyond DBAs will not be analyzed to the same level of detail as DBAs. The requirement is that an evaluation be performed that simply provides insight into the magnitude of consequences of beyond DBAs (i.e., provide perspective on potential facility vulnerabilities). This insight from beyond DBA analysis has the potential for identifying additional facility features that could prevent or reduce severe beyond DBA consequences. For nonreactor nuclear facilities, however, the sharp increase in consequences from DBA to beyond DBA is not anticipated to approach that found in commercial reactors where the beyond DBA precedent was generated. No lower limit of frequency for examination is provided for beyond DBAs whose definition is frequency dependent. It is understood that as frequencies become very low, little or no meaningful insight is attained. Operational beyond DBAs are simply those operational accidents with more severe conditions or equipment failures than are estimated for the corresponding DBA. For example, if a deterministic DBA assumed releases were filtered because accident phenomenology did not damage filters, the same accident with loss of filtration is a beyond DBA. The same concept holds true for natural phenomena events, but beyond DBAs are defined by the initiating frequency of the natural phenomena event itself (i.e., frequency of occurrence less than DBA frequency of occurrence). Beyond DBAs are not evaluated for external events.	technical basis for selecting SSC performance categories should be based on the safety standards and requirements identification process and the facility's preliminary design, including the RES. **…** **…** 6. The selection of beyond-the-design-basis earthquake seismic events for accident analysis, including descriptions and technical basis for selecting beyond-the-design-basis earthquake events. The objective is to demonstrate that the radiation exposure standards for facility and co-located workers and the public will not be exceeded based on the facility design even if seismic events beyond-the-design-basis earthquake occur. If the radiation exposure standards (Safety Criterion 2.0-1) are exceeded, the performance categorization of Important to Safety SSCs should be re-evaluated, and additional accident prevention and mitigating features should be identified. If a simplified worst-case model is found to be excessively pessimistic, a more realistic model such as PRA may be applied.	risk goal criteria are not intended to replace defense-in-depth or adequate safety considerations provided by other regulatory programs but to supplement them with those credible risk insights that are available. The risk analysis will include accidents that are beyond the design basis, using best estimate methods for estimating both the accident frequencies and the consequences. The event/fault tree analysis will consider multiple failure events by assigning conditional probabilities. Events less frequent than 10^{-6} events/year that may have very large consequences will be considered. As a result, the process embodied by the RL/REG-99-05 requiring risk analysis, is a comprehensive approach to consideration of beyond design basis events.
CHAPTER 4 SAFETY STRUCTURES, SYSTEMS, AND COMPONENTS The purpose of this chapter is to provide information that	**4.5.3 Defining Operating Environments and Performance Requirements** **4.5.3.1 Purpose of Review**	The guidance to define the safety function of structures, systems, and components is similar in both DOE-STD-3009 and the CAR

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(d), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)4b and 4.f.(3)(d)4c, of the Order (Topic 4), and paragraph(s) 8.b.(3)(k), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d) 11n, of the Order (Topic 11). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. [NOTE: The cited text from DOE 5480.23 identifies engineered safety features as topics to be addressed in the SAR. Topic 4 (4.f.(3)(d)4b and 4.f.(3)(d)4c) list what should be included in the SAR to describe the design of principal structures, components, systems, engineered safety features, and processes. Topic 11(4.f.(3)(d) 11n) provides detail on what to include in the accident analyses regarding the derivation of environmental qualification requirements for safety components. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	The purpose of this review is to determine whether the Contractor's submittal adequately describes the operating environments and performance requirements for the selected hazard control provisions of its facility. Further, the reviewer should determine if the Contractor has provided an adequately quantified basis for designing the provisions selected to implement the hazard control strategies. Defining operating environments and performance requirements is the initial interpretation of the DBE results. After this information has been defined, alternative hazard controls are identified and evaluated, as described in Section 4.7 in this Guide. **4.7 Hazard Controls** **4.7.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the hazard control strategies and related design provisions to ensure facility safety according to the applicable requirements of the Contract (including the SRD).	Guide, recognizing that the definitions for classification of safety SSCs is different in the two documents. (See Endnote 2)
4.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**4.5.3.2 Areas of Review** The reviewer will determine whether the Contractor's submittal accurately defines the operating environment and performance requirements for Important to Safety SSCs. To assess adequacy, the reviewer will determine whether the Contractor's proposed selection of operating environments related to DBEs provides an adequately quantified basis for designing the provisions selected to implement the hazard control strategies. The reviewer will determine whether the operating environment and performance requirements include those for normal operations	Both DOE-STD-3009 and the CAR Guide require introductory material on the selection of safety-related SSCs supporting the safety analysis that follows. The focus of the CAR Guide is for a new facility, whereas DOE-STD-3009 relates to existing facilities. (See Endnotes 3 and 4)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	and for off-normal and accident conditions. The operating environment and the performance requirements can be defined after the Contractor develops and analyzes the DBEs considered in the PSAR.	
4.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders, which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**4.5.3.3.2 Regulatory and Contractual Requirements** The requirements for defining operating environments and performance are found in the following two general contractual requirements from the Regulatory Process document: (DOE/RL-96-0003, Rev. 1) • Approval Condition: "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been sufficiently controlled/ mitigated…*to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope* [emphasis added]." • Submittal Requirements: "Description of the range of off-normal events and postulated accidents that could initiate internal to the Contractor's facility, the selected design-basis internal events, and the rationale for their selection"; and "Description of facility features and functions provided to control the radiological, nuclear, and process hazards." Related regulatory and contractual requirements are found in the SRD and include the following safety criterion: Safety Criterion 3.1-4, which states, in part, "The hazard analysis shall be performed in accordance with the following requirements: The risks that hazardous inventories and energy sources present shall be evaluated by	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated ISM process and results are documented in the Contractor's SRD. Thus, safety basis information pertinent to the safety analysis expected under RL/REG-99-05 is similar to that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	consideration of normal operation (including startup, testing and maintenance), anticipated operational occurrences, and accident conditions. The identification of anticipated operational occurrences and accident conditions shall consider internal events (i.e., equipment failure and human error), external events (e.g., nearby facilities and transportation), and natural phenomena." In addition, Section 4.7, "Definition of Operating Environment," of Appendix A of the SRD states, "The hazard evaluation shall define a set of bounding operating conditions in which SSCs relied upon to control hazards must function. Environmental parameters to be addressed include the following: temperature, pressure, humidity levels, and chemical environment." **4.7.3.2 Regulatory and Contractual Requirements** The requirements for hazard controls are found in the Regulatory Process document, which states the following two general contractual requirements: • Approval Condition: "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been *sufficiently controlled/mitigated* [emphasis added]**…** to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope." (DOE/RL-96-0003, Rev. 1) • Submittal Requirement: "Analysis of hazards-control features during all expected facility operating modes, off-normal conditions, and design basis internal and external events." Related regulatory and contractual requirements are	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	found in the SRD. **…** For each of the final hazard control strategies and provisions, the PSAR should describe how the strategies and provisions ensure compliance to the *relevant* safety criteria **…**	
4.3 SAFETY-CLASS SYSTEMS, STRUCTURES, AND COMPONENTS Relevant information is provided, in the following SSC specific subsections, for safety-class SSCs with descriptions sufficiently detailed to provide an understanding of the safety function of safety-class SSCs. Descriptions for each safety-class SSC must be complete enough to indicate suitability of safety analysis inputs and assumptions. Provide a summary list of safety-class SSCs. This summary list should identify, in tabular form, safety-class SSCs, the accidents from Chapter 3 for which safety-class designation was made, safety functions, functional requirements, and performance criteria judged to require TSR coverage. The remaining subsections provide details that correlate to the summary list. NOTE: The following format is repeated sequentially for each ("X") safety-class SSC. The examples provided are for illustration purposes only, and should not be construed as a requirement to designate such systems safety-class or safety-significant. **4.3.X [Applicable Safety-class System, Structure, or Component]** Identify the safety-class SSC. **4.3.X.1 Safety Function** This subsection states the reason for designating the SSC as a safety-class SSC, followed by specific identification of its preventive or mitigative safety function(s) as determined in the hazard and accident analysis. Do not	**4.5.3.3.3 Regulatory Acceptance Criteria** The submittal on defining operating environments and performance requirements is acceptable if the Contractor has appropriately determined the most severe anticipated conditions under which Important to Safety SSCs must function, including temperature, pressure, humidity, radiation level, and chemical environment. The operating environments must support the provisions selected to implement the hazard control strategies and include the operating environment during normal operations and under off-normal and accident conditions. The Contractor's definition of the operating environment and the necessary performance requirements can be evaluated by considering the following two steps: **Step 1 – Defining the Operating Environment.** For selected DBEs, the normal operation of selected SSCs may help reduce the severity of or eliminate the dose consequences. When this is the case, these SSCs should be identified as Important to Safety for normal operation and tracked through the design process. The operating environment is defined using the DBE analysis to determine the required conditions that must be maintained to control hazards, such as temperature, pressure, humidity, radiation levels, and the chemical environment. Other information useful to defining the operational environment may include the need for early warning or alarms, and the potential need for respiratory protection. The definition of the operating environment should be clearly related to reasonably	.Major portions of both DOE-STD-3009 and RL/REG-99-05 require the identification and management of SSCs that are relied upon to provide a safety function. However, DOE-STD-3009 requires the documentation of information for each SSC that is not organized in the same manner as in RL/REG-99-05. The DOE-STD-3009 organization of information is useful in providing a complete description of each SSC and its safety function. As a result, RL/REG-99-05 (Sections 4.5.3.3.3 and potentially 4.7.2 and 4.7.3.3) will be expanded to include the details of the safety descriptions (found elsewhere throughout the PSAR) for the individual ITS SSCs in this section of the PSAR. (See Endnotes 3, 4, and 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
discuss nonsafety functions. Safety functions are top level statements that express the objective of the SSC in a given accident scenario. … The specific accidents associated with the safety function should be identified. **4.3.X.2 System Description** This subsection provides a description of the safety-class SSC and the basic principles by which it performs its safety function (e.g., sensor and interlock for hydrogen detector discussed in section 4.3.X.1). Describe its boundaries and interface points with other SSCs relevant to the safety function. Identify SSCs whose failure would result in a safety-class SSC losing the ability to perform its required safety function. These SSCs would also be considered safety-class SSCs for the specific accident conditions for which the safety-class designation was made originally. When describing the SSC, provide a basic summation of the physical information known about the SSC, including Process and Instrumentation Drawings (P&IDs), or a simplified system drawing with reference to P&IDs. If known, abstract and reference pertinent aspects of manufacturer's specifications. Pertinent aspects are considered to be those that directly relate to the safety function (e.g., diesel generator load capacity, time to load if critical) as opposed to general industrial equipment specifications that fall out from these capabilities (e.g., starting torque, motor insulation, number and type of windings). Such lower tier details should be implicitly included only by reference to the overall specifications. **4.3.X.3 Functional Requirements** This subsection identifies requirements that are specifically needed to fulfill safety functions. Such functional requirements are specified for both the safety-	ensuring that the consequences of the DBEs will be mitigated or prevented to the extent assessed in the DBE analysis and will permit the principles of defense-in-depth to be applied. In this regard, the degree of assurance and the selection of control strategies should be commensurate with the potential consequences and consistent with the definition of the operating environment. **Step 2 – Defining Performance Requirements.** Performance requirements are defined by the required accident frequency levels and/or required level of consequence mitigation for the defined safety envelope that must be achieved through the combination of controls and the designation of Important to Safety SSCs. For specific DBEs, it may also be possible to provide an indication that the required accident frequency level for SSCs not affected by the accident, such as an intact ventilation and filtration system, will help achieve the required frequency level for DBEs. When this is the case, the performance requirements for these unaffected SSCs should be identified as Important to Safety features and tracked during the design process with regard to their normal operation. This portion of the review is closely related to Section 4.7, "Hazard Controls," in this Guide. The Contractor should demonstrate by a systematic review of the DBE characteristics that the operating environment and performance requirements are adequately justified and documented. **4.7.2 Areas of Review** The reviewer will verify whether the Contractor has adequately determined the following: • Unmitigated DBE consequence and likelihood requirements.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
class SSC and any needed support safety-class SSCs. Limit functional requirement designation to those requirements necessary for the safety function. Functional requirements are provided for safety-class SSCs for the specific accident(s) where the safety-class SSC must function to meet the Evaluation Guidelines (e.g., if that accident is not initiated by an earthquake, the functional requirement does not involve seismic parameters). Functional requirements specifically address the pertinent response parameters or nonambient environmental stresses related to an accident for which the safety function is being relied upon. … **4.3.X.4 System Evaluation** This subsection provides performance criteria imposed on the safety-class SSC so it can meet functional requirement(s) and thereby satisfy its safety function. Performance criteria characterize the specific operational responses and capabilities necessary to meet functional requirements. Engineering judgment may be used to develop performance criteria for existing safety SSCs (i.e., already designed) where documentation of design and operational responses may not exist. In determining performance criteria for safety-class SSCs, existing criteria traditionally associated with safety-class designation, such as single failure criteria, should be considered in the judgment process. However, for existing SSCs, formal design comparison and compliance with traditional safety-class performance criteria is not required. Evaluate the capabilities of the SSC to meet performance criteria. The evaluation should be as simple as possible, and rely on engineering judgment, calculations, or performance tests as opposed to formal design	• Operating environment requirements for hazard control provisions. • SSC design requirements. • Human-action requirements. • As-designed requirements for SSCs Important to Safety. • As-designed requirements for human actions Important to Safety. • Specific analysis assumptions. • SSC reliabilities and uncertainties. • Mitigated consequence analysis results and uncertainties. • Effectiveness of hazard control provisions. The reviewer will ensure that when the term "Important to Safety" is used in the Contractor's submittal, it adheres to the following Contract definition: "Important to Safety. Structures, systems, and components that serve to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public. It encompasses the broad class of facility features addressed (not necessarily explicitly) in the top-level radiological, nuclear, and process safety standards and principles that contribute to the safe operation and protection of workers and the public during all phases and aspects of facility operations (i.e., normal operation as well as accident mitigation). This definition includes not only those structures, systems, and components that perform safety functions and traditionally have been classified as safety class, safety-related or safety-grade, but also	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
reconstitution. … **4.3.X.5 Controls (TSRs)** This subsection identifies those assumptions requiring TSRs to ensure performance of the safety function.	those that place frequent demands on or adversely affect the performance of safety functions if they fail or malfunction, i.e., support systems, subsystems, or components. Thus, these latter structures, systems, and components would be subject to applicable top-level radiological, nuclear, and process safety standards and principles to a degree commensurate with their contribution to risk. In applying this definition, it is recognized that during the early stages of the design effort all significant systems interactions may not be identified and only the traditional interpretation of Important to Safety, i.e., safety-related may be practical. However, as the design matures and results from risk assessments identify vulnerabilities resulting from non-safety-related equipment, additional structures, systems, and components should be considered for inclusion within this definition." The reviewer should refer to Section 5.0, "Development of Control Strategies," in Appendix A of the SRD and to Appendix B, "Implementing Standard for Defense in Depth," of the SRD to follow the logic used by the Contractor in selecting the hazard control strategies.	
4.4 SAFETY-SIGNIFICANT STRUCTURES, SYSTEMS, AND COMPONENTS Relevant information is provided, in the following SSC specific subsections, with descriptions sufficiently detailed to provide an understanding of the safety function of safety-significant SSCs. Descriptions for each safety-significant SSC must be complete enough to allow for verification of the accuracy of the safety analysis inputs and assumptions. Provide a summary list of safety-significant SSCs. This	**4.5.3.3.3 Regulatory Acceptance Criteria** The submittal on defining operating environments and performance requirements is acceptable if the Contractor has appropriately determined the most severe anticipated conditions under which Important to Safety SSCs must function, including temperature, pressure, humidity, radiation level, and chemical environment. The operating environments must support the provisions selected to implement the hazard control strategies and include the operating environment during normal operations	**Major portions of both DOE-STD-3009 and RL/REG-99-05 require the identification and management of SSCs that are relied upon to provide a safety function. However, DOE-STD-3009 requires the documentation of information for each SSC that is not organized in the same manner as in RL/REG-99-05. The DOE-STD-3009 organization of information is useful in providing a**

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
summary list should identify, in tabular form, safety-significant SSCs, the rationale from Chapter 3 for which safety-significant designation was made, safety functions, functional requirements, and performance criteria judged to require TSR coverage. The remaining subsections provide details that correlate to the summary list. NOTE**:** The following format is repeated sequentially for each ("X") safety-significant SSC. The examples provided are for illustration purposes only, and should not be construed as a requirement to designate such systems safety-class or safety-significant. **4.4.X [Applicable Safety-significant System, Structure, or Component]** Identify the safety-significant SSC. **4.4.X.1 Safety Function** This subsection states the reason for designating the SSC as a safety-significant SSC, followed by specific identification of its preventive or mitigative safety function(s) as determined in the hazard and accident analysis. Do not discuss non-safety functions. Safety functions are top-level statements that express the objective of the SSC in a given accident scenario. … The specific accident(s) or general rationale associated with the safety function should be identified. Safety-significant SSCs are designated for overall purposes such as defense-in-depth, for which even normal operation considerations are involved. There may, or may not be, a single accident that, by itself, completely defines the safety function. **4.4.X.2 System Description** This subsection provides a description of the safety-significant SSC and the basic principles by which it	and under off-normal and accident conditions. The Contractor's definition of the operating environment and the necessary performance requirements can be evaluated by considering the following two steps: **Step 1 – Defining the Operating Environment.** For selected DBEs, the normal operation of selected SSCs may help reduce the severity of or eliminate the dose consequences. When this is the case, these SSCs should be identified as Important to Safety for normal operation and tracked through the design process. The operating environment is defined using the DBE analysis to determine the required conditions that must be maintained to control hazards, such as temperature, pressure, humidity, radiation levels, and the chemical environment. Other information useful to defining the operational environment may include the need for early warning or alarms, and the potential need for respiratory protection. The definition of the operating environment should be clearly related to reasonably ensuring that the consequences of the DBEs will be mitigated or prevented to the extent assessed in the DBE analysis and will permit the principles of defense-in-depth to be applied. In this regard, the degree of assurance and the selection of control strategies should be commensurate with the potential consequences and consistent with the definition of the operating environment. **Step 2 – Defining Performance Requirements.** Performance requirements are defined by the required accident frequency levels and/or required level of consequence mitigation for the defined safety envelope that must be achieved through the combination of controls and the designation of Important to Safety SSCs. For specific DBEs, it	**complete description of each SSC and its safety function. As a result, RL/REG-99-05 (Sections 4.5.3.3.3 and potentially 4.7.2 and 4.7.3.3) will be expanded to include the details of the safety descriptions (found elsewhere throughout the PSAR) for the individual ITS SSCs in this section of the PSAR.** (See Endnotes 3, 4, and 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
performs its safety function. **…** Describe its boundaries and interface points with other SSCs relevant to the safety function. Identify SSCs whose failure would result in a safety-significant SSC losing the ability to perform its required safety function. These SSCs would also be considered safety-significant SSCs for the specific accident conditions or general rationale for which the safety-significant designation was made originally. When describing the SSC, provide a basic summation of the physical information known about the SSC, including simplified system drawings. If known, summarize pertinent aspects of manufacturer's specifications. Pertinent aspects are considered to be those that directly relate to the safety function (e.g., diesel generator load capacity, time to load if critical) as opposed to general industrial equipment specifications that fall out from these capabilities (e.g., starting torque, motor insulation, number and type of windings). Such lower tier details should be implicitly included only by reference to the overall specifications. **4.4.X.3 Functional Requirements** This subsection identifies requirements that are specifically needed to fulfill safety functions. Such functional requirements are specified for both the safety-significant SSC and any needed support safety-significant SSCs. Limit functional requirement designation to those requirements necessary for the safety function. Functional requirements are provided for safety-significant SSCs for the specific accident(s) or general rationales for which the SSC is needed (e.g., if that accident is not initiated by an earthquake, the functional requirement does not involve seismic parameters).	may also be possible to provide an indication that the required accident frequency level for SSCs not affected by the accident, such as an intact ventilation and filtration system, will help achieve the required frequency level for DBEs. When this is the case, the performance requirements for these unaffected SSCs should be identified as Important to Safety features and tracked during the design process with regard to their normal operation. This portion of the review is closely related to Section 4.7, "Hazard Controls," in this Guide. The Contractor should demonstrate by a systematic review of the DBE characteristics that the operating environment and performance requirements are adequately justified and documented. **4.7.2 Areas of Review** The reviewer will verify whether the Contractor has adequately determined the following: • Unmitigated DBE consequence and likelihood requirements. • Operating environment requirements for hazard control provisions. • SSC design requirements. • Human-action requirements. • As-designed requirements for SSCs Important to Safety. • As-designed requirements for human actions Important to Safety. • Specific analysis assumptions. • SSC reliabilities and uncertainties. • Mitigated consequence analysis results and uncertainties. • Effectiveness of hazard control provisions.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
Functional requirements specifically address the pertinent response parameters or nonambient environmental stresses related to an accident for which the safety function is being relied upon. In the hydrogen detector example, one obvious parameter would be maintaining hydrogen concentration below the explosive limit. If the offgas temperature was significantly above ambient temperatures, operation at that temperature would be a functional requirement as well. **4.4.X.4 System Evaluation** This subsection provides performance criteria imposed on the safety-significant SSC so it can meet functional requirement(s) and thereby satisfy its safety function. Performance criteria characterize the specific operational responses and capabilities necessary to meet functional requirements. Safety-significant SSCs, are not required to consider performance criteria traditionally associated with safety-class SSCs or traditional nuclear standards in general. Performance criteria for a safety-significant SSC should be representative of the general rigor associated with non-nuclear power reactor industrial and OSHA practices. Performance criteria for safety-significant SSCs are developed by SAR preparers using engineering judgment based on the expected functions for which it was designated a safety-significant SSC and its overall importance to safety. Evaluate the capabilities of the SSC to meet performance criteria. The evaluation should be as simple as possible, and rely on engineering judgment, calculations, or performance tests as opposed to formal design reconstitution. … **4.4.X.5 Controls (TSRs)**	The reviewer will ensure that when the term "Important to Safety" is used in the Contractor's submittal, it adheres to the following Contract definition: "Important to Safety. Structures, systems, and components that serve to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public. It encompasses the broad class of facility features addressed (not necessarily explicitly) in the top-level radiological, nuclear, and process safety standards and principles that contribute to the safe operation and protection of workers and the public during all phases and aspects of facility operations (i.e., normal operation as well as accident mitigation). This definition includes not only those structures, systems, and components that perform safety functions and traditionally have been classified as safety class, safety-related or safety-grade, but also those that place frequent demands on or adversely affect the performance of safety functions if they fail or malfunction, i.e., support systems, subsystems, or components. Thus, these latter structures, systems, and components would be subject to applicable top-level radiological, nuclear, and process safety standards and principles to a degree commensurate with their contribution to risk. In applying this definition, it is recognized that during the early stages of the design effort all significant systems interactions may not be identified and only the traditional interpretation of Important to Safety, i.e., safety-related may be practical. However, as the design matures and results from risk assessments identify vulnerabilities	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
This subsection identifies those assumptions requiring TSRs to ensure performance of the safety function.	resulting from non-safety-related equipment, additional structures, systems, and components should be considered for inclusion within this definition." The reviewer should refer to Section 5.0, "Development of Control Strategies," in Appendix A of the SRD and to Appendix B, "Implementing Standard for Defense in Depth," of the SRD to follow the logic used by the Contractor in selecting the hazard control strategies. **4.7.3.3 Regulatory Acceptance Criteria** The Contractor's analysis of hazard controls is acceptable if the Contractor demonstrates that the selected hazard control provisions and strategies satisfactorily mitigate or prevent the accidents identified in the PSAR.	
CHAPTER 5 DERIVATION OF TECHNICAL SAFETY REQUIREMENTS The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(p), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)16, of the Order (Topic 16). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. [NOTE: The cited text from DOE 5480.23 identifies the derivation of TSRs. Attachment 1, Topic 16 addresses the derivation in detail identifying the following parameters for inclusion: • Safety Limits;	**4.8 Technical Safety Requirements** The technical safety requirements (TSRs) consist of two areas: 1) potential safety limits, and 2) other draft TSRs. These areas are discussed in the following sections. **4.8.1 Potential Safety Limits** **4.8.1.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes appropriate safety limits for the hazard control provisions and strategies for the Contractor's facility according to the applicable requirements of the Contract (including the SRD). The review will also determine whether the Contractor's submittal adequately provides the basis for developing safety limits to ensure that the facility will operate within the analyzed safety basis.	The derivation of technical safety requirements is common to both DOE-STD-3009 and the CAR Guide. Specifically, the requirements cited in DOE 5480.23 include surveillance requirements that are to be developed on the basis of the information provided in the TSRs. This subject is addressed in Section 4.8.2.2 of the CAR Guide. (See Endnotes 2 and 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
• Limiting Safety System Settings/Limiting Control Settings; • Limiting Conditions for Operations; and • Surveillance Requirements. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**4.8.2 Other Draft Technical Safety Requirements** **4.8.2.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately identifies appropriate draft TSRs other than potential safety limits for the final hazard control provisions and strategies for its facility and provides an adequate basis for ensuring operation of facility within the analyzed safety basis.	
5.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**4.8.1.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the proposed potential safety limits. Both "safety limits" and "operating limits" (as discussed below under "Regulatory and Contractual Requirements") comprise this portion of the TSRs. Because the PSAR only defines potential safety limits and safety limits that may change as the design process and safety analysis continue beyond the start of construction, it is not possible to demonstrate that application of these limits will ensure facility operations within the analyzed safety basis. Such a demonstration is required in the FSAR. At the CAR stage of design, it is adequate to demonstrate that the selection of potential safety limits complies with related standards in the SRD. **4.8.2.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the draft proposed limiting conditions for operation, surveillance requirements, and administrative controls.	Expectations regarding TSRs in the CAR Guide are limited to "potential safety limits for hazard control provisions and strategies" and "draft TSRs…for final hazard control provisions and strategies." The purpose of the potential safety limits and draft TSRs at the PSAR stage is primarily for evaluations of the adequacy of the Contractor's hazard evaluation and selection of control strategies. A complete set of TSRs and the graded approach thereto will be developed for the FSAR.
5.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders, which are required for establishing the	**4.8.1.3.2 Regulatory and Contractual Requirements** The requirements for potential safety limits are	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	found in the Regulatory Process document (DOE/RL-96-0003, Rev. 1), which states the following two general contractual requirements: • Approval Condition: "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been…*sufficiently controlled/mitigated* [emphasis added]…to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope." • Submittal Requirements: *"Potential safety limits and the justification for their selection*," and a PSAR containing: **…***"Analysis of the safety basis* for the facility in terms of physical design, structures with prescribed safety functions, systems with prescribed safety functions, equipment with prescribed safety functions, operating modes, operating conditions, off-normal internal events considered, external events considered, assumptions made, uncertainties in data and analyses, *safety limit*s, and *operating limit*s." [emphases added] Related regulatory and contractual requirements are found in the SRD. Specific safety criteria that apply to potential safety limits include the following: Safety Criterion 9.2-1, which states, "Technical safety requirements shall be prepared and submitted for approval, and the facility shall be operated in accordance with the approved technical safety requirements." The implementing standards are from the ISMP, Section 1.3.15, "Operations," and Section 3.3.1.4, "Technical Safety Requirements." Safety Criterion 9.2-3 (items 1 and 2a) describes the standard for TSRs, consisting of "Safety Limits	contract-stipulated ISM process and results are documented in the Contractor's SRD. Thus, safety basis information pertinent to the safety analysis expected under RL/REG-99-05 is similar to that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	(item 1)," and "Limiting Control Settings (item 2a)." Each of these items is further defined in the SRD. The implementing standard is from the ISMP, Section 3.3.1.4, "Technical Safety Requirements." Safety Criterion 9.2-4, which states, "Technical safety requirements shall be kept current at all times so that they reflect the facility as it exists and as it is analyzed in the SAR." The implementing standards are from the ISMP, Section 3.3.1.4 and Section 4.2.3.4, both entitled "Technical Safety Requirements."	
5.3 TSR COVERAGE This section provides assurances that TSR coverage for the facility is complete. This section lists the features identified in Chapters 3 and 4 that are needed to: • Provide significant defense in depth. These features are safety-significant SSCs noted in Section 3.3.2.3.2 and their associated assumptions requiring TSR coverage identified in Section 4.4.X.5, and any other TSR assumptions identified in accordance with screening criteria of DOE 5480.22 in Section 3.3.2.3.2. • Provide for significant worker safety. These features are safety-significant SSCs identified in Section 3.3.2.3.3 and their associated assumptions requiring TSR coverage identified in Section 4.4.X.5, and any programs identified as needing coverage in TSR administrative controls in Section 3.3.2.3.3. • Maintain consequences of facility operations below Evaluation Guidelines. These features are safety-class SSCs and assumptions requiring TSR coverage identified in Sections 3.4.2.X.5, and 4.3.X.5. This subsection will specifically note those safety SSCs listed, if any, that will not be provided with TSR coverage and provide accompanying explanation. Designation as a	**4.8.2.3.3 Regulatory Acceptance Criteria** The Contractor's selection of other draft TSRs is acceptable if the description of "surveillance requirements," "administrative controls," "use and application," and "appendices" complies with Safety Criterion 9.2-3 (items 2b and 3-6).	Expectations regarding TSRs in the CAR Guide are limited to "potential safety limits for hazard control provisions and strategies" and "draft TSRs…for final hazard control provisions and strategies." The purpose of the potential safety limits and draft ISRs at eh PSAR stage is primarily for evaluations of the adequacy of the Contractor's hazard evaluation and selection of control strategies. A complete set of TSRs is expected in the Contractor's FSAR submittal. (See Endnote 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
design feature, in accordance with DOE 5480.22, that is not provided a safety limit is an acceptable rationale for lack of TSR coverage.		
5.4 DERIVATION OF FACILITY MODES This section derives basic operational modes (e.g., startup, operation, shutdown) used by the facility that are relevant to derivation of TSRs. The definition of modes required in this subsection expands and formalizes the information provided in Chapter 3, "Hazard and Accident Analyses," regarding operational conditions associated with accidents.	None.	The CAR Guide is designed for review of the PSAR prior to construction, with detailed requirements for normal and off-normal facility operations. Per the RPP-WTP regulatory process, mode derivation, including shutdown will be addressed in the FSAR.
5.5 TSR DERIVATION NOTE: This information can be organized by the hazard protected against, specific features, or even actual TSRs if desired. The choice of a specific method of organization is left to the discretion of the SAR preparer. The following format is repeated sequentially for each TSR ("X"). **5.5.X [Applicable Hazard/Feature/TSR "X"]** This subsection identifies the specific feature(s) listed in Section 5.3 and the relevant modes of operation. **5.5.X.1 Safety Limits, Limiting Control Settings, and Limiting Conditions for Operation** This section provides the basis and identifies information sufficient to derive SLs, LCSs, and LCOs to support the facility TSR documentation required by DOE 5480.22. SLs, if used, are reserved for a small set of extremely significant features that prevent potentially major offsite impact. LCSs are developed for any SL that is protected by an automatic device with setpoints. LCSs/LCOs act to keep normal operating conditions below the SLs and are developed for each SL identified, thereby providing a margin of safety. Most LCOs are assigned without an accompanying SL. Generally SLs are applicable only for protection of passive barriers as close to the accident source as possible whose	**4.8.2.3.3 Regulatory Acceptance Criteria** The Contractor's selection of other draft TSRs is acceptable if the description of "surveillance requirements," "administrative controls," "use and application," and "appendices" complies with Safety Criterion 9.2-3 (items 2b and 3-6).	The DOE-STD-3009 guidance for TSR derivation is flexibile, allowing the SAR preparer to determine how to organize and present the relevant information. The discussion of format (with the sequentially repeated TSR "X" notation), outlines the key features to be documented. Although less prescriptive, the CAR Guide does request similar information and requires consistency with the Safety Criterion found in the Contractor's SRD. (See Endnote 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
failure, due to the occurrence of a specific event, will result in exceeding Evaluation Guidelines. Mitigation of releases is generally not amenable to useful definition of SLs. **5.5.X.2 Surveillance Requirements** This section provides the basis and identifies information necessary to derive Surveillance Requirements that address testing, calibration, or inspection requirements to maintain operation of the facility within SLs, LCSs, and LCOs. **5.5.X.3 Administrative Controls** This section provides the basis and identifies information necessary to derive TSR administrative controls. This section is the only applicable section for those features listed in Section 5.3, "TSR Coverage," that are provided with only TSR administrative controls. The rationale for assigning TSR administrative controls need to be clearly and briefly stated. A special type of TSR administrative control is that covering a safety management program. The administrative controls section of the TSR document will contain commitments to establish, maintain, and implement these programs at the facility and, as appropriate, facility staffing requirements.		
5.6 DESIGN FEATURES This section identifies and briefly describes the passive design features not specifically required to have TSRs in accordance with the definition in DOE 5480.22. Simply reference Chapter 2, "Facility Description" if that chapter contains the desired information.	**1.2.3.3 Regulatory Acceptance Criteria** The Contractor's facility description submittal is acceptable if it is presented at a level of detail appropriate to support the Preliminary Safety Analysis (PSA) (see Section 4.0 of this Guide). The submittal should identify and describe the facility, emphasizing features that are Important to Safety and should describe the facility safety functions and their bases. If such information is available elsewhere in the submittal, the appropriate sections	DOE-STD-3009 requests the identification of passive design features of the facility that are not specifically required to have TSRs, while the CAR Guide includes review of adequate measures to support the PSA. (See Endnote 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	of the submittal can be referenced.	
5.7 INTERFACE WITH TSRS FROM OTHER FACILITIES This section summarizes TSRs from other facilities that affect this facility's safety basis and briefly summarize the provisions of those TSRs.	None.	The CAR Guide provides guidance on draft TSRs required to support the PSAR. A final set of TSRs, including TSRs from other facilities that affect RPP-WTP safety basis, is expected in the FSAR.
CHAPTER 6 PREVENTION OF INADVERTENT CRITICALITY The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(h), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)8, of the Order (Topic 8). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the inadvertent criticality prevention program. It is intended to describe the essential features of the program as it relates to facility safety. [NOTE: The cited text from DOE 5480.23 identifies inadvertent criticality protection. Attachment 1, Topic 8 addresses the topic in detail identifying; the Double Contingency Principle; establishing verification; criticality safety design limits; and error contingency criteria. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**6.0 NUCLEAR CRITICALITY SAFETY** **6.1 Purpose Of Review** The purpose of this review is to determine whether the Contractor has implemented an acceptable Nuclear Criticality Safety (NCS) program, including adequate measures to prevent criticality.	The review methodology for nuclear criticality safety is similar in both DOE-STD-3009 and the CAR Guide. The CAR Guide includes review of adequate measures designed to prevent criticality where DOE-STD-3009 describes the identification of essential features of the inadvertent criticality prevention program as they relate to facility safety for existing facilities. (See Endnote 2)
6.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes	**6.2 Areas Of Review** The reviewer will determine whether the Contractor's submittal adequately describes the	Both DOE-STD-3009 and the CAR Guide include introductory material on criticality safety supporting the safety analysis that

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
objectives and scope specific to the chapter as developed.	NCS program as discussed in the following sections. 1. **NCS Organizational Responsibilities** – The review will verify that the Contractor has established an organization that has appointed individuals with the responsibility and authority for ensuring NCS. **…** 2. **Management Control Systems for NCS** – The reviewer will determine whether the Contractor has committed to administrative controls to ensure NCS … 3. **NCS Technical Practices** – The reviewer will verify that the Contractor has adequately addressed the following elements of NCS technical practices, as found in the PSA hazard and accident analysis (Section 4.0 in the CAR Review Guide) **…** The reviewer will also verify that enough detail is provided so that criticality controls and double contingency analyses can be reviewed. This includes reviewing examples of both the input and output data that involve major modeling changes to ensure that the calculations were performed correctly.	follows. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
6.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**6.3.2 Regulatory and Contractual Requirements** The requirements for the NSC program are found in the Regulatory Process document (DOE/RL-96-0003, Rev. 1), which states, "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been adequately assessed, sufficiently controlled/mitigated, and adequately documented in a formally controlled Preliminary Safety Analysis Report (PSA) to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope."	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated ISM process and results are documented in the Contractor's SRD. Thus, safety basis information pertinent to the safety analysis expected under RL/REG-99-05 is similar to that expected under DOE-STD-3009. Further, the Contractor has adopted ANSI/ANS 8.1.3 and 8.19 as implementing standards, the same standards required by the DOE Orders. Therefore, the intent of the DOE-STD-3009 guidance is

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Criticality-related Safety Criteria 3.3-1 through 3.3-8 2 require that the facility be designed and operated in a manner that prevents criticality. These criteria form the detailed regulatory and contractual requirements for reviewing criticality safety in the Construction Authorization Request (CAR). ANSI/ANS 8.1 3 and 8.19 also have been included as implementing standards for the safety criteria.	met. (See Endnote 2)
6.3 CRITICALITY CONCERNS This section identifies the fissile material available within the facility and provides information on the location of potential criticality hazards (e.g., description, drawing), the fissile material form (e.g., chemical and/or physical, including isotopic content, concentration, densities), and the maximum quantities involved. This information should be summarized from Chapter 3, "Hazard and Accident Analyses."	**6.3.3 Regulatory Acceptance Criteria** The Contractor's NCS submittal is acceptable if the following criteria are met. (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 3. **NCS Technical Practices** – The NCS aspects of the PSA are acceptable if the following criteria are met: a. Hazard and Accident Analyses - Criticality hazards are identified and evaluated for each point in the process where significant quantities of fissile material may accumulate. This qualitative analysis should be based on estimates of fissile material inventory, composition, and concentration at the accumulation point (e.g., process tank). The accident analysis in the PSA describes in detail all credible accident sequences associated with the criticality hazards identified in the hazard analysis. These accident sequences consider credible normal events, fire, loss of electrical services, and other potential common-mode failures (Safety Criterion 3.3-2). Note: A "credible" event has a frequency greater than 1.0E-06/year. **…**	The identification of criticality concerns is consistent between the two documents. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
6.4 CRITICALITY CONTROLS This section summarizes information relevant to criticality control. Include a general discussion of the criticality safety design limits, their bases, and any design criteria	**6.3.3 Regulatory Acceptance Criteria** The Contractor's NCS submittal is acceptable if the following criteria are met. (Alternative descriptions also may be acceptable if they are adequately	The identification of criticality controls is consistent between the two documents. DOE-STD-3009 requests a discussion of

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
used to ensure subcritical configurations under all normal, abnormal, and accident conditions (i.e., ensure criticality limits are not exceeded); the parameters used for the prevention and control of criticality and the methods for the application and validation of these parameters; and the application of the double contingency principle in criticality safety. It is not the intention of this section to individually list all criticality safety design limits.	justified and meet applicable requirements.) **…** **3. NCS Technical Practices** **...** 3.b.iv. NCS Limits – The development of NCS limits used to ensure that credible criticality accident scenarios are prevented is acceptable if the following criteria are met.	design criteria used to ensure subcritical configuration under all normal, abnormal and accident conditions, while the CAR Guide addresses NCS limits used to "ensure that credible criticality accident scenarios are prevented."
6.4.1 Engineering Controls This section summarizes the safety design limits on engineered controls, either passive or active, and the bases placed on equipment designs or operations to ensure subcritical conditions under all normal, abnormal, and accident conditions. Include in the summary of these engineered controls use of geometry, spacing, and any other engineered controls (e.g., neutron absorbers, elimination of moderators, storage location limitations, and level detectors). This section also summarizes the configuration control program as it relates to the configuration of the equipment used to store, handle, transport, or process fissile material, as required by DOE 5480.24 Sections 7.c and 7.e.	**6.3.3 Regulatory Acceptance Criteria** The Contractor's NCS submittal is acceptable if the following criteria are met.(Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **3. NCS Technical Practices** **...** 3.b.iv. NCS Limits *Techniques for NCS Control*: Where practicable, reliance is placed on equipment design that uses passive-engineered controls rather than on administrative controls (Safety Criterion 3.3-4). The following are techniques for NCS control, listed in the order of preference: **...** • Passive-engineered controls use fixed design features or devices. No human intervention is required except maintenance and inspection. • Active-engineered controls use active hardware to sense parameters and automatically secure the system to a safe condition. No human intervention is required. **…**	The identification of engineering controls against criticality is consistent between the two documents. The CAR Guide states that passive engineered controls are preferred to other forms of control where DOE-STD-3009 does not make this distinction. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
6.4.2 Administrative Controls This section summarizes the administrative controls used to prevent accidental criticality. Include in the discussion the administrative controls on nuclear material safety limits such as mass, moderators, changes in geometry	**6.3.3 Regulatory Acceptance Criteria** The Contractor's NCS submittal is acceptable if the following criteria are met.(Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…**	The use of administrative controls to prevent accidental criticality is consistent between the two documents. The CAR Guide states that passive engineered controls are preferred to other forms of control where DOE-STD-

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
configurations, and procedures for handling, storing, and transporting fissile materials. Discuss also the administrative controls for reviewing and approving changes to process or system configurations.	**2. Management Control Systems for NCS** The management control systems are acceptable if the following criteria are met for the elements specific to NCS. Additional acceptance criteria for the elements for the management control systems regarding configuration management and maintenance are outlined in Sections 3.1 and 3.2, respectively, in the CAR Review Guide. a. Quality Assurance – The Contractor's QA program is considered acceptable if the Contractor has met the following acceptance criteria: • NCS codes and software are subject to QA controls [required by Section 4.3.4 (untitled) of ANSI/ANS 8.1]. • Supervision verifies that new or modified equipment complies with NCS specifications before it is used (e.g., based on inspection reports from the Contractor's QA function) (required by Section 4.1.2, "Process Analysis," of ANSI/ANS 8.1). b. Training – The Contractor's training program is considered acceptable if the Contractor has met the acceptance criteria in "Training and Qualifications," in the CAR Review Guide as they apply to NCS. c. Operational Inspections, Audits, Assessments, and Investigations – The program for operational inspections, audits, assessments, and investigations is considered acceptable if the following element is included. • Consistent with ANSI/ANS-8.1, operations are reviewed at least annually to verify that procedures are being followed and that process conditions have not been altered to adversely affect NCS. These reviews are conducted, in	3009 does not make this distinction. The Contractor has adopted ANSI/ANS 8.1.3 and 8.19 as implementing standards, the same standards required by the DOE Orders. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	consultation with operating personnel, by Contractor reviewers who are knowledgeable in NCS and who (to the extent practicable) are not immediately responsible for the operations. **3. NCS Technical Practices …** **3.b.iv. NCS Limits …** *Techniques for NCS Control*: Where practicable, reliance is placed on equipment design that uses passive-engineered controls rather than on administrative controls (Safety Criterion 3.3-4). The following are techniques for NCS control, listed in the order of preference: **…** • Augmented administrative controls rely on human judgment, training, and actions for implementation but use warning devices (visual or audible) that require specific human actions to occur before the process can proceed with the augmented administrative controls. Simple administrative controls rely solely on human judgment, training, and actions for implementation. **…**	
6.4.3 Application of Double Contingency Principle This section summarizes the methods used to ensure that at least more than one unlikely, independent, and concurrent changes in process conditions would be necessary before a criticality accident is possible (e.g., contingency or criticality safety evaluation). The contingency or criticality safety evaluation will identify how the double contingency principle, as defined in DOE 5480.24, is being met (i.e., control of two independent process parameters or a system of multiple controls on a single parameter). It is not the intention of this section to individually present all facility contingency or criticality safety evaluations.	**6.3.3 Regulatory Acceptance Criteria** The Contractor's NCS submittal is acceptable if the following criteria are met.(Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 3. **NCS Technical Practices** – The NCS aspects of the PSA are acceptable if the following criteria are met: b. Criticality Safety Evaluations – Criticality safety evaluations, which include analyzing k_{eff} for the system in question (Safety Criterion 3.3-2) and	The application of double contingency principle against criticality is consistent between the two documents. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
The results of the contingency or criticality safety evaluation helps identify safety SSCs, controls, and the TSR limit designations (safety control parameters). The identification of safety SSCs and safety control parameters for TSR controls may be done as part of Chapter 3, "Hazard and Accident Analyses," Chapter 4, "Safety Structures, Systems, and Components," and Chapter 5, "Derivation of Technical Safety Requirements."	determining criticality controls, must be performed for each accident sequence in the PSA where criticality is identified as a credible event. Criticality safety evaluations in the PSA are considered acceptable if the following criteria are met: **…** iii. Adherence to the Double Contingency Principle – The PSA demonstrates, for each system that could cause a nuclear criticality, that the system possesses double contingency (required by Safety Criterion 3.3-3). A process design possesses double contingency if it incorporates sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. The term "independent" as used in double contingency or in control failures and other events in accident sequences means that the probability of failure of one event is the same, regardless of whether the other event has occurred. This means that no event is a common cause of both events in question and that the occurrence of either does not influence the probability of the other. Independence may not hold for two safety controls when failure of one control causes process or environmental conditions that place stress on the other control. Two administrative safety procedures performed by the same individual, or by a group of individuals in close cooperation, cannot be independent. Protection against criticality shall be provided by either 1) the control of two independent process parameters or 2) a system of multiple independent controls on a single process parameter. The first method is preferred because of the difficulty in preventing common-mode failure when controlling	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	only one parameter. In all cases, to possess double contingency, no single credible event or failure shall result in a criticality accident. **…**	
6.5 CRITICALITY PROTECTION PROGRAM This section presents an overview of the organizational structure and interfaces, and the technical and administrative practices of the criticality protection policy and programs. **6.5.1 Criticality Safety Organization** This section summarizes the organizational structure that administers the criticality safety program. Include information about staffing levels, positions of authority and responsibilities, and staff qualifications. Discuss the interfaces and interrelationships with other safety organizations and facility operations. Reference the administrative plans and procedures that implement the criticality safety program. Include in the summary the purpose, organization, and functions of any committees responsible for criticality safety. Include in the description the charter of responsibilities, scope of reviews, and qualifications and requirements for committee members. This summary may be provided in this chapter or Chapter 17, "Management, Organization, and Institutional Safety Provisions."	**6.3.3 Regulatory Acceptance Criteria** 1. **NCS Organizational Responsibilities** – The Contractor's organization and management system are considered acceptable if the following criteria are met: • The Contractor's organization and management system provides for all elements contained in ANSI/ANS-8.19, "Administrative Practices for Nuclear Criticality Safety." • The Contractor describes the organizational positions, functional responsibilities, experience, and adequate qualifications of persons responsible for NCS. • Management clearly establishes responsibility for NCS at the facility (required by Section 4.1.1, "Responsibilities," of ANSI/ANS 8.1). • Management provides personnel skilled in interpreting data pertinent to NCS and familiar with the facility's operation to serve as advisors to supervision. To the extent practicable, these specialists are administratively independent of process supervision (required by Section 4.1.1, "Responsibilities," of ANSI/ANS 8.1). • The PSA team includes an individual who has the appropriate NCS experience and qualifications. • Written procedures govern operations pertinent to NCS. The Contractor's submittal includes a method for developing procedures that includes controls and limits significant to the operation's NCS and that specifies all parameters procedurally controlled (required by Section 4.1.3, "Written Procedures," of ANSI/ANS 8.1).	The guidance to establish the criticality protection program, with a definition of the organizational and management structure, and the technical, and policy practices is consistent between the two documents. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Procedures related to NCS may not be fully developed when the CAR is submitted. However, the CAR is expected to satisfy the acceptance criteria in "Procedures," in the CAR Review Guide as they apply to NCS. **…**	
6.5.2 Criticality Safety Plans and Procedures This section summarizes the criticality safety plans and procedures for governing operations involving fissile materials. Discuss the document control measures employed to ensure that plans and procedures, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the locations where fissile materials are used, processed, or stored. Include in the summary abstracts of procedures for posting criticality safety limits, material and operational controls, review of operations, emergency evacuation, and guidelines for permitting fire fighting water or other moderating materials used to suppress fires within or adjacent to moderation control areas. These guidelines on fire fighting are based on comparisons of risks and consequences of accidental criticality with the risks and consequences of postulated fires for the respective areas. The bases for guidelines for fire fighting are to be referenced or documented here. This section is interdependent with Chapter 11, "Operational Safety" and Chapter 17, "Management, Organization, and Institutional Safety Provisions."	**6.3.3 Regulatory Acceptance Criteria** 1. **NCS Organizational Responsibilities** – The Contractor's organization and management system are considered acceptable if the following criteria are met: • The Contractor's organization and management system provides for all elements contained in ANSI/ANS-8.19, "Administrative Practices for Nuclear Criticality Safety." **...** • Written procedures govern operations pertinent to NCS. The Contractor's submittal includes a method for developing procedures that includes controls and limits significant to the operation's NCS and that specifies all parameters procedurally controlled (required by Section 4.1.3, "Written Procedures," of ANSI/ANS 8.1). Procedures related to NCS may not be fully developed when the CAR is submitted. However, the CAR is expected to satisfy the acceptance criteria in Section 3.9, "Procedures," in the CAR Review Guide as they apply to NCS. **…** • Contractor procedures shall ensure that deviations from operating procedures and unforeseen alterations in process conditions that affect NCS shall be documented, reported to management, investigated promptly, and corrected as appropriate. **…**	The identification of criticality safety plans and procedures is consistent between the two documents. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
6.5.3 Criticality Safety Training This section summarizes the scope of facility wide criticality safety training as well as the specific training	**6.3.3 Regulatory Acceptance Criteria …** **2. Management Control Systems for NCS** – The management control systems are acceptable if the	The guidance for criticality safety training is consistent between the two documents.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
requirements for personnel associated with the operation of the facility. Discuss specifically the training of personnel on the configuration of the equipment used to store, handle, transport, or process fissile material. Reference, as appropriate, Chapter 12, "Procedures and Training" if that chapter presents requested information.	following criteria are met for the elements specific to NCS. **…** b. Training – The Contractor's training program is considered acceptable if the Contractor has met the acceptance criteria in Section 3.4, "Training and Qualifications," in this Guide as they apply to NCS. **…**	
6.5.4 Determination of Operational Nuclear Criticality Limits This section summarizes the analytical approach (i.e., methods, codes, and analysis techniques) used to derive operational nuclear criticality limits, including the error contingency criteria or margin of error (uncertainty), the use of contingency analyses, and the basic justification of the appropriateness of such an approach (i.e., bases and design criteria). This section should not include detailed calculations and limits for the facility. This section explains and demonstrates the relationship between operational nuclear criticality limits and their TSR designations.	**6.3.3 Regulatory Acceptance Criteria** 3. **NCS Technical Practices …** iv. NCS Limits – The development of NCS limits used to ensure that credible criticality accident scenarios are prevented is acceptable if the following criteria are met. *Assumptions Used for Developing NCS Limit*s: Optimum conditions (i.e., most reactive-conditions) are assumed for each parameter unless specified and acceptable controls are implemented to limit the parameters to certain values. **…** k_{eff} at the safety limit is always less than 1. "Safety limit" (as applied to NCS) means a limit on a controlled parameter that has sufficient margin for uncertainties, abnormal events, and process variations so that high confidence exists that the system will be subcritical as intended. Margins would normally be included for both estimated and unknown uncertainties (administrative margin) in determining k_{eff} and for uncertainties in determining or controlling the actual value of the controlled process parameter. **…** *Consideration of Heterogeneous Effect*s: Heterogeneous effects are considered in deriving NCS, particularly for low-enriched uranium processes, where heterogeneous systems are more reactive than homogeneous systems when all other	The determination of criticality safety limits for the facility is consistent between the two documents. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	parameters are equal. *Maximum k_{eff}*: Controlled parameter safety limits are determined such that below the safety limit, keff is less than 0.95, including adjustments for bias and uncertainty at the 95% confidence level (Safety Criterion 3.3-2). The uncertainty calculated for k_{eff} should include uncertainty in input parameters used in the calculation of k_{eff} and uncertainty from the numerical methods used in the calculation. *Techniques for NCS Contro*l: Where practicable, reliance is placed on equipment design that uses passive-engineered controls rather than on administrative controls (Safety Criterion 3.3-4). **…** *Methods of NCS Control (Controlled Parameters*): Several methods of NCS control are available (i.e., controlled parameters). Controlled parameters available for NCS control include mass, favorable geometry, density, enrichment, reflection, moderation, concentration, interaction, neutron absorber (e.g., boron), volume, process variables (e.g., temperature and pH), flow controls, and instrumentation. **…** v. NCS Control Parameters – The following 12 parameters are typically used to control NCS: *Mas*s **…** *Favorable Geometr*y **…** *Density***…** *Enrichment* **…** *Reflection* **…** *Moderation* **…** *Concentration* **…** *Interaction* **…** *Neutron Absorber* **…**	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Volume **…** *Process Variable(s)* **…** *Flow Controls* **…** *Instrumentation* **…**	
6.5.5 Criticality Safety Inspections/Audits This section summarizes the criticality safety inspection and audit programs which verify the established procedures used for preventing inadvertent criticalities. This includes their responsibilities and authorizations and the criteria used to select items, functions, analysis, etc., for inspections and audits. This section also provides a discussion of associated facility record keeping.	**6.3.3 Regulatory Acceptance Criteria …** 2. **Management Control Systems for NCS** – The management control systems are acceptable if the following criteria are met for the elements specific to NCS. **…** c. Operational Inspections, Audits, Assessments, and Investigations – The program for operational inspections, audits, assessments, and investigations is considered acceptable if the following element is included. • Consistent with ANSI/ANS-8.1, operations are reviewed at least annually to verify that procedures are being followed and that process conditions have not been altered to adversely affect NCS. These reviews are conducted, in consultation with operating personnel, by Contractor reviewers who are knowledgeable in NCS and who (to the extent practicable) are not immediately responsible for the operations.	The guidance for the establishment of criticality safety inspections and audits is consistent between the two documents.
6.5.6 Criticality Infraction Reporting and Follow-Up This section provides a brief summary of the criticality infraction program for reporting and follow-up of criticality infractions. Include in the discussion provisions for the recovery from criticality infractions. Provide brief assurances that program results and lessons learned are incorporated into the safety analysis.	**3.7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal is acceptable if the Contractor describes an incident investigation program that meets the following regulatory criteria: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.)**…** **APPENDIX 3.8-A Health & Safety Records …** e. Procedures for maintaining auditable records and documentation related to abnormal events, investigations, and root cause analysis. For each	The reporting and follow-up associated with any criticality infractions is consistent between the two documents.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	incident, the incident report should describe contributing factors, root cause analysis (as appropriate based on significance of the event), and findings and recommendations. Findings are reviewed with all affected personnel. Upon request, original reports of investigative teams will be made available to the OSR for review. Documentation related to determining the causes of the events shall be maintained for the life of the facility. **…**	
6.6 CRITICALITY INSTRUMENTATION This section summarizes the criticality alarm system and detection systems used to mitigate exposures from a criticality event. Include in the summary the methods and procedures used to determine the placement of the monitoring equipment and the selection of the equipment functions and sensitivity, if required.	**6.3.3 Regulatory Acceptance Criteria …** **2. NCS Technical Practices** **…** c. Criticality Alarms – The criticality accident alarm system committed to in the PSA is considered acceptable if the following criteria are met: • The Contractor demonstrates criticality alarm system coverage for all systems and activities (e.g., processing, storage, and handling) that the PSA identifies as credible nuclear criticality hazards (Safety Criterion 3.3-6). • In areas requiring criticality alarm coverage, excessive radiation dose rates are reliably detected and audible alarms are signaled for conditions requiring personnel evacuation; and analyses are provided to demonstrate that the detector can adequately and reliably detect a nuclear criticality at the points where criticality monitoring instrumentation is placed. • Emergency plans are maintained where alarm systems are installed. • The system is uniform throughout for the type of radiation detected, the mode of detection, the alarm signal, the system dependability, and the design criteria. • An alarm is clearly audible in all areas that must be evacuated.	The guidance for criticality instrumentation and alarms is consistent between the two documents. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	• Approved procedures are implemented for calibrating instrumentation, testing (individual detectors and the entire system), and documenting the results; and these procedures are embedded in the configuration management system. • The system can detect a nuclear criticality that produces a neutron-plus-gamma absorbed dose of 20 rads in soft tissue at an unshielded distance of 2 meters within one minute (Safety Criterion 3.3-7). • Formal training is required for personnel to recognize the criticality alarm signal and to evacuate promptly to a safe area. • The effects of shielding and geometry are considered in demonstrating the adequacy of the alarms to detect a nuclear criticality.	
CHAPTER 7 RADIATION PROTECTION The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(i), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)9 and 4.f.(3)(d)11a, of the Order (Topic 9). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. [NOTE: This chapter is not intended to be the vehicle for review and approval of the radiation protection program. It is intended to describe the essential features of the program as it relates to facility safety. The cited text from DOE 5480.23 identifies radiation protection. Attachment 1, Topic 9 lists the areas to be included in radiation protection. Topic 11a discusses	**5.0 RADIOLOGICAL CONTROLS** **5.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has described an acceptable radiological controls program that protects the health and safety of the facility and co-located workers and the public. Review procedures and acceptance criteria for the Contractor's program to protect the public and the environment outside a controlled area and to control effluent releases are addressed separately in Section 9.0, "Environmental Protection," of the CAR Review Guide. The Contractor’s radiological controls submittal must be consistent with previous approved submittals, including the Contractor’s documented Radiation Protection Program, Environmental Radiological Protection Program (ERPP), Quality	The same general elements of radiation protection are common to both DOE-STD-3009 and the CAR Guide. The CAR Guide requires that the Contractor is accountable for the development and maintenance of an RPP as required by 10 CFR 835. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
safety analyses for normal, abnormal and accident conditions. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	Assurance Program(QAP), and draft Emergency Response Plan. **…**	
7.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**5.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the radiological controls program. This program will address the radiological controls program for construction. The Contractor has previously submitted a documented RPP in response to the requirements of 10 CFR 835, "Occupational Radiation Protection." The Contractor's RPP submittal is a subset of the Radiological Controls Program limited to occupational radiation protection and compliance with the requirements of 10 CFR 835. Additional cross-cutting guidance for topics, e.g., recordkeeping and radioactive source control, may be found in other guidance documents, such as review guidance for the RPP and quality assurance. … Because not all the functional elements of radiological controls are expected to be fully developed as part of the CAR, review of the CAR includes verifying that any incomplete functional elements have been identified and will be addressed at an appropriate phase of facility authorization in the future.	Both DOE-STD-3009 and the CAR Guide include introductory material on radiation safety supporting the safety analysis that follows. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009 for compliance with 10 CFR 835. Both documents discuss a graded approach and the CAR Guide has a focus on construction activities. A summary of the CAR Guide information is provided here for comparison purposes.
7.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent	**5.3.2 Regulatory and Contractual Requirements** The requirements for radiological controls are found in the Regulatory Process document (DOE/RL-96-0003, Rev.2). In particular, the following three general requirements will be considered in	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated ISM process and results are documented in the Contractor's SRD.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	reviewing the 13 functional elements of the radiological controls section: 1. "The Contractors safety-related activities are being conducted in accordance with its approved ISMP." 2. "The radiological, nuclear, and process hazards associated with facility design and construction, including those from postulated accidents, shall have been adequately assessed, sufficiently controlled/mitigated, and adequately documented in a formally controlled Preliminary Safety Analysis Report (PSAR) to establish a basis for safe construction and a clear definition of the safe-operating envelope." 3. The Contractor shall also provide that "drafts of programs to be finalized as elements of the operating authorization request and implemented during operation are adequate and acceptable." **…** Individual requirements for the 13 functional areas of radiological controls are discussed below (applicable laws and regulations, safety criteria, and implementing codes and standards identified by the Contractor for each element can be found in the SRD): 1. **ALARA Policy …** ALARA is to be addressed for radiation protection of facility and co-located workers, the public, and the environment. The Contractor has also addressed ALARA in the Initial Safety Analysis Report (ISAR), Chapter 5.1, "As Low As Is Reasonably Achievable (ALARA) Policy and Program." 2. **Organizational Relationships and Personnel Qualifications …** This section addresses radiological control aspects of organizational relationships and personnel qualifications, including	Thus, safety basis information pertinent to the safety analysis expected under RL/REG-99-05 is similar to that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	job descriptions and responsibilities The Contractor has further identified organizational relationships and personnel qualifications in the ISMP, Section 3.2, "Safety Responsibilities." During design and construction, safety roles are assigned to and by the project manager according to functional areas as shown in the ISMP, Tables 9-1 through 9-5. The roles assigned to organizations are provided in the ISMP, Chapter 11.0, "Organization Roles, Responsibilities, and Authorities." The SRD, Appendix B, "Implementing Standard for Defense in Depth," Section 2.6, "Human Aspects," also should be considered when evaluating this section. Section 6.1.3, "Personnel Qualification and Resources," of the ISMP also identifies a commitment to relevant training in environmental, safety, and health requirements at all levels of the organization. 3. **Radiological Control Procedures and Workplace Controls …** The Contractor has also addressed the development of procedures in the QAP, Section 5.3.1, "Project Management and Planning," and Section 5.3.2, "Instructions and Procedures"; the ISAR, Section 3.9, "Procedures," which is cited in the ISMP, Section 1.3.13, "Procedures," and includes information on preparing, approving, and controlling procedures; and Regulatory Guide 3.52, which the Contractor has committed to for format and content of its submittal in Section 4.2.3, "Tailoring of Safety-Related Documentation," of the ISMP (cited in Safety Criterion 9.1-3). Section 3.9 of Regulatory Guide 3.52 contains details on the submittal requirements pertaining to procedures. The ISMP, Section 3.1, "Defense-in-	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Depth," identifies multiple layers of hazard protection, including procedural restrictions for safety management. The ISMP, Section 3.4, "Safety/Quality Culture," includes implementing procedures that facilitate safety and quality. The ISMP, Section 4.2.2, "Training and Procedures," stresses the importance of safety within procedures that are developed during the facility design and startup testing. 4. **Radiological Controls Training …** The review of radiological controls training should be conducted in conjunction with the review of Section 3.4 of the CAR Review Guide. The Contractor has also addressed training in the SRD, Appendix B, "Implementing Standard for Defense in Depth," Section 2.6, "Human Aspects"; the ISMP, Section 6.1.3, "Personnel Qualification and Resources"; the ISMP, Section 1.3, "Description of the Integrated Safety Management Plan"; and the ISMP, Section 3.5, "Quality Assurance Program." 5. **Ventilation Systems …** The ventilation systems are engineered control features used to confine airborne materials to the designated process areas and to protect facility and co-located workers. The Contractor has also addressed ventilation systems in the ISMP, Section 3.1, "Defense in Depth"; the ISMP, Section 3.7.2, "Active Features"; and the ISMP, Section 3.9.1.1, "Radioactive Material Confinement." 6. **Air Sampling …** The Contractor has also addressed air sampling in Table 5-5 of ISAR , Section 5.6, "Ventilation Systems," which discusses the designation of Airborne Radiological Areas. The ISAR, Section 5.7, "Air Sampling," identifies two guidance documents: Regulatory Guide 8.25, *Air Sampling in the Workplace,* and NUREG-1400, *Air Sampling in the Workplace,* to be used for	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	monitoring and air sampling. 7. **Contamination Control …** Contamination control ensures that facility contamination sources are limited to areas of the facility designed to handle radioactive materials and that these areas are as small as reasonably practicable. The Contractor has also addressed contamination control in the ISMP, Section 3.9.1.1, "Radioactive Material Confinement"; and the ISMP, Section 3.9.2, "ALARA Design." 8. **External Exposure …** Monitoring personnel external radiation exposure includes methods for measuring, assessing, and recording radiation dose to individuals. The Contractor has also addressed external exposure in the ISAR, Section 5.9, "External Exposure." In this section the exposure criteria for monitoring facility and co-located workers are listed and a commitment is made to dosimetry program accreditation under 10 CFR 20 or 10 CFR 835. 9. **Internal Exposure …** A program to monitor personnel internal radiation exposure includes the following: a. Criteria for determining when an individual's internal exposure must be monitored. b. Methods for determining internal doses to individuals. c. Frequency of analysis. d. Minimum detection levels. e. Action levels and actions to be taken based on the results. The Contractor also addresses internal exposure in the ISAR, Section 5.10, "Internal Exposure." This section states that the exposure criteria for bioassay monitoring of facility and co-located workers will be specified in the applicable radiation work permit (RWP) or technical work document based on	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	receiving a committed effective dose equivalent (CEDE) of 0.1 rem or greater or 5 rem CEDE to any organ or tissue in a year under normal operating conditions. A qualified vendor will perform internal dosimetry services. Monitoring is expected to include *in vivo* or *in vitro* measurement of radionuclides. 10. **Combing Internal and External Dose Equivalents …** Methods for combining internal and external dose equivalents are identified to demonstrate compliance with the dose limits. The Contractor also addresses combining internal and external dose equivalents in the ISAR, Section 5.11, "Summing Internal and External Exposure." This section states that management of exposures and exposure data will be consistent with the following guidance: Regulatory Guide 8.7, *Instructions for Recording and Reporting Occupational Radiation Exposure Data*; Regulatory Guide 8.34, *Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*; and Regulatory Guide 8.36, *Radiation Dose to the Embryo/Fetu*s. 11. **Respiratory Protection …** In the Contractor's facility, personnel are expected to be protected from internal radiation exposures by engineered features (e.g., confinement, ventilation, and remote handling) that have been designed into the facility. When engineered features are not practical, administrative controls such as procedures, posting, and physical access barriers are used. The least desirable protective feature selected is personal respiratory protection. 12. **Instrumentation …** Radiation detection and measurement instrumentation are used to implement the personnel radiological monitoring program and to ensure that radiation exposures and contamination are maintained ALARA. Other Contractor	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	documents that reference instrumentation include the ISMP, Section 3.12, "Human Factors"; the ISMP, Section 3.1, "Defense-in-depth"; the ISMP, Section 5.1, "Process Safety"; the ISMP, Section 3.8, "Criticality Safety"; the ISMP Table 4-2, #4.3 "Process Description" for the PSAR; and SRD, Appendix B, "Defense-in-Depth," Section 2.3, "Control." 13. **Preliminary Safety Analysis …** Acceptable risk analysis for radiological controls is to be documented. **…**	
7.3 RADIATION PROTECTION PROGRAM AND ORGANIZATION This section summarizes the program, including the safety management policies and philosophies used as a basis for the program. Reference facility documents detailing the program. Identify the organizational structure of the radiation protection program including staffing levels and qualifications, positions of authority and responsibilities, and interfaces with other safety organizations and facility operations. The organizational summary may be provided in this chapter or Chapter 17, "Management, Organization, and Institutional Safety Provisions."	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological control submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **...** 2. **Organizational Relationships and Personnel Qualifications** – The Contractor's submittal on organizational relationships and personnel qualifications is consistent with the Contractor's RPP, which addresses applicable regulatory requirements of 10 CFR 835. The Contractor's radiological controls program organizational relationships and personnel qualifications are acceptable if the regulatory and contractual requirements identified in Section 5.3.2, item 2, in this Guide have been adequately addressed and the submittal meets the following criteria: a. The Contractor identifies and includes the authority and responsibility of each position identified. b. The Contractor describes the organizational relationships between the individual positions responsible for the radiological controls program and other line managers.	Both documents address organization within the radiation protection program in a consistent manner. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	c. The Facility Manager, or equivalent, has overall responsibility and authority for safety. d. The Radiation Protection Manager, or equivalent, has direct responsibility for establishing and implementing the RPP and has direct access to the Facility Manager. e. Radiation Protection Technician(s), or equivalent, conduct the specific activities assigned to the radiological controls program to ensure control of radiological contamination, personnel exposures, and environmental protection. f. Radiological Engineering provides technical support for radiological control activities. Certain radiological control technical support and/or audit activities may be supplied by qualified offsite corporate or consultant organizations. Qualifications for Radiation Protection Manager, or equivalent, include a bachelor's degree in science or engineering and at least five years experience as a health physicist.	
7.4 ALARA POLICY AND PROGRAM This section summarizes the ALARA policy and program for the facility.	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. **ALARA Policy** – The Contractor incorporates the ALARA principle as applied to radiation protection of the facility and co-located workers, the public, and the environment to comply with 10 CFR 835 and Contractor-selected standards. As presented in Section 5.3.2, item 1, in this Guide, the Contractor has incorporated the ALARA principle in selected safety criteria in the SRD. In the SRD, the Contractor has committed to applying the ALARA principle to environmental radiation	Both documents address the ALARA policy and program within the radiation protection program in a consistent manner. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	protection (Safety Criterion 5.3-1) and protection of the public and the environment during normal operation (Safety Criterion 5.3-2) and waste management (Safety Criterion 5.3-3). Maintaining occupational exposure ALARA is regulated under 10 CFR 835, and implementing the occupational ALARA program is described in the RPP. The Contractor's radiological controls section should be consistent with the information in other documentation the Contractor has previously developed. **…** The Contractor's ALARA program is acceptable if the regulatory and contractual requirements have been adequately addressed and if the submittal meets the following criteria: a. The Contractor includes formal plans and measures for applying ALARA to radiological controls. b. This policy is evidenced by an organizational structure in which radiation protection personnel interact in a timely manner with production personnel to ensure that methods and techniques for reducing occupational radiation exposure are incorporated in facility design. c. Management representatives of radiation protection, environmental, safety, and production conduct periodic reviews of the RPP at least every three years and document their results. The Contractor commits to reviewing and evaluating audits conducted by the radiation protection organization and to reporting high radiation levels, contamination levels, employee exposures, waste management, and effluent releases. **…**	
7.5 RADIOLOGICAL PROTECTION TRAINING This section summarizes plans and procedures for training	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is	Both documents address radiological training for workers within the radiation protection

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
general employees, radiation workers, radiation protection technicians, supervisors, and managers who are involved in operations or maintenance activities in any area where radiological protection is required. Reference, as appropriate, Chapter 12, "Procedures and Training" if that chapter presents requested information.	acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 4. **Radiological Controls Training** – The review of this functional element should be coordinated and consistent with the review of "Training and Qualifications," of this Guide. The radiological controls training information in this submittal should be consistent with the Contractor's RPP, which addresses the applicable regulatory requirements of 10 CFR 835. The Contractor's radiological controls training program is acceptable if the regulatory and contractual requirements **...** have been adequately addressed **…**	program in a consistent manner. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
7.6.1 Administrative Limits This section summarizes facility administrative control levels and dose limits, including process for planned special exposures.	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **3. Radiological Control Procedures and Workplace Controls …** The Contractor's radiological controls program covering radiological control procedures and workplace controls is acceptable if the regulatory and contractual requirements have been adequately addressed and the CAR submittal meets the following criteria: a. Written, Contractor-approved radiological control procedures, RWPs, and administrative and other workplace controls are used to carry out activities related to the radiological controls program; and the procedures and workplace controls are reviewed, revised, and updated	Both documents address the establishment of administrative limits within the radiation protection program in a consistent manner, given differences in the regulatory approach. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	periodically. **…** 8. **External Exposure …** e. The Contractor specifies the specific exposure levels below the regulatory and contractual requirements at which action is taken to investigate the cause of the exposures and to reduce exposures. **…**	
7.6.2 Radiological Practices This section summarizes exposure controls directly associated with radiological activities. Include in this summary generic precautions for conduct of radiological tasks, special personnel protective equipment, and permanent shielding used to control exposures. This section specifically summarizes plans and procedures for posting, labeling, or signifying boundaries for facility areas containing radioactive material and material containers and entry and exit control for personnel in radiological areas in the facility. Include in the summary use of radiation work permits and provisions for controlling access and stay times, and definition and posting requirements for the following radiological areas: radiation area, high radiation area, very high radiation area, airborne radioactivity area, high contamination area, and radiological buffer areas.	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **...** 3. **Radiological Control Procedures and Workplace Controls** – RWPs represent one type of work control. Not all radiological control procedures and RWPs will be fully developed or available when the CAR is submitted. However, the Contractor identifies and develops this functional element to an appropriate level to support the CAR submittal. At a minimum, procedures are available commensurate with radiological controls, radiological design, and radiological accident analysis activities planned and anticipated in the CAR submittal for the 13 functional elements listed in this Guide. **…** The Contractor’s radiological controls program covering radiological control procedures and workplace controls is acceptable if the regulatory and contractual requirements identified in the SRD and this Guide have been adequately addressed and the CAR submittal meets the following criteria: a. Written, Contractor-approved radiological control procedures, RWPs, and administrative and	Both documents address radiological practices within the radiation protection program in a consistent manner. The commitment to produce a Radiation Protection Program (RPP) for compliance with 10 CFR 835 will assure coverage of the required elements, including posting, labeling, RWPs and other controls. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	other workplace controls are used to carry out activities related to the radiological controls program; and the procedures and workplace controls are reviewed, revised, and updated periodically. b. A mechanism is established for providing a current copy of the procedures to personnel. c. Procedures are reviewed and approved by a qualified Contractor individual at least every two years and are revised and updated as necessary. d. The Contractor specifies how the use of a workplace control is determined, the positions within the organization authorized to approve and issue a workplace control, the types of information that will be included in a workplace control, the provisions for updating and terminating workplace controls, and the records to be kept for the workplace controls. e. The Contractor specifies the approval levels necessary to make a workplace control (e.g., RWP) effective and verifies that the workplace control is approved and signed by a supervisor or specialist in radiation protection. f. Approvals are required from other involved groups to ensure that the provisions of the workplace control (e.g., RWP) cover potential hazards and that the operations are conducted according to proper standards. g. The Contractor provides a system that ensures that workplace controls (e.g., RWPs) are not used past their termination dates. **…**	
7.6.3 Dosimetry This section summarizes the basis of the dosimetry program for external and internal radiation monitoring of workers. Include in the summary basis for use of various types of dosimeters including accident dosimetry and bioassay requirements (i.e., bases for selecting personnel,	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.)	Both documents address internal and external dosimetry in a consistent manner. The combining of dose is addressed in Section 5.3.3 Item 10 of the CAR Guide. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
frequency of routine in vivo and in vitro and any nonroutine bioassay conducted). Briefly discuss the program in terms of issuance, control, and monitoring of dosimeters and documentation of dosimetry results including combining internal and external dosimetry results.	8. **External Exposure** – In the ISMP, Table 4-1, "Deviations from the Safety Analysis Report Content Guidance of Regulatory Guide 3.52," the Contractor identified the National Voluntary Laboratory Accreditation Program as an alternative accreditation program for the external dosimetry program. Part 835.402(b) requires that personnel external dosimetry programs shall conform with the requirements of the U.S. Department of Energy's Laboratory Accreditation Program (DOELAP) for Personnel Dosimetry. Conformance to an accreditation program other than DOELAP will require an exemption to 10 CFR 835. The information contained in the submittal on external dosimetry should be consistent with the Contractor's RPP, which addresses compliance to the applicable regulatory requirements, for external exposure contained of 10 CFR 835. No other deviations to the content of external dosimetry as specified by Regulatory Guide 3.52 are identified. The Contractor's external exposure program is acceptable if the regulatory and contractual requirements identified in the SRD have been adequately addressed **…** 9. **Internal Exposure** – The internal exposure information contained in this submittal should be consistent with the Contractor's RPP, which addresses applicable regulatory requirements for internal dosimetry found in 10 CFR 835. The Contractor's program for internal exposure is acceptable if the regulatory and contractual requirements identified in the SRD have been adequately addressed **…**	of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
7.6.4 Respiratory Protection This section summarizes plans and procedures for respiratory protection for workers. Include in this summary types of respiratory protection equipment and their usage in normal, abnormal, and accident conditions; control and issuance of respirators (training; fitness and medical testing); inspection of equipment (cleaning, maintenance, and repair); and documentation of associated records.	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 11. **Respiratory Protection** – The review of this functional element should be coordinated and consistent with the review of "Ventilation Systems;" and "Air Sampling". The respiratory protection information in this submittal should be consistent with the Contractor's RPP, which addresses applicable regulatory requirements for airborne radioactivity areas found in 10 CFR 835. The Contractor's respiratory protection program is acceptable if the regulatory and contractual requirements identified in the SRD have been adequately addressed **…**	The CAR Guide provides a significantly greater level of detail on respiratory protection than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
7.7 RADIOLOGICAL MONITORING This section summarizes the radioactive material sampling and monitoring program conducted internal and external to the facility. This summary should address overall facility monitoring to prevent the spread of radioactive contamination, operational monitoring of workers, and monitoring and sampling for detection of material release by airborne and other pathways (e.g., water, soil), programs for continuing collection of relevant meteorological data, and records, and reports generated in the monitoring program.	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 6. **Air Sampling** – The information contained in the submittal on air sampling should be consistent with the Contractor's RPP, which addresses applicable regulatory requirements of 10 CFR 835. The Contractor's air sampling program is acceptable if the regulatory requirements identified in the SRD have been adequately addressed **…** 7. **Contamination Control** – The contamination control information in this submittal should be consistent with the Contractor's RPP, which	Both documents address respiratory protection as part of the radiation protection program in a comparable manner. For the WTP, SRD Safety Criteria 5.1-2 covers all the areas identified in DOE-STD-3009, Section 7.6.4 and also the issue of the individual's fitness for use of respiratory protection. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	addresses applicable regulatory requirements of 10 CFR 835. The Contractor's contamination control program is acceptable if the regulatory and contractual requirements identified in the SRD have been adequately addressed **…** The Contractor's program provides for leak testing of sealed sources, including procedures addressing the acceptable contamination levels, test frequencies, and actions to be followed, if limits are exceeded. The Contractor's program also periodically reviews all aspects of access control to determine the following: 1) signs, labels, and other access controls are properly posted and operative; 2) restricted areas established to prevent the spread of contamination are identified with appropriate signs; and 3) step-off pads, change facilities, protective clothing facilities, and personnel monitoring instruments are provided in sufficient numbers and locations. The reviews are documented, along with any deficiencies, and the corrective actions are taken.	
7.8 RADIOLOGICAL PROTECTION INSTRUMENTATION This section summarizes plans and procedures governing radiation protection instrumentation. Such instrumentation, whether fixed, portable, or laboratory use, includes instruments for radiation and contamination surveys; sampling; area radiation monitoring; and personnel monitoring during normal operations and accidents. Include in the summary selection and placement criteria for technical equipment and instrumentation, types of detectors and monitors, and their quantity, sensitivity, and range. This section also summarizes plans and procedures for control of calibration processes and for quality assurance for calibration and maintenance. Reference Chapter 2, "Facility Description," Chapter 10,	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 12. **Instrumentation** – The instrumentation information contained in this submittal should be consistent with the Contractor's RPP, which addresses applicable regulatory requirements for instrumentation found in 10 CFR 835. The Contractor's program for instrumentation is acceptable if the regulatory and contractual requirements have been adequately addressed **…**	Both documents address radiological monitoring in a comparable manner. Some of the areas identified in DOE-STD-3009 (i.e., meteorological data) are addressed in the CAR Guide, Section 10, Environmental Protection. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
"Initial Testing, In-Service Surveillance, and Maintenance," and Chapter 14, "Quality Assurance," if those chapters contain requested information.		
7.9 RADIOLOGICAL PROTECTION RECORD KEEPING This section summarizes plans and procedures for retention, and disposition of records and reports. Discuss document control measures used to ensure that records are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the locations where required and when needed.	**3.8 Records Management** **3.8.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the handling and storing of quality assurance records associated with Important to Safety records, including the records generated or needed in the facility's design and construction phases. Additionally, the reviewer will examine the Contractor's description of the program for the facility's operating and deactivation phases. The review will include the following: 1. The process whereby safety records, including training, dosimetry, effluents, and facility structures, systems, or components (SSCs) Important to Safety are created, selected, verified, categorized, indexed, inventoried, protected, stored, maintained, distributed, deleted, or preserved. The process may be linked with or be a part of the facility configuration management program. 2. The handling and control of various kinds of records and the methods of recording media that comprise the records. 3. The physical characteristics of the records storage area(s) for preserving and protecting the records for their designated lifetimes.	Both documents address records management, including radiological protection records, in a consistent manner. The RPP-WTP focus is on Important to Safety Records. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
7.10 OCCUPATIONAL RADIATION EXPOSURES This section summarizes the predicted annual exposures to workers from radiation sources. Worker exposure information will be based on historical facility radiation data if the operations have not changed. For new operations or facilities that do not have historical records, provide an estimate of the projected (calculated)	**5.3.3 Regulatory Acceptance Criteria** The Contractor's radiological controls submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 10. **Combining External and Internal Dose**	Both documents address combining external and internal dose in a comparable manner. DOE-STD-3009 provides more detail for the determination of dose for new operations, while the CAR Guide cites 10 CFR 835.203 for the same topic. The CAR Guide provides a significantly greater level of detail overall than DOE-STD-3009. A summary of the

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
annual exposures to the workers from normal operations (not including accidents). Base such estimates on expected average and maximum operating conditions, inventories, operating cycles, personnel occupancy factors, etc., for the facility. Identify the methods, and assumptions used in estimating occupational exposures. It is acceptable to estimate exposures based on historical data for similar facilities. Finally, this section provides a comparison of the measured, estimated (calculated), or both, worker exposures with the maximum allowable limits. Any discrepancies among these estimated, measured, or allowed values need to be discussed.	**Equivalent** – The information on combining external and internal dose equivalents in this submittal should be consistent with the Contractor's RPP, which addresses applicable regulatory requirements for combining external and internal dose equivalent as found in 10 CFR 835. The Contractor's proposed method is acceptable if it complies with 10 CFR 835.203.	CAR Guide information is provided here for comparison purposes.
CHAPTER 8 HAZARDOUS MATERIAL PROTECTION The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(j), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)10 and 4.f.(3)(d)11a, of the Order (Topic 10). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the hazardous material protection program. It is intended to describe the essential features of the program as it relates to facility safety. [NOTE: The cited text from DOE 5480.23 identifies hazardous material protection as a topic in the safety analysis report. Attachment 1, Topic 10 lists the areas that should be covered in sufficient detail to demonstrate compliance with applicable requirements for control or personnel exposures to hazardous materials. Topic 11 a includes description of the analysis of normal, abnormal and accident conditions including DBA and directs the	**7.0 CHEMICAL PROCESS SAFETY** **7.1 Purpose Of Review** The purpose of this review is to determine whether the Contractor has implemented an acceptable chemical process safety program to control chemicals that pose hazards (including hazardous chemicals as well as other chemicals that would pose hazards, such as inert gases, ion exchange resins, and trace contaminants). The review will determine whether the chemical process accident sequences are identified, their consequences and likelihoods are assessed, and the necessary controls important to chemical process safety are selected and maintained to prevent or mitigate accident sequences potentially resulting in unacceptable safety consequences.	The Contractor is responsible for obtaining relevant permits and obeying laws and regulations associated with hazardous materials, as required by the Contract. This includes all OSHA regulations, as discussed in Chapter 8 of DOE-STD-3009. Discussion of hazardous material protection is currently limited in the CAR Guide to chemical process safety only. The CAR Guide provides for training for chemical process safety. However, the CAR Guide discussion of hazardous material protection is currently limited to chemical process safety. A requirement to address in the FSAR, the overall hazardous material protection program per Chapter 8 of DOE-STD-3009 will be added through the back-fit process and contract modification. (See Endnotes 2 and 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
Contractor to identify and classify the spectrum of accident sequences or scenarios that release hazardous materials ranging from normal events through those identified as low probability – high consequences. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]		
8.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**7.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the elements important to chemical process safety. As discussed in Section 7.3.3, not all elements of the chemical process safety program must be in place for the review of the Construction Authorization Request (CAR); some will not need to be in place until Operations Authorization. The reviewer will determine whether the Contractor has implemented or committed to implement the process safety principles and the following 12 elements of a process safety management program as outlined in the Safety Requirements Document (SRD) and Integrated Safety Management Plan (ISMP): 1. Process Safety Information 2. Process Hazard Analysis 3. Operating Procedures 4. Training 5. Subcontractors 6. Pre-Startup Safety Review 7. Mechanical Integrity 8. Hot Work Control 9. Management of Change 10. Incident Investigation 11. Emergency Planning 12. Compliance Audits.	Both DOE-STD-3009 and the CAR Guide include introductory material on hazardous material and process chemical safety supporting the safety analysis that follows. (See Endnote 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	The review will confirm the Contractor's assessment of whether portions of the facility are regulated under the U.S. Environmental Protection Agency's (EPA's) Risk Management Program (as defined in 40 CFR 68) or the Occupational Safety and Health Administration's (OSHA's) Process Safety Management Program (as defined in 29 CFR 1910.119). The reviewer will compare the Contractor's list of hazardous chemicals and the expected quantities in the facility with the regulated list of chemicals and their threshold quantities.	
8.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**7.3.2 Regulatory and Contractual Requirements** The requirements for chemical process safety are found in the Regulatory Process document, which states that the Contractor shall 1) conduct activities related to safety according to the ISMP and 2) adequately assess, sufficiently control/mitigate, and adequately document in a Preliminary Safety Analysis (PSA) the radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents. Related regulatory and contractual requirements can be found in the SRD and the associated implementing codes and standards, including sections of the ISMP.	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated ISM process and results are documented in the Contractor's SRD. Thus, safety basis information pertinent to the safety analysis expected under RL/REG-99-05 is similar to that expected under DOE-STD-3009. (See Endnotes 2 and 6)
8.3 HAZARDOUS MATERIAL PROTECTION AND ORGANIZATION This section summarizes the program, including the safety management policies and philosophies used as a basis for the program. Reference facility documents detailing the program. Identify the organizational structure of the hazardous material protection program including staffing levels and qualifications, positions of authority and responsibilities, and interfaces with other safety organizations and facility operations. The organizational summary may be provided	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety	The CAR Guide contains more detail on chemical process safety than provided in DOE-STD-3009. (See Endnote 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
in this chapter or Chapter 17, "Management, Organization, and Institutional Safety Provisions."	program. At a minimum, the submittal should include the following: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. **Process Safety Information –** The Contractor provides adequate process safety information as described in Section 4.1 in this Guide. **4.1.3.3 Regulatory Acceptance Criteria** The Contractor's process safety information is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. The Contractor provides hazardous material information, including toxicity information, permissible exposure limits, physical data, reactivity data, corrosivity data, thermal and chemical stability data, and hazardous effects of inadvertent mixing of different materials that could conceivably occur. The Contractor may reference the appropriate Material Safety Data Sheet for the hazardous materials. 2. The Contractor provides process technology information, including block flow or simplified process flow diagrams, process chemistry, maximum intended inventory, and safe upper and lower limits for parameters controlled for safety reasons (such as temperatures, pressures, flows, and compositions) and evaluates the consequences of deviations. 3. The Contractor provides process equipment information, including materials of construction, piping and instrument diagrams, electrical information, relief system design and design basis, ventilation system design, design codes and	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	standards used, material and energy balances, and safety systems (e.g., interlocks, detection systems, and suppression systems). The process safety information should be sufficiently detailed to permit an understanding of the accident and hazard analysis for the proposed design.	
8.4 ALARA POLICY AND PROGRAM This section summarizes the ALARA policy and program for the facility. Historically, hazardous materials, unlike radioactive materials, have often been evaluated assuming de minimis level below which little harm is associated with exposures (e.g., OSHA Permissible Exposure Limits). Where this is the case for given subject matter, ALARA needs to be considered a qualitative concept evaluated against OSHA and industrial hygiene exposure standards and guidelines.	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements of the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program. **…**	In the CAR Guide, the discussion of hazardous material protection is limited to chemical process safety only. A requirement to address in the FSAR, the overall hazardous material protection program per Chapter 8 of DOE-STD-3009 will be added through the back-fit process and contract modification. (See Endnote 6)
8.5 HAZARDOUS MATERIAL TRAINING This section summarizes plans and procedures for general training of employees on hazardous material safety, training of workers, supervisors ,and managers who are involved in activities involving hazardous materials protection, and training of industrial hygiene technicians. Reference, as appropriate, Chapter 12, "Procedures and Training" if that chapter presents requested information.	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program. **…**	In the CAR Guide, the discussion of hazardous material protection is limited to chemical process safety only. However, the CAR Guide does provide for training for chemical process safety. A requirement to address in the FSAR, the overall hazardous material protection program per Chapter 8 of DOE-STD-3009 will be added through the back-fit process and contract modification. (See Endnote 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	4. **Training** – The training required for chemical process safety will overlap with the training program (Section 3.4 in this Guide), and the Contractor should properly integrate the common elements. An acceptable training function provides operators, technical staff, and management with the appropriate level of knowledge to conduct their activities using process chemicals in a safe manner. Training includes what actions are expected of the personnel for each possible accident with hazardous chemicals. Each operator should be trained in an overview of the process and in the operating procedures. The training should also include the safety and health hazards, operating limits, emergency operations, and safe work practices. The operators should receive refresher training at appropriate intervals. The operators should be tested to verify that they understood the training. The submittal should describe the significant content of this program.	
8.6 HAZARDOUS MATERIAL EXPOSURE CONTROL This section summarizes the plans and procedures for controlling: (1) occupational exposure to hazardous materials; and (2) spread of hazardous material contamination. **8.6.1 Hazardous Material Identification Program** Summarize the plans and procedures the facility uses for the identification and evaluation of material hazards, (e.g., toxicity, flammability, reactivity). Include in this summary overall industrial hygiene programs, plans, and procedures, and hazard elimination or control measures. Reference and abstract any relevant site manuals detailing these programs. **8.6.2 Administrative Limits**	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program **…** 2. **Process Hazard Analysis** The Contractor performs the analysis using appropriate techniques and valid assumptions in	In the CAR Guide, discussion of hazardous material protection is limited to chemical process safety only. However, the CAR Guide does provide process hazards identification and analysis, and the development of operating procedures for chemical process safety. A requirement to address in the FSAR, the overall hazardous material protection program per Chapter 8 of DOE-STD-3009 will be added through the back-fit process and contract modification. (See Endnote 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
This section summarizes facility administrative control levels and exposure limits. **8.6.3 Occupational Medical Programs** This section summarizes the components of the occupational medical program relevant to hazardous material protection, including physical examinations, medical evaluations, medical surveillance (including bioassay), and medical record keeping. **8.6.4 Respiratory Protection** This section summarizes plans and procedures for respiratory protection for workers. Include in this summary types of respiratory protection equipment and their usage in normal, abnormal, and accident conditions; control and issuance of respirators (training; fitness and medical testing); inspection of equipment (cleaning, maintenance, and repair); and documentation of associated records. If no special distinctions exist with regard to the respiratory protection program described in section 7.6.4, simply reference that section.	estimating hazardous chemical concentrations for comparison with the "consequences of concern" levels as described in the ISMP, Section 1.3.7, "Acceptance Level of Public Safety," and Section 1.3.8, "Acceptable Level of Worker Safety." The analysis considers uncertainty in comparing projected concentrations with consequence limits. **…** • For hazardous chemicals without published Acute Exposure Guideline Levels or Emergency Response Planning Guidelines chemical concentration levels, the Contractor identifies comparable limits for assessing the consequences of concern and provides the rationale or basis for using the chosen value. The Contractor provides an adequate rationale for deviating from OSHA or National Institution of Occupational Safety and Health published values, if deviations are made. Because the consequences of concern are for process upsets or emergencies, the hazardous chemical concentration levels are usually acute doses and are not averaged over time or based on time-weighted averages. However, releases that may last several hours should be compared with appropriate dose standards, such as OSHA permissible exposure limits or time-weighted averages – threshold limit values. **3. Operating Procedures** – The procedures required for chemical process safety will overlap with the facility procedures development program (Section 3.9 of this Guide), and the Contractor should properly integrate the common elements. For chemical process safety, the Contractor identifies steps involving hazardous chemicals in procedures and ensures operator review of the	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	procedure and safety steps before performing the operation. The items important to chemical process safety are identified in procedures. Alarm response procedures provide actions to prevent or mitigate an off-normal process operation or emergency with hazardous chemicals. The procedures address at least the following elements: steps for each operating phase of the process (such as startup, shutdown, emergency shutdown, normal operations, and envisioned abnormal events), operating limits, safety and health considerations, and safety systems and their functions. Additionally, the operating procedures include safe work practices that cover items such as confined space entry, lockout/tagout, line breaking, hot work, and radiation work. The effort to plan the development and write procedures for all phases of operation should be underway for the CAR, but the final procedures are not required to be in place until the Final Safety Analysis Review (FSAR) is completed and before plant startup. However, the significant content of procedures should be described.	
8.7 HAZARDOUS MATERIAL MONITORING This section summarizes the hazardous material sampling and monitoring program conducted internal and external to the facility. This summary should address overall facility monitoring to prevent the spread of hazardous materials, operational monitoring of workers, and monitoring and sampling for detection of material release by airborne and other pathways (e.g., water, soil), programs for continuing collection of relevant meteorological data, and records, and reports generated in the monitoring program.	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program. **…**	In the CAR Guide, hazardous material protection is currently limited to chemical process safety only. The CAR Guide does provide for the development of a chemical process safety program that complies with the SRD requirements. A requirement to address in the FSAR, the overall hazardous material protection program per Chapter 8 of DOE-STD-3009 will be added through the back-fit process and contract modification.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
		(See Endnote 6)
8.8 HAZARDOUS MATERIAL PROTECTION INSTRUMENTATION This section summarizes plans and procedures governing hazardous protection instrumentation. Such instrumentation, whether fixed, portable, or laboratory use, includes instruments for hazardous material and contamination surveys; sampling; area hazardous material monitoring; and personnel monitoring during normal operations and accidents. Include in the summary selection and placement criteria for technical equipment and instrumentation, types of detectors and monitors, and their quantity, sensitivity, and range. This section also summarizes plans and procedures for control of calibration processes and for quality assurance for calibration and maintenance. Reference Chapter 2, "Facility Description," Chapter 10, "Initial Testing, In-Service Surveillance, and Maintenance," and Chapter 14, "Quality Assurance," if those chapters contain requested information.	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program. … **3. Operating Procedures** – The procedures required for chemical process safety will overlap with the facility procedures development program (Section 3.9 of this Guide), and the Contractor should properly integrate the common elements. For chemical process safety, the Contractor identifies steps involving hazardous chemicals in procedures and ensures operator review of the procedure and safety steps before performing the operation. The items important to chemical process safety are identified in procedures. Alarm response procedures provide actions to prevent or mitigate an off-normal process operation or emergency with hazardous chemicals. The procedures address at least the following elements: steps for each operating phase of the process (such as startup, shutdown, emergency shutdown, normal operations, and envisioned abnormal events), operating limits, safety and health considerations, and safety systems and their functions. Additionally, the operating	In the CAR Guide, hazardous material protection is currently limited to chemical process safety only. The CAR Guide does provide for the development of a chemical process safety program that complies with the SRD requirements. A requirement to address in the FSAR, the overall hazardous material protection program per Chapter 8 of DOE-STD-3009 will be added through the back-fit process and contract modification. (See Endnote 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	procedures include safe work practices that cover items such as confined space entry, lockout/tagout, line breaking, hot work, and radiation work. The effort to plan the development and write procedures for all phases of operation should be underway for the CAR, but the final procedures are not required to be in place until the Final Safety Analysis Review (FSAR) is completed and before plant startup. However, the significant content of procedures should be described.	
8.9 HAZARDOUS MATERIAL PROTECTION RECORD KEEPING This section summarizes plans and procedures for retention, and disposition of records and reports. Discuss document control measures used to ensure that records are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the locations where required and when needed.	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program. … **3. Operating Procedures** – The procedures required for chemical process safety will overlap with the facility procedures development program (Section 3.9 of this Guide), and the Contractor should properly integrate the common elements. For chemical process safety, the Contractor identifies steps involving hazardous chemicals in procedures and ensures operator review of the procedure and safety steps before performing the operation. The items important to chemical process safety are identified in procedures. Alarm response	In the CAR Guide, hazardous material protection is limited to chemical process safety only. The CAR Guide does provide for the development of a chemical process safety program that complies with the SRD requirements. (See Endnote 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	procedures provide actions to prevent or mitigate an off-normal process operation or emergency with hazardous chemicals. The procedures address at least the following elements: steps for each operating phase of the process (such as startup, shutdown, emergency shutdown, normal operations, and envisioned abnormal events), operating limits, safety and health considerations, and safety systems and their functions. Additionally, the operating procedures include safe work practices that cover items such as confined space entry, lockout/tagout, line breaking, hot work, and radiation work. The effort to plan the development and write procedures for all phases of operation should be underway for the CAR, but the final procedures are not required to be in place until the Final Safety Analysis Review (FSAR) is completed and before plant startup. However, the significant content of procedures should be described. 12. **Compliance Audits** – The compliance audits will also overlap with the audits and assessments program (Section 3.6 in this Guide), and the Contractor should properly integrate the common elements. The Contractor conducts periodic compliance audits to certify that the policies, procedures, and practices developed under the chemical process safety program are adequate and are being followed. The Contractor's audit program includes preparing an audit report with recommendations and findings. The Contractor promptly resolves the audit's findings and recommendations. An audit procedure and policy should be described in the CAR and must be completely implemented before operations authorization for plant startup.	
8.10 HAZARD COMMUNICATION PROGRAM	**7.3.3 Regulatory Acceptance Criteria**	In the CAR Guide, discussion of hazardous

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
This section summarizes the facility's hazard communication program for obtaining material safety data sheets, providing for employee information and training, directions for nonroutine tasks and outside contractor, and information for multi employer worksites and hazardous material labeling.	The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program. **…** **2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: … 9. Effective lines of communication and authority are clearly defined and exercised among the organizational units involved in the engineering, health, safety, environmental, and pre-operational testing functions of the facility. **3.11.3.3 Regulatory Acceptance Criteria …** 4. **Communications –** The Contractor describes both the systems and administrative processes for controlling communications to ensure reliable communications are available and properly used in normal and emergency conditions. The Contractor's existing commitment includes that "Various communication devices are provided for transmission of information (e.g. telephones, paging equipment, public address system, horns, bells, sirens, two-way radios). These devices are available in an emergency, yet the devices are controlled to ensure that they do not detract from normal operations." The reviewer will consider the	material protection is limited to chemical process safety only. The CAR Guide does provide for the development of a chemical process safety program that complies with the SRD requirements. (See Endnote 6)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Contractor's tailoring of the following communication elements to the facility: a. Emergency communications systems. b. Public address system. c. Contacting shift operators. d. Radios. e. Oral instructions and informational communications. Examples of general guidance on this topic are available in DOE Order 5480.19 and INPO 96-008.	
8.11 OCCUPATIONAL CHEMICAL EXPOSURES This section summarizes the predicted annual exposures to workers from hazardous material sources. Worker exposure information will be based on historical facility data if the operations have not changed. For new operations or facilities that do not have historical records, provide an estimate of the projected (calculated) annual exposures to the workers from normal operations (not including accidents). Base such estimates on expected average and maximum operating conditions, inventories, operating cycles, personnel occupancy factors, etc., for the facility. Identify the methods, and assumptions used in estimating occupational exposures. It is acceptable to estimate exposures based on historical data for similar facilities. Finally, this section provides a comparison of the measured, estimated (calculated), or both, worker exposures with the maximum allowable limits. Any discrepancies among these estimated, measured, or allowed values need to be discussed.	**7.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on the chemical process safety program is acceptable if it adequately documents a program that complies with the requirements outlined in the SRD. The submittal should provide sufficient information to describe and document the 12 elements of the chemical process safety program below. If the information is located in several sections of the CAR, then the submittal should include a matrix that identifies the location of the material in the submittal versus the requirements for the chemical process safety program. **…**	**7.2** In the CAR Guide, discussion of hazardous material protection is limited to chemical process safety only. The CAR Guide does provide for the development of a chemical process safety program that complies with the SRD requirements. (See Endnotes 6 and 7)
CHAPTER 9 RADIOACTIVE AND HAZARDOUS WASTE MANAGEMENT The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(g), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)7, of the Order	**10.0 ENVIRONMENTAL PROTECTION** **10.1 Purpose of Review** The purpose of this review is to determine whether there is reasonable assurance that the Contractor's proposed environmental protection measures	Elements of radioactive and hazardous waste management are common to both DOE-STD-3009 and the CAR Guide. The Contractor has committed to the development of an ERPP, which will address radioactive waste

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
(Topic 7). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the radioactive and hazardous waste management program. It is intended to describe the essential features of the program as it relates to facility safety. [NOTE: The cited text from DOE 5480.23 identifies radioactive and hazardous material waste management as a topic in the safety analysis report. Attachment 1, Topic 7 directs the Contractor to provide estimates of the quantity and form of radioactive wastes generated incidental to the mission of the facility, as well as equipment, provisions, and plans for the management of these wastes. The Contractor should also discuss the radwaste forms. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	adequately protect public health and the environment and comply with regulatory, permit, and authorization basis requirements. The purpose of this review is also to determine whether the Contractor has submitted an acceptable draft Environmental Radiological Protection Program (ERPP).	issues. However, the RPP-WTP PSAR submittal is currently not required to address radioactive and hazardous waste management. A requirement to address in the FSAR, overall radioactive and hazardous waste management program per Chapter 9 of DOE-STD-3009, will be added through back-fit process and contract modification. (See Endnotes 2 and 8)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
9.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**10.2 Areas of Review** The reviewer will determine whether the Contractor has provided adequate physical design features and administrative controls to 1) control and assess the level of radioactive and nonradioactive material (e.g., gaseous, liquid, and solid) released to the environment; 2) ensure that the estimated quantities of material to be released is adequate and that this estimated quantity will be within regulatory limits; and 3) ensure that environmental media sampling and analysis and environmental impact assessment methodologies are adequate such that the environmental impacts are appropriately assessed. The reviewer will also determine whether the Contractor has provided for continuing assurance of environmental protection and whether the draft ERPP submitted by the Contractor, as required by Table S4-1 of the Contract, is acceptable.	Both DOE-STD-3009 and the CAR Guide include introductory material on radioactive waste management discussions supporting the safety analysis that follows. The Contractor is responsible for obtaining relevant permits and obeying laws and regulations, including waste management regulations, associated with hazardous materials, as required by the Contract. (See Endnote 8)
9.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**10.3 Acceptance Criteria** **10.3.2 Regulatory and Contractual Requirements** The requirements for environmental protection are found in the Regulatory Process document,1 which states that the Construction Authorization Request (CAR) submittal shall include the "drafts of the Environmental Radiological Protection Program." The safety criteria applicable to this review were identified based on reference or application to environmental protection within the criterion itself.	This information has been documented in the Contractors SRD under "Implementing Codes and Standards." The Contractor is responsible for obtaining relevant permits and obeying laws and regulations, including waste management regulations, associated with hazardous materials, as required by the Contract. (See Endnotes 2 and 8)
9.3 RADIOACTIVE AND HAZARDOUS WASTE MANAGEMENT PROGRAM AND ORGANIZATION This section summarizes the program, including the safety management policies and philosophies used as a basis for the program. Reference facility documents detailing the program. Identify the organizational structure that administers the	**10.3.3.1 Environmental Protection** The Contractor's submittal on environmental protection is acceptable if the following criteria are met: 1. **Effluent Control** – The Contractor has provided adequate physical design features and administrative controls to control the release of radioactive and nonradioactive materials (e.g., gaseous, liquid, and solid) into the environment. **…**	Both DOE-STD-3009 and the CAR Guide include introductory material on radioactive waste management supporting the safety analysis that follows. The Contractor is responsible for obtaining relevant permits and obeying laws and regulations, including waste management regulations, associated with hazardous materials, as required by the Contract.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
radioactive and hazardous waste management program. This summary includes the plans, procedures, and training for governing radioactive and hazardous waste management activities. The organizational summary may be provided in this chapter or Chapter 17, "Management, Organization, and Institutional Safety Provisions."	3. **Waste Management** – The Contractor has developed an adequate waste management program that manages the generation, handling, storage, and disposal of general, hazardous, dangerous, and radiological waste. **…** 7. **Regulatory Compliance** – The Contractor has established an integrated process of effluent control and monitoring, environmental monitoring, and environmental impact assessment to demonstrate regulatory compliance. 8. **Provisions for Continuing Assurance** – The Contractor has provided for continuing assurance for environmental protection by integrating environmental protection into organization and administration, training and qualification, maintenance and surveillance, audits and assessments, and quality assurance.	(See Endnote 8)
9.4 RADIOACTIVE AND HAZARDOUS WASTE STREAMS AND SOURCES Summarize the solid, liquid, and gaseous waste streams and sources, including estimated inventories. Identify the waste management and waste handling process or treatment system for each of the following waste types: • Radioactive waste. • Mixed waste. • Hazardous waste. Simply reference the hazard identification of Chapter 3, "Hazard and Accident Analysis," and information in Chapter 2, "Facility Description," if these chapters contain requested information.	**10.3.3.2 Draft Environmental Radiological Protection Program …** 2. **Effluent Control and Monitoring** – The Contractor provides adequate equipment to monitor and maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations, including anticipated operational occurrences, to reasonably ensure that the dose standards will be met and that effluents, environmental impacts, and doses to the public will be kept ALARA (Safety Criterion 5.3-4). The Contractor's submittal on effluent control and monitoring is acceptable if the following criteria are met: **…** c. Physical and Chemical Characteristics of Effluents – The Contractor provides physical and chemical characteristics of gaseous and liquid effluents such that an independent assessment of environmental impacts can be performed (Safety	Both DOE-STD-3009 and the CAR Guide include radioactive waste management discussions supporting the safety analysis that follows. Information from the CAR Guide on the relevant portions of the Contractor's ERPP is consistent with the DOE-STD-3009 guidance for radioactive materials. The Contractor is responsible for obtaining relevant permits and obeying laws and regulations, including waste management regulations, associated with hazardous materials, as required by the Contract. (See Endnote 8)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Criteria 5.4-7 and 5.4-8). d. Known or Expected Concentrations of Effluents – The Contractor provides information that the known or expected concentrations of radioactive materials in airborne and liquid effluents are below the dose standards and are ALARA (Safety Criteria 5.3-2 and 5.3-7). e. Sample Identification and Frequency – The Contractor designs and commits to install equipment to monitor and maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations, including anticipated operational occurrences, of sufficient sensitivity and sampling frequency to demonstrate compliance with the dose standards (Safety Criteria 5.3-4, 5.4-1, 5.4-7, and 5.4-8). **…**	
9.4.1 Waste Management Process This section summarizes the overall waste management plan, including an overall management policy or philosophy. Summarize the administrative and operational practices important to the effective management of each of the waste types, such as waste segregation.	**10.3.3.2 Draft Environmental Radiological Protection Program …** 3. **Waste Management –** The Contractor develops a waste management program that reasonably ensures that the facility can be operated in compliance with all applicable laws and regulations. The waste management program should also be able to demonstrate that the radiological impact to the general public and environment from radioactive wastes arising from the Contractor's facility operations is ALARA (Safety Criterion 5.3-3). The Contractor's submittal on waste management is acceptable if the following criteria are met: a. Waste Minimization – The Contractor describes how both facility design and operations procedures will minimize, to the extent practicable, contamination of materials, the facility, and the environment and the generation of radioactive waste (Safety Criterion 5.3-3). b. Handling and Storage – The Contractor adequately provides for the temporary storage,	Both DOE-STD-3009 and the CAR Guide include radioactive waste management discussions supporting the safety analysis that follows. Information from the CAR Guide on the relevant portions of the Contractor's ERPP is consistent with the DOE-STD-3009 guidance for radioactive materials. The Contractor is responsible for obtaining relevant permits and obeying laws and regulations, including waste management regulations, associated with hazardous materials, as required by the Contract. (See Endnote 8)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	packaging, and handling of facility-generated solid radioactive waste to prevent the release of radioactive material to the environment or radiation exposures in excess of specified limits (Safety Criterion 5.1-5). **…** c. Disposal – The Contractor provides for the timely disposal of radioactive and hazardous waste in conformance with applicable regulations [e.g., Resource Conservation and Recovery Act (RCRA)].	
9.4.2 Waste Sources and Characteristics This section summarizes how and where the waste is generated (i.e., waste streams) and how it enters the appropriate waste handling or treatment system. For each waste type (i.e., radioactive, mixed, or hazardous) discuss by characteristics, composition, and waste material form (i.e., gaseous, liquid, or solid) the effluent discharges, emission limits, and permitting.	**10.3.3.2 Draft Environmental Radiological Protection Program ...** 2. **Effluent Control and Monitoring** – The Contractor provides adequate equipment to monitor and maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations, including anticipated operational occurrences, to reasonably ensure that the dose standards will be met and that effluents, environmental impacts, and doses to the public will be kept ALARA (Safety Criterion 5.3-4). The Contractor's submittal on effluent control and monitoring is acceptable if the following criteria are met: a. Discharge Locations – The Contractor provides a complete list of gaseous and liquid effluent discharge locations and their characteristics such that an independent assessment of environmental impacts can be performed [Safety Criteria 5.4-7, 5.4-8, and 5.3-1(6)(i) & (ii)]. b. Effluent Mitigation Measures – The Contractor uses BARCT for designing air emission units (Safety Criterion 5.3-5). The Contractor commits to treating effluents with BARCT under the following circumstances: 1) if untreated, the effluent would contain at the point of discharge a concentration of radioactive material, averaged	Both DOE-STD-3009 and the CAR Guide include radioactive waste management discussions supporting the safety analysis that follows. Information from the CAR Guide on the relevant portions of the Contractor's ERPP is consistent with the DOE-STD-3009 guidance for radioactive materials. The Contractor is responsible for obtaining relevant permits and obeying laws and regulations, including waste management regulations, associated with hazardous materials, as required by the Contract. (See Endnote 8)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	over the year, greater than the effluent concentrations in Table II, "Effluent Concentrations," of WAC 246-221-290, Appendix A"; or 2) the effluents result in the Contractor's facility exceeding the dose standards (Safety Criterion 5.3-2). **…** d. Known or Expected Concentrations of Effluents – The Contractor provides information that the known or expected concentrations of radioactive materials in airborne and liquid effluents are below the dose standards and are ALARA (Safety Criteria 5.3-2 and 5.3-7). **…**	
9.4.3 Waste Handling or Treatment Systems This section summarizes the processes to treat different waste types and forms produced in the facility. This brief summary should include system function, and basic chemical or physical operating principles (e.g., sedimentation, ion exchange, decanting). Also include or reference simplified process flow diagrams that show the location of equipment and instrumentation (including monitoring equipment).	**10.3.3.2 Draft Environmental Radiological Protection Program …** 3. **Waste Management –** The Contractor develops a waste management program that reasonably ensures that the facility can be operated in compliance with all applicable laws and regulations. The waste management program should also be able to demonstrate that the radiological impact to the general public and environment from radioactive wastes arising from the Contractor's facility operations is ALARA (Safety Criterion 5.3-3). The Contractor's submittal on waste management is acceptable if the following criteria are met: a. Waste Minimization – The Contractor describes how both facility design and operations procedures will minimize, to the extent practicable, contamination of materials, the facility, and the environment and the generation of radioactive waste (Safety Criterion 5.3-3). b. Handling and Storage – The Contractor adequately provides for the temporary storage, packaging, and handling of facility-generated solid radioactive waste to prevent the release of radioactive material to the environment or radiation exposures in excess of specified limits	Both DOE-STD-3009 and the CAR Guide include radioactive waste management discussions supporting the safety analysis that follows. Information from the CAR Guide on the relevant portions of the Contractor's ERPP is consistent with the DOE-STD-3009 guidance for radioactive materials. The Contractor is responsible for obtaining relevant permits and obeying laws and regulations, including waste management regulations, associated with hazardous materials, as required by the Contract. (See Endnote 8)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	(Safety Criterion 5.1-5). c. Disposal – The Contractor provides for the timely disposal of radioactive and hazardous waste in conformance with applicable regulations [e.g., Resource Conservation and Recovery Act (RCRA)].	
CHAPTER 10 INITIAL TESTING, IN-SERVICE SURVEILLANCE, AND MAINTENANCE The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(o), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)15, of the Order (Topic 15). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the surveillance, testing, or maintenance programs. It is intended to describe the essential features of the program as it relates to facility safety. NOTE: The cited text from DOE 5480.23 identifies initial testing, inservice surveillance, and maintenance as a topic in the safety analysis report. Attachment 1, Topic 15 directs the Contractor to delineate the plans and provisions for initial and inservice testing, documenting the assessment of the adequacy of the provisions for tests, the scope of the test, and the frequency and timing of tests, in the context of the provision and capabilities for maintenance and repair. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**3.10 Testing Program** **3.10.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the Contractor's commitment to a thorough testing program, including a pre-operational testing program that describes the planned testing of Important to Safety equipment. The submittal describes the purpose of each test, expected data, and the test and associated equipment.	The guidance associated with developing a testing program, as associated with new facility operations, is common to both DOE-STD-3009 and the CAR Guide. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
10.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**3.10 Testing Program** **3.10.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the Contractor's commitment to a thorough testing program, including a pre-operational testing program that describes the planned testing of Important to Safety equipment. The submittal describes the purpose of each test, expected data, and the test and associated equipment.	Both DOE-STD-3009 and the CAR Guide include introductory material on the initial testing program for a new facility supporting the safety analysis that follows.
10.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**3.10.3 Acceptance Criteria** **3.10.3.2 Regulatory and Contractual Requirements** The requirements for the testing program are found in the Regulatory Process document, which states that "construction and pre-operational testing procedures are adequate to ensure that the construction-related part of the SRD will be properly implemented and the Contractor is to submit a "description of planned safety-related testing to be performed, including the purpose of each test, expected data, and a description of the test and associated equipment." The scope of the pre-operational testing program must include all Important to Safety equipment and structures, systems, and components (SSCs). Related regulatory and contractual requirements can be found in the Contractor's Safety Requirements Document (SRD). Specific safety criteria that apply to testing include the following: Safety Criterion 6.0-1, which states, "A pre-operational testing program shall be established and followed to demonstrate that Important to Safety structures, systems, and components have been properly constructed and can perform their specified functions. The program shall provide for the	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing, surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	detection, tracking, and correction of deficiencies." Safety Criterion 6.0-2, which states, "Procedures for normal facility and systems operation and for functional tests to be performed during the operating phase shall be validated as part of the pre-operational testing program." Safety Criterion 6.0-3, which states, "During pre-operational testing, detailed diagnostic data shall be collected on systems and components designated as Important to Safety and the initial operating parameters of the systems and components shall be recorded." Safety Criterion 6.0-4, which states in part, "During the pre-operational testing program, the as-built operating characteristics of process systems, and systems and components designated as Important to Safety shall be determined and documented." The above safety criteria are implemented through the Contractor's Integrated Safety Management Plan (ISMP)4 and the following implementing codes and standards: • Section 1.3.14, "Startup Testing" • Section 3.14, "Startup Testing and Operation" • Section 5.6.4, "Startup Review." Section 5.6.4, "Startup Review," of the ISMP states that the content of the startup plan is provided in Section 3.10, "Testing Program and Operational Safety Review" of the ISAR. The testing program description in the Initial Safety Evaluation Report (ISER) includes supplier testing, construction testing, and startup testing. In addition, the Construction Authorization Request (CAR) submittal shall identify a subordinate standard for the testing program, as described in Section 3.10, "Testing Program and Preoperational	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Safety Review," of the ISER.	
10.3 INITIAL TESTING PROGRAM This section briefly summarizes the initial testing program. This summary includes the initial testing program that ensures operability of a facility modification prior to service and information to ensure that adequate testing activities exist to support facility safety management. Reference relevant site manuals as appropriate.	**3.10 Testing Program** **3.10.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the Contractor's commitment to a thorough testing program, including a pre-operational testing program that describes the planned testing of Important to Safety equipment. The submittal describes the purpose of each test, expected data, and the test and associated equipment. **3.10.2 Areas of Review** The reviewer will determine whether the Contractor has committed to an acceptable subordinate standard for the testing program. The reviewer will also determine the adequacy of the Contractor's description of the planned testing program for conformance to this subordinate standard and compliance to the quality assurance program outlined in the Quality Assurance Program (QAP). These programs should ensure that equipment and facilities are built and function according to the approved design. In addition, the reviewer will determine the adequacy of the descriptions of the Important to Safety tests to be performed, including the purpose of each, the expected data, and the test and associated equipment. It is recognized that because of the preliminary stage of design, detailed information likely will not be available on all specific tests.	The CAR Guide addresses initial testing of Important to Safety Equipment and the importance of equipment and facilities being built and functioning according to the approved design. DOE-STD-3009 presents testing in generic terms "to ensure that adequate testing activities exist to support facility safety management." The information expected under the CAR Guide encompasses information expected under DOE-STD-3009.
10.4 IN-SERVICE SURVEILLANCE PROGRAM This section summarizes the in-service surveillance program. The summary should cover provisions for testing and calibrations, control and calibration of test equipment, trending of surveillance test results, programmatic review, and training of personnel performing surveillance.	None	The CAR Guide is silent on in-service surveillance program. This information is expected to be provided in the FSAR. (See Endnote 5)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
Reference relevant site manuals as appropriate.		
10.5 MAINTENANCE PROGRAM This section summarizes the maintenance program supporting safe operation of the facility. The summary should include the maintenance organization, training of maintenance personnel, maintenance facilities and equipment, post maintenance testing; control and calibration of measuring equipment, and maintenance history and trending. Reference relevant site manuals as appropriate.	**3.2 Maintenance** **3.2.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has provided an acceptable draft of its maintenance implementation plan for Important to Safety structures, systems, and components (SSCs) during the construction, pre-operational, and operational phases to ensure the facility's continued availability and reliability. **3.2.3 Acceptance Criteria** **3.2.3.2 Regulatory and Contractual Requirements** The requirements for maintenance are found in the Regulatory Process document. The Contractor shall submit a draft Maintenance Implementation Plan, which complies with the current description from the Safety Requirements Document (SRD) and Integrated Safety Management Plan (ISMP) of its maintenance program to ensure that items Important to Safety are maintained for availability of service. Related safety requirements are found in the Contractor's SRD. The following safety criteria apply directly to maintenance: Safety Criterion 7.6-1, which states, "A maintenance program for the facility shall be developed and implemented using a tailored approach." Safety Criterion 7.6-2, which states, "The maintenance program shall contain provisions sufficient to preserve, predict, and restore the availability, operability, and reliability of structures, systems, and components (SSCs) designated as Important to Safety." Safety Criterion 7.6-3, which states, "The maintenance program for Important to Safety SSCs shall clearly define:	Both documents address the maintenance program; however the focus of the CAR Guide is for Important to Safety SSCs. As with other areas, the CAR Guide specifically references the Safety Criteria that were established in the SRD that define the maintenance requirements for the RPP-WTP. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	1. the Important to Safety SSCs that comprise the facility 2. the requirements of the maintenance program that are derived from the program elements listed in Safety Criterion 7.6-4 3. the management systems used for those activities, including the means for monitoring and measuring the effectiveness of the program and the management of maintenance backlog 4. the assignment of responsibilities and authority for all levels of the maintenance organization 5. mechanisms to feedback such relevant information as trend analysis and instrumentation performance/reliability data in order to identify necessary program modifications 6. provisions for identifying and evaluating possible component, system design, occupational safety and health, or other relevant problems and implementation of a self-assessment program 7. performance indicators and criteria to be utilized to measure equipment, systems, and personnel effectiveness in maintenance activities 8. interfaces between maintenance and other organizations (e.g., involving operation, engineering, quality, and safety) 9. quantitative reliability target values for systems and components to start or run, when such values are credited in safety analysis 10. appropriate authorization is received before modification starts on a safety instrumented system 11. assessment of the impact of the modification on the functionality of the safety instrumented system is performed to ensure functionality is not impaired." **…** **3.2.3.3 Regulatory Acceptance Criteria** The Contractor shall describe each of the 17 areas of	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	the draft maintenance program, which through a tailored approach, is sufficient to preserve, predict, and restore the availability, operability, and reliability of SSCs designated as Important to Safety. For each of the 17 areas, general guidance is provided below on potentially acceptable approaches for the reviewer to use in the evaluation. However, these are not requirements. The Contractor's maintenance program submittal is acceptable if the following guidance is met: 1. **Organization and Administration** – The organization and administration of maintenance ensure that maintenance is effectively implemented and controlled. Maintenance activities are effectively implemented and controlled primarily by establishing written policies, procedures, and standards for maintenance; periodically observing and assessing performance; and holding personnel accountable for their performance. Examples of general guidance in this area are available in DOE Order 4330.4B, Chapter II, Section 2.0. 2. **Maintenance Training and Qualification –** The Contractor describes the program for providing maintenance training and qualification for personnel and considers the following: a. A maintenance-training program tailored to the needs of all personnel involved in Important to Safety maintenance responsibilities. b. An initial personnel training and qualification program that verifies that maintenance personnel possess the requisite skills and knowledge to perform Important to Safety maintenance. c. A continuing training program for personnel performing Important to Safety work. d. Management and supervisory training.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	e. Control of subcontractor personnel. Examples of general guidance in this area are available in DOE Order 4330.4B, Chapter II, Section 3.0, and INPO 97-013, Chapter II, Section C. See also Section 3.4, "Training and Qualifications," in this Guide. **…**	
CHAPTER 11 OPERATIONAL SAFETY The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(q), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)17, of the Order (Topic 17). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of an operational safety or fire protection program. It is intended to describe the essential features of the programs as they relate to facility safety. NOTE: The cited text from DOE 5480.23 identifies operational safety as a topic in the safety analysis report. Attachment 1, Topic 17 directs the Contractor to describe the bases for the Conduct of Operations listing the areas to be covered. This includes operations organization and administration; shift routines and operating practices; controlled area activities; communications within the facility; control of onshift training; notifications and reporting practices; investigation of abnormal events; control of equipment and system status; independent verification practices; operations turnover practices; and control of operations procedures. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria;	**4.11 Safety Adequacy** **4.11.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately establishes, according to requirements of the Contract and the SRD, activities and measures that will result in adequate safety. This section uses all of the results of evaluations performed in the other sections in this Guide and integrates the results to form an overall conclusion. **8.0 FIRE SAFETY** **8.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has implemented a comprehensive fire safety program that provides an acceptable level of safety from fires, chemical explosions, and related events. The review establishes that the radiological consequences from fires, chemical explosions, and related events are considered and adequately resolved.	Comprehensive aspects of operational safety and the determination of adequate safety are common to both DOE-STD-3009 and the CAR Guide. While DOE-STD-3009 generally refers to operational safety, the CAR Guide refers to measures that will result in "adequate safety," one aspect of which is operational safety. Further, the CAR Guide pays separate attention to fire safety as a subset of operational safety. The CAR Guide expectations adequately address DOE-STD-3009 expectations. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
applicable Facility design codes and standards.]		
11.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**4.11 Safety Adequacy** **4.11.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately establishes, according to requirements of the Contract and the SRD, activities and measures that will result in adequate safety. This section uses all of the results of evaluations performed in the other sections in this Guide and integrates the results to form an overall conclusion.	Both DOE-STD-3009 and the CAR Guide include introductory material on the operational safety program supporting the safety analysis that follows.
11.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**4.1.3.2 Regulatory and Contractual Requirements** The requirements for process safety information are found in the Regulatory Process document, which states that the Contractor shall provide process safety information as part of the assurance that "the radiological, nuclear, and process hazards associated with facility operation…have been adequately documented in a controlled Preliminary Safety Analysis Report (PSAR) to establish a basis for safe operation and an unambiguous definition of the safe-operating envelope." For all processes regulated by the Occupational Safety and Health Administration (OSHA) or U.S. Environmental Protection Agency (EPA), the Contractor shall comply with process safety information requirements specified by 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals," and 40 CFR 68, "Chemical Accident Prevention Provisions," as applicable. Related regulatory and contractual requirements are found in the SRD. The following safety criterion applies directly to process safety information:	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing, surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Safety Criterion 3.1-2 states, in part, "A compilation of written process safety information shall be completed before conducting the process hazard analysis. The compilation of written process safety information enables the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving radioactive chemicals and process chemicals considered to pose a hazard. This process safety information shall include information pertaining to hazards of the materials used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process." In the Contractor's Integrated Safety Management Plan (ISMP), the implementing code and standard that applies to Safety Criterion 3.1-2 is Section 5.1, "Process Safety Information." **…** **4.11.3.2 Regulatory and Contractual Requirements** The requirements for all six areas of review are found in the following two general contractual requirements from the Regulatory Process document: • Approval Conditions: "The radiological, nuclear, and process hazards associated with facility operation, including those from postulated accidents, have been…*adequately documented* [emphasis added] in a formally controlled Preliminary Safety Analysis Report (PSAR)," and "The Contractor's construction and pre-operational testing procedures are adequate to ensure that the construction-related portion of the SRD will be properly implemented."	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	• Submittal Requirements: "A demonstration that adequate protection of the public, the workers, and the environment *should* [emphasis added] be achieved," and "the approach to be used to implement the construction and pre-operational testing part of the SRD and the Integrated Safety Management Plan (ISMP)." Related regulatory and contractual requirements can be found in the SRD. Specific safety criteria that apply to safety adequacy include the following: Safety Criterion 9.0-2, which states, "The Contractor should request authorization for construction only after being satisfied by appropriate internal assessments that the main safety issues have been satisfactorily resolved and that the remainder are amenable to solution before operations are scheduled to begin." Safety Criterion 9.1-3, which states, "A Preliminary Safety Analysis Report (PSAR) shall be submitted to the regulator only after all major safety issues have been resolved and other safety issues scheduled for completion. The PSAR shall document the facility design and plans for construction and demonstrate adequate planning for the operational phase." **8.3.2 Regulatory and Contractual Requirements** The requirements for fire safety are found in the Regulatory Process document, which states that "the Contractor's design complies with the design-related part of the updated Safety Requirements Document." Related regulatory and contractual requirements can be found in Section 4.5, "Fire Protection" of the Safety Requirements Document (SRD), Volume II. In the SRD, the Contractor has selected U.S. Department of Energy's (DOE's) Fire	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Safety Criteria and applicable codes and standards promulgated by the National Fire Protection Association (NFPA) for designing and constructing its waste treatment facilities. The applicable codes and standards cited in the SRD (or included by reference in the cited documents). **…**	
11.3 CONDUCT OF OPERATIONS This section summarizes applicability of conduct of operations to the facility and briefly identifies salient features of the conduct of operations program. Specific topical areas from DOE 5480.19 that should be considered are: • Shift routines and operating practices. • Control area activities. • Communications. • Control of onshift training. • Control of equipment and system status. • Lockouts and tagouts. • Independent verification. • Log keeping. • Operations turnover. • Operations aspects of facility chemistry and unique processes. • Required reading. • Timely orders to operators. • Operator aid postings. • Equipment and piping labeling.	**3.11 Operational Practices** **3.11.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has provided an acceptable draft of its Conduct of Operations Plan. The plan should provide for safe operations within the boundaries of the operational safety requirements. **3.11.2 Areas of Review** The reviewer will determine whether the Contractor has submitted an adequate Conduct of Operations Plan. This description should include the basic elements of Conduct of Operations as committed in Safety Requirements Document (SRD), Safety Criterion 7.5-2, which includes the following 19 areas: 1. Operations Organization and Administration 2. Shift Routines and Operating Practices 3. Control Area Activities 4. Communications 5. Control of On-Shift Training 6. Investigation of Abnormal Events 7. Notifications 8. Control of Equipment and System Status 9. Lockout and Tag Out 10. Independent Verification 11. Log Keeping 12. Operations Turnover 13. Operations Aspects of Facility Chemistry and Unique Processes 14. Required Reading 15. Timely Order to Operations	The areas of review are consistent between DOE-STD-3009 and the CAR Guide. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	16. Operations Procedures 17. Operator Aid Posting 18. Equipment and Piping Labeling 19. Emergency Operating Procedures for Dealing with Responses to Accident Conditions. It is recognized that when the Construction Authorization Request (CAR) is submitted, not all areas will be fully developed. For portions of the program that are to be used before operating authorization, such as pre-operational testing, the reviewer will verify that the program description of the applicable Conduct of Operations areas are adequate.	
11.4 FIRE PROTECTION **11.4.1 Fire Hazards** This section provides a realistic discussion of the magnitude of facility fire hazards in terms of overall combustible and explosive loading in proximity to hazardous materials being protected. This information should be based on and correlate with accident descriptions in Chapter 3, "Hazard and Accident Analyses." Results of overall assessments, such as Fire Hazards Analyses and actual facility walkdowns, should be summarized as appropriate to put fire interaction with material into a proper perspective (e.g., will material be within flame zone, heated indirectly, or largely unaffected). The purpose of this section is to define the main fire protection issues of interest in the SAR.	**8.3.3 Regulatory Acceptance Criteria** The Contractor's fire safety program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 6. **Fire Hazard Analysis** – The FHA is considered acceptable if the following criteria are met: a. It is comprehensive. b. It accurately characterizes the hazards from fire, chemical explosions, and related events. c. It adequately identifies the means necessary to sufficiently mitigate these hazards. d. It reflects current conditions throughout the facility. The level of detail provided in the FHA reflects the complexity of each fire area and the anticipated consequences from fires, chemical explosions, and related events. (See also Section 4.5, "Internal Design Basis Events," and Section 4.6, "External	While both documents address fire hazards, the CAR Guide provides a significantly more detailed discussion.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Design Basis Events," in this Guide.) Requirements for an FHA are described in more detail in Appendix 8-A at the end of this section. A provision should exist in the FHA that the FHA will be revised to incorporate significant changes and modifications to the facility, processes, or inventories, as needed to document that fire protection measures are adequate to ensure plant fire safety. The conclusions of the FHA are reflected in the PSA. (Safety Criterion 4.5-20)	
11.4.2 Fire Protection Program and Organization This section summarizes the program, including the safety management policies and philosophies used as a basis for the program. These elements should include the overall conceptual approach to fire and explosion prevention, and the means used to identify facility fire and explosive hazards, including periodic update reviews. Reference facility documents detailing the program. Identify the organizational structure that administers the fire protection program and the main elements of the program. Organizational aspects of this summary may be provided in this chapter or Chapter 17, "Management, Organization, and Institutional Safety Provisions."	**8.3.3 Regulatory Acceptance Criteria** The Contractor's fire safety program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. **Organization and Management Control Systems** – The organization and management control systems are acceptable if the following criteria are met: a. The documented fire safety program is complete and comprehensive, including incorporation of adequate fire safety and emergency services policies, programs, practices, and procedures as well as the adoption of DOE and NFPA codes and standards as delineated in the SRD. (Safety Criterion 4.5-12) b. Specific fire safety roles and responsibilities are clearly delineated, and the required qualifications and training of all facility positions involved in plant fire safety functions and activities (including emergency services) are clearly documented. This includes a functional organization chart showing the positions and authorities of personnel involved in fire safety and emergency response in relation to the overall plant organization. (Safety Criterion	The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes. The CAR Guide also provided a summary of the SRD Safety Criteria in detail.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	4.5-15) c. A single, senior management plant position is assigned the overall responsibility for plant fire safety. Where other individuals are assigned the responsibility for day-to-day supervision of the performance of tasks relating to fire safety, their responsibilities are clearly defined and are commensurate with their qualifications. Where an interface will occur with outside (site or offsite) organizations that also have responsibilities for fire safety (such as the site fire department), provisions establish a formal means of effective liaison and communication to coordinate the exercise of these responsibilities (such as manual fire-fighting). (Safety Criterion 4.5-21) d. Sufficient staffing is provided by qualified fire safety professionals with sufficient knowledge and experience in all relevant elements of fire protection engineering and emergency services to ensure that all elements of the fire protection program (such as policies, procedures, FHAs, testing, maintenance, and pre-fire plans) will be implemented. (Safety Criterion 4.5-15) e. Fire protection requirements are documented and incorporated in the plans and specifications, procedures, and acceptance tests. Documented reviews of those plans, specifications, and procedures by qualified fire protection engineers are included. (Safety Criterion 4.5-17)	
11.4.3 Combustible Loading Control This section summarizes the program used to prevent unnecessary combustible loading in the facility. The bases for the program, storage practices for allowed flammable, combustible, and reactive materials loading, the main mechanisms for limiting combustible loading during operations, maintenance, etc. for the types of activities performed, and the frequency of inspections are noted	**8.3.3 Regulatory Acceptance Criteria** The Contractor's fire safety program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 3. **Fire Prevention Program** – The fire prevention	The prevention of unnecessary combustible loading in the facility as cited in DOE-STD-3009 and the fire prevention program cited in the CAR Guide are quite similar. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009 because of the need to reference the safety criteria found in the Contractor's SRD. A

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
here.	program is considered acceptable if the following criteria are met: a. Provisions are made to establish and implement comprehensive administrative procedures for controlling combustible materials, including transient combustibles. The procedures establish controls for storing, handling, transporting, and using combustible solids, liquids, and gases; construction materials; materials associated with normal facility processes and operations; and combustibles introduced during maintenance or modification activities. Procedures are established for safely operating processes and equipment that present fire hazards and for controlling ignition sources in areas identified as important to plant safety. (Safety Criterion 4.5-19) b. Provisions are made to establish and implement a system to control activities that could 1) introduce combustible materials, 2) introduce sources of ignition, or 3) degrade fire protection features (passive or active) important to facility fire safety. Impairments to fire protection systems (active or passive) are governed by a written procedure that tracks the impaired system, identifies personnel to be notified, and specifies compensatory fire protection and prevention measures. Such measures are location-specific and supported by a hazard analysis. (Safety Criterion 4.5-23) c. Provisions are made to establish and implement administrative procedures, including quality assurance reviews for engineering review of facility and process design and modifications that may impact fire safety. (Safety Criterion 4.5-17) (See also Section 3.3, "Quality Assurance," in this Guide.) d. Provisions are made to establish and implement	summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	procedures to report and investigate fires, chemical explosions, and related incidents. These provisions include transmitting the resulting information to the appropriate authority having jurisdiction. (Safety Criterion 4.5-15) e. Provisions are made to establish and implement a fire barrier penetration protection tracking program to record pertinent information on emplacing and modifying fire barrier penetration seals, doors, dampers, and related devices that are identified in the Preliminary Safety Analysis (PSA) or FHA as relied on for plant safety. (Safety Criterion 4.5-17) f. Provisions are made to establish, implement, and maintain a prioritized fire safety issues management system to identify and track to completion fire safety program issues, such as assessment findings. (Safety Criterion 4.5-16) ...	
11.4.4 Fire Fighting Capabilities Based on the fire hazards, this section summarizes available fire fighting equipment, fire response procedures, basic training and personnel qualifications for fire fighters, and special precautions taken for fire fighting in radiological and hazardous chemical environments. Reference, as appropriate, Chapter 12, "Procedures and Training" if that chapter presents requested information.	**8.3.3 Regulatory Acceptance Criteria** The Contractor's fire safety program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **...** 2. **Training and Qualifications** – The training and qualifications are considered acceptable if the following criteria are met: a. Qualifications and experience are specified for all positions involved in fire protection functions and activities that affect plant fire safety. Such qualifications and experience shall be commensurate with assigned responsibilities. (Safety Criterion 4.5-15) b. Provisions are made to suitably train and instruct site personnel periodically to recognize fire hazards and to have a working knowledge of the general fire safety program of the plant.	Both documents address specialized training for fire fighters, but the CAR Guide also acknowledges the role of emergency response team members and the need for involvement in drills with the site fire department. DOE-STD-3009 includes a summary of available fire fighting equipment not found in the CAR Guide. This information is expected in the FSAR. However, the CAR Guide provides a significantly greater level of detail in most areas than presented in DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	(Safety Criterion 4.5-15) (See also Section 3.4, "Training and Qualifications," in this Guide.) c. Provisions are made to regularly provide specialized fire safety training for plant personnel involved in the facility's operations and maintenance work. Such training shall include hazard recognition and a general knowledge of fire safety features and emergency response concepts related to individual accident scenarios. (Safety Criterion 4.5-15) d. Provisions are made to regularly provide specialized fire protection and fire fighting training for emergency response team members. Such training shall include involvement in drills with the site fire department and other emergency response organizations. (Safety Criterion 4.5-15) **…**	
11.4.5 Fire Fighting Readiness Assurance This section summarizes: (1) the fire prevention inspection program, including basic scheduling and resolution of inspection findings; (2) types and frequencies of fire safety drills and exercises, and 3) the fire protection program record keeping requirements.	**8.3.3 Regulatory Acceptance Criteria** The Contractor's fire safety program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 5. **Manual Fire-Fighting Capability** – The facility's manual fire-fighting capability is acceptable if the following criteria are met: a. Plant documentation clearly describes the manual fire-fighting capability proposed. A baseline needs assessment establishes the minimum required capabilities of the fire-fighting forces that are expected to respond to facility fires, chemical explosions, and related events. These capabilities are reflected in the facility technical safety requirements with compensatory fire protection delineated when they are unavailable because of unexpected events. (Manual fire-	Both documents address the aspects of the fire protection readiness program. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	fighting capability may be provided by a fully staffed, well-trained, and fully equipped onsite fire emergency response team, by qualified offsite resources, or by a coordinated combination of the two approaches.) (Safety Criterion 4.5-15) … e. Provisions exist to develop a pre-fire plan for each fire area of the facility, including the yard area. The pre-fire plan supplements the information provided in the Emergency Preparedness Plan. As a minimum, the pre-fire plans identify access and egress routes; location of structures, systems, or components determined to be important to plant fire safety; special radiological and toxic hazards; automatic and manually operated fire-suppression measures provided in each fire area; specific procedures for fire-suppression activities because of nuclear criticality, buildup of explosive gases, or other concerns; and location of vital heat-sensitive components or equipment. Responsibilities for specific actions, such as shutting down processes, are incorporated in plant operating and safe shutdown procedures and coordinated with the pre-fire plans. The pre-fire plans are to be revised when any of the above listed information changes significantly. (Safety Criterion 4.5-22)	
CHAPTER 12 PROCEDURES AND TRAINING The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(m), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)13, of the Order (Topic 13), and paragraph(s) 8.b.(3)(k), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)11k, of the Order (Topic 11). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in	**3.4 Training and Qualification** **3.4.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has implemented an acceptable training and qualification program to reasonably ensure that site personnel have the knowledge and skills necessary to design, construct, operate, maintain, modify, and deactivate the facility in a manner that adequately protects the health and safety of the facility and co-located workers, the	The aspects of training and qualification for new facility operations are common to both DOE-STD-3009 and the CAR Guide. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the procedures or training programs. It is intended to describe the essential features of the programs as they relate to facility safety. NOTE: The cited text from DOE 5480.23 identifies procedures and training; and analysis of conditions as topics in the safety analysis report. Attachment 1, Topic 13 directs the Contractor to document the processes by which the technical content of procedures are developed, verified, and validated; and sufficient information to demonstrate commitment to training programs. From Topic 11 is identified the need to develop accident and incident analyses to identity and validate the technical content of skills and abilities for the development of training and operating procedures. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	public, and the environment. **3.9 Procedures** **3.9.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has implemented an acceptable procedures program that includes a commitment to developing, reviewing, controlling, and implementing written procedures that adequately protect the facility and co-located workers, the public, and the environment.	
12.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**3.4.2 Areas of Review (Training)** The reviewer will determine whether the Contractor's submittal adequately describes the training and qualifications of managers, supervisors, technical staff, operators, technicians, and maintenance personnel whose level of knowledge is important to the plant's safe operation. The reviewer will verify that the Contractor lists areas identified in the Preliminary Safety Analysis (PSA) where staff actions or training is critical to controls that prevent or mitigate identified consequences of concern. The review of training and qualification covers all phases of the Contractor's activities (i.e., design, construction, pre-operational training, and operations) **…**	Both DOE-STD-3009 and the CAR Guide include introductory material on procedures and training for facility staff supporting the safety analysis that follows. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	3.9.2 Areas of Review (Procedures) The reviewer will determine whether the Contractor's submittal adequately describes the program for producing, using, and managing control of written procedures. This will include the elements of identifying, developing, verifying, approving, validating, issuing, controlling changes to, reviewing and resolving comments to, and conducting periodic reviews of procedures. This review addresses two types of procedures: 1. Procedures used to directly control process operations, commonly called "operating procedures." **…** 2. Procedures used to control activities that support the process operations, commonly referred to as "management control procedures." **…**	
12.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**3.4.3.2 Regulatory and Contractual Requirements** The requirements for training and qualification are found in the Safety Requirements Document (SRD). The safety criteria applicable to this review were identified based on reference or application to training or qualification … The safety criteria and the associated sections of the Integrated Safety Management Plan (ISMP) and other codes and standards that were cited in BNFL's SRD as implementing codes and standards for this review. Requirements specific to other sections of this Guide for performing training or using qualified personnel are covered in those sections and are not included in this section. Examples of requirements to use qualified personnel that are not included in this section are requirements for PSA teams, risk and process safety management personnel, fire protection personnel, radiation protection personnel,	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing, surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	quality assurance personnel, independent assessment teams, and maintenance personnel. **…** **3.9.3.2 Regulatory and Contractual Requirements** The requirements for procedures are found in the Safety Requirements Document (SRD), which contains many safety criteria that address procedures. In general, these criteria establish the requirement to have acceptable procedures in areas such as engineering and design, radiation protection, and management and operations. Also, some of the safety criteria referenced the ISMP, Section 1.3.13, "Procedures"; Section 4.2.2, "Training and Procedures"; and Section 5.6.1, "Procedure Development," as implementing codes and standards. **…**	
12.3 PROCEDURE PROGRAM This section summarizes the facility procedures program, including brief statements addressing the safety management policies and philosophies used as a basis for the program. Reference facility documents detailing the program. Do not list specific procedures. **12.3.1 Development of Procedures** This section summarizes how procedures are selected for development and describes the processes by which the technical content of procedures is developed, verified, and validated for normal, abnormal, and emergency operations; and for surveillance testing and maintenance. **12.3.2 Maintenance of Procedures** This section summarizes provisions for documenting and controlling procedures and providing the necessary training and coordination before the introduction of new procedures, or the introduction of changes in the human-machine interface covered by procedures.	**3.9 Procedures** **3.9.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has implemented an acceptable procedures program that includes a commitment to developing, reviewing, controlling, and implementing written procedures that adequately protect the facility and co-located workers, the public, and the environment. **3.9.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the program for producing, using, and managing control of written procedures. This will include the elements of identifying, developing, verifying, approving, validating, issuing, controlling changes to, reviewing and resolving comments to, and conducting periodic reviews of procedures. This review addresses two types of procedures:	Both documents require the establishment and maintenance of a procedures program. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009 because of the need to reference the detailed safety criteria found in the Contractor's SRD. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
Document control in this instance refers to the program that maintains the latest revision of the procedures; captures and corrects errors; changes training when procedures change; and, in general, maintains congruence between the facility's actual condition, the procedures, and the training for the procedures.	1. Procedures used to directly control process operations, commonly called "operating procedures." **…** 2. Procedures used to control activities that support the process operations, commonly referred to as "management control procedures." **…** The review of the development, internal review, control, and implementation of the procedures will be coordinated with reviewers of the associated CAR sections. The review will include the following areas: 1. The method for identifying the procedures that are needed. Procedures exist or are planned for all necessary steps or operations for SSCs Important to Safety to be conducted at the facility. Procedures are planned or provided, as appropriate, for each element of management control (Section 3.0) that is discussed in this Guide. 2. The method for creating and controlling procedures within facility management control systems, including how procedures are managed within the facility configuration management function. 3. The method for verifying and validating procedures before use. 4. The method for periodically reverifying and revalidating procedures. 5. The method for ensuring that current procedures are available to personnel and that personnel are trained to use the latest procedures. **…**	
12.4 TRAINING PROGRAM This section summarizes the facility training program, including brief statements addressing the safety management policies and philosophies used as a basis for the program. Reference facility documents detailing the program.	**3.4.3.2 Regulatory and Contractual Requirements** The requirements for training and qualification are found in the Safety Requirements Document (SRD). The safety criteria applicable to this review were identified based on reference or application to training or qualification. **...**	Both documents address similar aspects of training for plant operations. The CAR Guide includes aspects of Quality Assurance under 10 CFR 830, Subpart A (previously 10 CFR 830.120) as an important aspect of the training program, and also includes provisions for training and qualification of

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
12.4.1 Development of Training This section summarizes the processes by which the technical content of training programs is developed, verified, and validated. This summary includes training methods and qualification requirements for: • Conduct of normal, abnormal, and emergency operations. • Onshift and classroom training. • Criticality training. • Radiation and hazardous material protection training. • Surveillance testing and maintenance training. • Fire protection training. • Quality assurance training. • Emergency preparedness training. **12.4.2 Maintenance of Training** This section summarizes the provisions that ensure training programs reflect actual plant conditions and current procedures, and that necessary coordination is done before introducing new training programs or introducing changes in procedures covered by training programs. Include in this section a description of the maintenance of training records or a reference to the plant procedure for maintaining such records. **12.4.3 Modification of Training Materials** This section summarizes the process by which technical or human factors deficiencies in training programs are identified and corrected.	Requirements specific to other sections of this Guide for performing training or using qualified personnel are covered in those sections and are not included in this section. Examples of requirements to use qualified personnel that are not included in this section are requirements for PSA teams, risk and process safety management personnel, fire protection personnel, radiation protection personnel, quality assurance personnel, independent assessment teams, and maintenance personnel. Examples of requirements to perform training that are not included in this section are requirements for fire protection training, respirator training, and emergency preparedness training. Additionally, the Regulatory Process document (DOE/RL-96-0003, Rev.1) states that "the submittal package shall include a draft of the Training and Qualification Plan." Also directly applicable to this area of review is 10 CFR 830.120, "Quality Assurance Requirements," sections (a)(1)(iii), (b)(1), (c)(1)(ii), (c)(1)(iii), (c)(1)(iv), (c)(2)(i), (c)(2)(iii), (c)(2)(iv), and (c)(3). **3.4.3.3 Regulatory Acceptance Criteria** The Contractor's draft Training and Qualification Plan and description of the training program are acceptable if they meet the following criteria: 1. **Organization and Management of the Training System** – The facility is organized, staffed, and managed to facilitate planning, directing, evaluating, and controlling a systematic training process that fulfills job-related training needs. Formal training is provided for each permanent position or temporary activity for which the required performance of duty is Important to Safety or for compliance with SRD	the PSA team. The CAR Guide also provides a significantly greater level of detail than DOE-STD-3009 in many training-related areas. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	requirements or ISMP commitments. The Contractor demonstrates that it has a graded approach to training based on the results of the site PSA. Positions relied on to prevent or mitigate identified consequences of concern or to comply with other SRD requirements or ISMP commitments are identified, and the minimum training and experience for each of these positions are stated. The training program provides for periodic retraining, based on specific criteria. Procedures for including operating experience feedback into the training program are also described. **…** 2. **Trainee Selection –** Minimum requirements for selecting trainee candidates are specified for candidates who perform actions relied on to prevent or mitigate accident sequences described in the PSA. Trainee candidates meet entry-level criteria defined for the position, including minimum requirements for education, experience, and physical fitness (if necessary). 3. **Conduct of Needs/Job Analysis and Identification of Tasks for Training –** The tasks required for competent and safe job performance are identified, documented, and included in the training. **…** 4. **Development of Learning Objectives as the Basis for Training –** Learning objectives that identify training content and define satisfactory trainee performance are derived from job performance requirements. **…** 5. **Organization of Instruction Using Lesson Plans and Other Training Guides –** Lesson plans and other training guides provide guidance and structure to ensure that training activities are conducted consistently and are based on the	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	required learning objectives derived from specific job performance requirements. **…** 6. **Evaluation of Trainee Mastery of Learning Objectives –** Trainees are evaluated periodically during training to determine their progress toward mastery of job performance requirements. 7. **Conduct of On-the-Job Training –** On-the-job training, if used for activities required by the PSA, is fully described. **…** 8. **Systematic Evaluation of Training Effectiveness –** A systematic evaluation of training effectiveness and its relation to on-the-job performance is used to ensure that the training program conveys the required skills and knowledge and to revise the training, where necessary, based on the performance of trained personnel in the job setting. **…** 9. **Integration of Feedback** – A mechanism is used to ensure that feedback on unsafe practices, root cause investigations, and other operational human errors related to safety is integrated into continuing qualification training plans or special training sessions. **…** **4.2 Training and Qualification of the Preliminary Safety Analysis Team** **4.2.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the proposed training and qualification to reasonably ensure that the PSA team personnel have the knowledge and skills necessary to perform PSAs in compliance with the SRD and the ISMP and in a manner that adequately protects the health and safety of the facility and co-located workers, the public, and the environment.	
CHAPTER 13 HUMAN FACTORS The purpose of this	**3.5 Human Factors**	Consideration of human factors in the design

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
chapter is to provide information that will satisfy then requirements of DOE 5480.23, paragraph(s) 8.b.(3)(n), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)14, of the Order (Topic 14). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the human factors process. It is intended to describe the essential features of the process as it relates to facility safety. [NOTE: The cited text from DOE 5480.23 identifies human factors as a topic in the safety analysis report. Attachment 1, Topic 14 directs the Contractor to systematically address the importance to safety of reliable, correct, and effective human-machine interactions, including the activities of surveillance, maintenance, and normal, abnormal, and emergency operations. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**3.5.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the Contractor's implementation of human factors for designing the facility, process, and equipment.	and operation of a new facility is common to both DOE-STD-3009 and the CAR Guide. (See Endnote 2)
13.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**3.5.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the human factors that could affect safety and the design of human-system interfaces. The Contractor should implement human factors engineering (HFE) as it applies to personnel activities in designing the facility, process, and equipment to do the following: 1. Reduce the likelihood that human actions, including inaction when action is required, are among the initiators of (or contributing factors to) high-risk event sequences. 2. Increase the likelihood that the human actions	Both DOE-STD-3009 and the CAR Guide include introductory material on human factors supporting the safety analysis that follows. The CAR Guide provides a significantly greater level of detail than found in DOE-STD-3009.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	required to prevent the occurrence of conditions that can be initiators of (or contributing factors to) high-risk event sequences are timely and effective. 3. Increase the likelihood that the human actions required to detect the occurrence of, and correct conditions that can be initiators of (or contributing factors to), high-risk event sequences are timely and effective. 4. Increase the likelihood that the human actions required to manage high-risk event sequences and to mitigate their consequences are timely and effective.	
13.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**3.5.3 Acceptance Criteria** **3.5.3.2 Regulatory and Contractual Requirements** The requirements for human factors are found in the Regulatory Process document, which states that "the Contractor's design complies with the design-related part of the updated Safety Requirements Document (SRD)." Related regulatory and contractual requirements are found in the Contractor's SRD and Integrated Safety Management Plan (ISMP) **…**	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing, surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)
13.3 HUMAN FACTORS PROCESS This section summarizes the human factors process for systematically evaluating the importance of human factors in facility safety. This summary includes the process features to provide assurance that the importance of human-machine interfaces is considered in facility safety.	**3.5.3.3 Regulatory Acceptance Criteria** Because the facility and process design work will be incomplete when the Construction Authorization Request (CAR) is reviewed, the reviewer should not expect to find the level of detail in treating human factors appropriate to the Final Safety Analysis Review (FSAR) (for which the facility and process design details will have been worked out and operating instructions, for example, will have been completed.) However, according to IEEE 1023-1988, an implementing standard of the SRD, HFE should be considered an integral part of the design. Because HFE affects all aspects of plant design, operation, testing, and maintenance, HFE should be	The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	applied as early as possible in the design process. The treatment of human factors in the design is acceptable if the Contractor has adequately implemented HFE for designing, evaluating, and modifying the facility, process, and equipment (particularly, the significant human-system interfaces) to achieve the four goals listed in Section 3.5.2 of this Guide. The Contractor's human factors submittal is acceptable if it meets the following criteria: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. The Contractor describes the accident sequences in which human errors are causes and where operator actions are credited as safeguards. (See also Section 4.5, "Internal Design Basis Events," of this Guide.) **…** 4. The Contractor explains how HFE-related problems and issues encountered in previous designs that are similar to the proposed design under review were identified and reviewed for relevance. 5. The Contractor explains how the codes and standards, particularly IEEE Standard 1023-1988, were used in designing the human-system interfaces and how human factors considerations were taken into account. 6. The Contractor explains how appropriate human factors considerations are or will be integrated into management control systems, such as training, maintenance, and management of change in the drafts of the Unreviewed Safety Question Plan (Section 3.1 in this Guide), the Conduct of Operations Plan (Section 3.11 of this Guide), the Training and Qualification Plan (Section 3.4 in this Guide), the Maintenance Implementation Plan	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	(Section 3.2 in this Guide), and the Emergency Response Plan (Section I in this Guide).	
13.4 IDENTIFICATION OF HUMAN-MACHINE INTERFACES This section summarizes the safety SSCs requiring human-machine interfaces to function, and the required human-machine interface. These are identified in conjunction with the results of the hazard analysis and accident analysis in Chapter 3 that identifies safety SSCs. Include human-machine interfaces necessary for the surveillance and maintenance of safety SSCs during normal operations, and the human-machine interfaces required for ensuring safety function during normal, abnormal, and emergency operations. Describe the actions identified so that the reviewer can understand what the humans are expected to do (i.e., close isolation valves) and the importance to facility safety of their action (e.g., ensures confinement, actuates a protective response system, etc.).	**3.5.3.3 Regulatory Acceptance Criteria** Because the facility and process design work will be incomplete when the Construction Authorization Request (CAR) is reviewed, the reviewer should not expect to find the level of detail in treating human factors appropriate to the Final Safety Analysis Review (FSAR) (for which the facility and process design details will have been worked out and operating instructions, for example, will have been completed.) However, according to IEEE 1023-1988, an implementing standard of the SRD, HFE should be considered an integral part of the design. Because HFE affects all aspects of plant design, operation, testing, and maintenance, HFE should be applied as early as possible in the design process. The treatment of human factors in the design is acceptable if the Contractor has adequately implemented HFE for designing, evaluating, and modifying the facility, process, and equipment (particularly, the significant human-system interfaces) to achieve the four goals listed in Section 3.5.2 of this Guide. **…** 2. The Contractor describes the human-system interfaces intended to support human actions required to prevent, detect, and correct conditions that could be initiators or contributing factors to accidents. 3. The Contractor describes the human-system interfaces intended to support human actions required to mitigate the consequences of accidents. **…**	Both documents discuss human-machine interfaces for normal, abnormal, and emergency operations for prevention of accidents and mitigation of accident consequences. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.
13.5 OPTIMIZATION OF HUMAN-MACHINE INTERFACES	**3.5.3.3 Regulatory Acceptance Criteria** Because the facility and process design work will be	Both documents provide a similar approach to human-machine interface considerations.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
This section summarizes a systematic inquiry into the optimization of human-machine interfaces with safety SSCs to enhance human performance. Checklists serve to document the systematic inquiry. Discussions will be proportionate to the importance to safety and may consider the following design elements: • Furnished instrumentation, provisions for communication and operational aids to support timely, reliable performance for safety functions. • Layout and design of controls and instrumentation, and provision for labeling that apply the principles of ergonomics and human engineering. • Work environments, including physical access, need for protective clothing or breathing apparatus, noise levels, temperature, humidity, distractions, and other factors bearing upon physical comfort, alertness, fitness, etc. • Staffing considerations (e.g., minimum staffing levels, allocation of control functions, overtime restrictions, facility status turnover between shifts, procedures, training, etc.). As necessary, reference documentation existing elsewhere in the SAR (i.e., Chapter 12, "Procedures and Training").	incomplete when the Construction Authorization Request (CAR) is reviewed, the reviewer should not expect to find the level of detail in treating human factors appropriate to the Final Safety Analysis Review (FSAR) (for which the facility and process design details will have been worked out and operating instructions, for example, will have been completed.) However, according to IEEE 1023-1988, an implementing standard of the SRD, HFE should be considered an integral part of the design. Because HFE affects all aspects of plant design, operation, testing, and maintenance, HFE should be applied as early as possible in the design process. The treatment of human factors in the design is acceptable if the Contractor has adequately implemented HFE for designing, evaluating, and modifying the facility, process, and equipment (particularly, the significant human-system interfaces) to achieve the four goals listed in Section 3.5.2 of this Guide. 1. The Contractor describes the accident sequences in which human errors are causes and where operator actions are credited as safeguards. (See also Section 4.5, "Internal Design Basis Events," of this Guide.) 2. The Contractor describes the human-system interfaces intended to support human actions required to prevent, detect, and correct conditions that could be initiators or contributing factors to accidents. 3. The Contractor describes the human-system interfaces intended to support human actions required to mitigate the consequences of accidents. 4. The Contractor explains how HFE-related problems and issues encountered in previous designs that are similar to the proposed design under	The CAR Guide addresses how the Contractor demonstrates that human factors are integrated into the design and construction of the facility. The CAR Guide addresses the human factors process at the level of detail for the submittal, acknowledging that more detail will be required for the FSAR. The CAR Guide also recognizes that human factors considerations are addressed in several sections of the Guide on a subject-by-subject basis.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	review were identified and reviewed for relevance. 5. The Contractor explains how the codes and standards, particularly IEEE Standard 1023-1988, were used in designing the human-system interfaces and how human factors considerations were taken into account. 6. The Contractor explains how appropriate human factors considerations are or will be integrated into management control systems, such as training, maintenance, and management of change in the drafts of the Unreviewed Safety Question Plan (Section 3.1 in this Guide), the Conduct of Operations Plan (Section 3.11 of this Guide), the Training and Qualification Plan (Section 3.4 in this Guide), the Maintenance Implementation Plan (Section 3.2 in this Guide), and the Emergency Response Plan (Section I in this Guide).	
CHAPTER 14 QUALITY ASSURANCE The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(r), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)18, of the Order (Topic 18). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the quality assurance program. It is intended to describe the essential features of the program as it relates to facility safety. [NOTE: The cited text from DOE 5480.23 identifies quality assurance as a topic in the safety analysis report. Attachment 1, Topic 18 directs the Contractor to include descriptions of the processes used at the facility for: design control; procurement control; instructions, procedures, and drawings; document control; control of	**3.3 Quality Assurance** **3.3.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has implemented an acceptable quality assurance (QA) program for those items and activities Important to Safety for construction and pre-operational testing.	The CAR Guide has identified that the quality assurance program is to be developed for those "items and activities Important to Safety for construction and pre-operational testing." Since this chapter is only intended to describe the essential features of the QA program, which is separately reviewed and approved, these documents contain comparable guidance. Acceptability of the Contractor's Quality Assurance program for activities beyond pre-operational testing is expected to be addressed in the FSAR. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
processes; inspection, surveillance, and testing control; control of measuring and test equipment; handing, storage, and shipping control; control of nonconforming materials, components, and fabrication/construction features; corrective actions for identified conditions adverse to quality; control of personnel training and qualification; quality improvement; quality assurance documents and records; and independent quality audits. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]		
14.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**3.3.2 Areas of Review** The reviewer will determine whether "the Contractor's submittal adequately describes the QA program used during the design and to be used during construction, safety-related testing, and pre-operational testing." The reviewer will verify that the submittal adequately describes the following: 1. QA Program **…** 2. Personnel Training and Qualification **…** 3. Quality Improvement **…** 4. Documents and Records **…** 5. Work Processes **…** 6. Design **…** 7. Procurement **…** 8. Inspection and Acceptance Testing **…** 9. Management Assessment **…** 10. Independent Assessment **…**	Both DOE-STD-3009 and the CAR Guide include introductory material on the Contractor QA program supporting the safety analysis that follows. (Note: The CAR Guide provides a significantly greater level of detail than DOE-STD-3009 since the DOE Orders are not being applied. A summary of the CAR Guide information is provided here for comparison purposes.)
14.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be	**3.3.3.2 Regulatory and Contractual Requirements** The requirements for QA are found in the Regulatory Process document, which states, in part: "The Contractor's QA plan is adequate and has been implemented such that the intended quality will be	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing,

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
referenced as appropriate.	assured in the safety-related portions of the design, construction, and pre-operational testing and that the quality assurance records will attest thereto." "This submittal package shall consist of the following documentation: 14) Description of QA program, including implementation procedures, employed during the design, and to be employed during construction, safety-related testing, and pre-operational testing." The requirement for QA is also addressed in the Top-Level Standards document(DOE/RL-96-0006, Rev.1, which states, in part: "QA and Quality Control (QC) should be applied throughout all phases and to all activities associated with the facility as part of a comprehensive system to ensure with high confidence that all items delivered and services and tasks performed meet required standards." "The Contractor should use well proven and established techniques and procedures supported by quality assurance practices to provide high quality equipment and achieve high quality construction." The Contractor's Safety Requirements Document (SRD), Volume II, contains specific regulatory and contractual requirements for QA in Chapter 1.0, "Radiological, Nuclear and Process Safety Objectives," and Section 7.3, "QA Program." The requirements of 10 CFR 830.120, "Quality Assurance Requirements," also apply to the review topics identified in Section 3.3.2 above. The following summarize the safety criteria and related 10 CFR 830.120 requirements that apply to QA, as	surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	well as their link to the 10 review topics noted above. Safety Criterion 1.0-10 states, in part, "**…**compliance with all requirements of 10 CFR 830.120…shall be achieved absent the granting of an exemption request to any specific requirement therein." (With no exemptions granted, full compliance is expected.) Safety Criterion 4.0-3 states, "A system shall be used to control and maintain accurate as-built records for important-to-safety SSCs through deactivation of the facility." [10 CFR 830.120 (c)(2)(ii) and 6. Design] Safety Criterion 4.1-2 states in part, "Verification and validation work shall be completed before approval and implementation of the design." [10 CFR 830.120 (c)(2)(ii) and 6. Design] Safety Criterion 7.3-1 states that the 10 elements of a QA program described in 10 CFR 830.120 will be applied using a graded approach. [10 CFR 830.120 (b)(1) and 1. QA Program] Safety Criterion 7.3-2 states, in part, "A written QAP shall be developed, implemented and maintained. The QAP shall describe the organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing the work." [10 CFR 830.120 (c)(1)(i) and 1. QA Program] Safety Criterion 7.3-3 states, "Personnel shall be trained and qualified to ensure they are capable of performing their assigned work. Personnel shall be provided continuing training to ensure that job proficiency is maintained." [10 CFR 830.120 (c)(1)(ii) and 2. Personnel Training and Qualification] Safety Criterion 7.3-4 states, "Documents shall be	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	prepared, reviewed, approved, issued, used, and revised to prescribe processes, specify requirements, or establish design. Records shall be specified, prepared, reviewed, approved, and maintained." [10 CFR 830.120 (c)(1)(iv) and 4. Documents and Records] Safety Criterion 7.3-5 states, "Work shall be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means. Items shall be identified and controlled to ensure their proper use. Items shall be maintained to prevent their damage, loss, or deterioration. Equipment used for process monitoring or data collection shall be calibrated and maintained." [10 CFR 830.120(c)(2)(i) and 5. Work Processes] Safety Criterion 7.3-6 states, in part, "Items, services, and processes that do not meet established requirements shall be identified, controlled, and corrected. Correction shall include identifying the causes of problems and preventing recurrence." [10 CFR 830.120 (c)(1)(iii) and 3. Quality Improvement] Safety Criterion 7.3-7 states "Inspection and testing of specified items, services, and processes shall be conducted using established acceptance and performance criteria. Equipment used for inspections and tests shall be calibrated and maintained." [10 CFR 830.120 (c)(2) (iv) and 8 - Inspection and Acceptance Testing] Safety Criterion 7.3-8 states, "Managers shall assess their management processes. Problems that hinder the organization from achieving its objectives shall be identified and corrected." [10 CFR 830.120 (c)(3)(i) and 9. Management Assessment] Safety Criterion 7.3-9 states, in part, "Independent assessment shall be planned and conducted to	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	measure item and service quality, to measure the adequacy of work performance, and to promote improvement." [10 CFR 830.120 (c)(3)(ii) and 10. Independent Assessment] Safety Criterion 7.3-11 states, "Procured items and services shall meet established requirements and perform as specified. Prospective suppliers shall be evaluated and selected on the basis of specified criteria. Processes to ensure that approved suppliers continue to provide acceptable items and services shall be established and implemented." [10 CFR 830.120 (c)(2)(iii) and 7. Procurement] Section 1.2, "Requirements and Structure," in the Contractor's approved QAP states that implementation and maintenance of the QA program shall comply with the applicable elements of the following QA requirements: • ASME NQA-1 1994, "QA Requirements for Nuclear Facility Applications" • DOE/RW/0333P (QARD 1995), "QA Requirements and Description for the Civilian Radioactive Waste Management Process" • NUREG-1293 1991, *QA Guidance for a Low-Level Radioactive Waste Disposal Facility*.	
14.3 QUALITY ASSURANCE PROGRAM AND ORGANIZATION This section summarizes the program, including the safety management policies and philosophies used as a basis for the program. Reference facility documents detailing the program. Identify the organizational structure of the quality assurance program including staffing levels and qualifications, positions of authority and responsibilities, and interfaces with other safety organizations and facility	**3.3.3.3 Regulatory Acceptance Criteria** The Contractor's QA program submittal for construction and pre-operational testing is acceptable if the criteria below are met. (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) The noted acceptance criteria are taken from the Contractor's commitments in the QAP and are modified only to reflect additional QA requirements that will be necessary before construction is started. The Contractor is expected to	Both documents address the organizational structure of the QA program in a similar manner. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009. In part this is because of the need to track QA issues associated with the pre-construction and construction activities associated with the safety functions of SSCs.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
operations. The organizational summary may be provided in this chapter or Chapter 17, "Management, Organization, and Institutional Safety Provisions."	incorporate these requirements during annual revisions of the QAP. Acceptance of the Contractor's QA program submittal may be based on a separate review and approval of the Contractor's QAP for construction. 1. **QA Program –** The Contractor describes the integration of the QA program, the QA organization, and the QA classification and grading approach. a. QA Program Integration – The Contractor describes how the construction and pre-operational testing QA program will ensure that applicable QA requirements are integrated across its project. This description explains the following: • How the Contractor intends to integrate applicable QA requirements documents into a single, unified, cohesive QA program for construction and pre-operational testing to ensure appropriate QA/QC coverage across the project. • How interdisciplinary interface and management involvement will be used to ensure the Contractor's QA program is integrated throughout and across project activities. • How the quality interface between design and construction will be effectively implemented to ensure that design is accurately translated into plans, drawings, and specification requirements for site characterization and preparation; structures, systems, and components (SSCs); and construction activities. • How the use of constructability reviews by the construction organization will ensure effectiveness of construction, equipment installation, and maintenance of configuration control.	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	• How the quality interface between construction and operations will be effectively implemented to ensure that plant turnover and startup testing are accomplished according to required and approved test plans and procedures. b. QA Organization – The Contractor describes the QA organizational structure, functional responsibilities, levels of authority, and interfaces during construction and pre-operational testing, including the following: • The Contractor's organizational structure for the construction and pre-operational testing phases. • The function of the various parts of the organization, their responsibilities and authorities, and how each supports the construction and pre-operational testing processes. • Measures for controlling interfaces and ensuring communication during construction and pre-operational testing among different organizations and between the Contractor's organization and parties outside the Contractor's organization. • A method for resolving inconsistencies, disputes, and differences of opinion between organizations and parties during construction and pre-operational testing. c. QA Classification and Grading – The Contractor describes how the QA classification and grading approach will be applied to the construction and pre-operational testing processes to: • Assign adequate QA measures and controls to items and activities in proportion to their importance to safety and other relevant grading factors. • Verify that Important to Safety SSCs perform in	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	a satisfactory manner. • Verify that Important to Safety activities are performed in a satisfactory manner.	
14.4 QUALITY IMPROVEMENT This section briefly describes management's programs and processes used to correct adverse conditions affecting quality. Specifically include identification of control and disposal of nonconforming materials, parts, and components.	3. **Quality Improvement** – The Contractor describes how items, services, and processes that do not meet established requirements will be identified, controlled, and corrected during construction and pre-operational testing. This description includes the following: a. The Corrective Action Management System database and how it effectively controls nonconforming items, services, and processes during construction. b. The Contractor's methods for identifying and reporting recurring conditions and potential adverse trends to management.	The CAR Guide requirements exceed the expectations of DOE-STD-3009 by focusing on the unique requirements of the construction phase.
14.5 DOCUMENTS AND RECORDS This section briefly describes the document control and records management program associated with quality assurance.	4. **Documents and Records –** The Contractor describes documents and records. a. Documents – The Contractor describes how documents that establish policies, prescribe work, specify requirements, or establish designs will be prepared, reviewed, approved, issued, used, revised, and controlled throughout the construction process, including a description of the specific types of documents under control that the Contractor, subcontractors, and suppliers will use during the construction process. b. Records – The Contractor describes how the quality records will be specified, prepared, reviewed, approved, and maintained throughout the construction and pre-operational testing processes, including the following: • Substantive details of the Contractor's records retention plan and records turnover plan for records turnover from construction to operation. • How construction and pre-operational testing	Both documents address documentation of the QA program in a comparable manner. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	records are determined, prepared, reviewed, approved, and maintained in light of a graded approach. • A description of the types of documents to be retained as quality records. • How construction records will be retained, protected, preserved, changed, and traced.	
14.6 QUALITY ASSURANCE PERFORMANCE This section presents an overview of process to ensure that the performed work meets requirements.	9. **Management Assessment** – The Contractor describes how management assessments will be applied to the construction and pre-operational testing phases to identify and correct problems that hinder the Contractor from achieving its objectives. This description includes the Contractor's methods for the following: a. Planning, performing, documenting, and evaluating management assessments conducted each year so that, together, they demonstrate the effectiveness of the entire integrated management system. b. Ensuring that problems resulting from management assessments are promptly, effectively, and completely addressed.	Both documents include the expectation of a process to assure that performed work meets requirements. The CAR Guide provides a description of the management assessment process for construction and pre-operational testing in a significantly greater level of detail than DOE-STD-3009.
14.6.1 Work Processes Briefly describe management's programs that ensure performance of tasks under controlled conditions, with applicable calibrated instrumentation, and in accordance with established technical standards and administrative controls.	5. **Work Processes –** The Contractor describes work processes, which include controlling work; identifying and controlling items; handling, storing, and maintaining items; and controlling M&TE. a. Controlling Work – The Contractor describes how work will be controlled during construction and pre-operational testing to ensure it is performed to established technical standards and administrative controls. This description includes the Contractor's methods for the following: • Providing clearly defined criteria for acceptable work performance. • Planning and designing construction work processes.	Both documents address work processes as related to the QA program in a comparable manner. However, the CAR Guide provides a significantly greater level of detail than DOE-STD-3009 for the construction and pre-operational testing phase.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	• Ensuring that qualified personnel perform the work. • Ensuring personnel take responsibility for the quality of their own work. • Ensuring personnel follow prescribed standards, procedures, or instructions. The Contractor also describes how construction and pre-operational testing process documents will be controlled to ensure they do the following: • Clearly identify authorities, responsibilities, and interfaces. • Are readily accessible to and usable by the workers. • Address work process elements such as methods to prevent use of incorrect or defective items. • Address and effectively control any special processes (e.g., nondestructive testing) that are highly dependent on controlling the process or the skill of the operator. b. Identifying and Controlling Items – The Contractor describes how items will be identified and controlled during construction and pre-operational testing to ensure their proper use. This description includes the Contractor's methods to do the following: • Track and control items and accompanying documentation. • Ensure personnel take responsibility for proper use of the items, with particular emphasis on controlling one-of-a-kind items and items specific to a particular craft. c. Handling, Storing, and Maintaining Items – The Contractor describes how items will be handled, stored, and maintained during construction and pre-operational testing to prevent damage, loss, or	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	deterioration. This description includes the Contractor's methods for the following: • Ensuring items are handled, stored, maintained, and provided special care according to their importance and to prevent damage. • Monitoring the conditions of items. • Measuring deterioration. • Identifying items with unique requirements such as in-storage maintenance; limited shelf life; or particularly hazardous to the environment, facilities, or personnel. d. Controlling M&TE – The Contractor describes how tools, gauges, instruments, and other measuring and testing devices used for inspection, measurement, and testing during construction and pre-operational testing will be properly identified, controlled, calibrated, and adjusted at specified intervals to maintain performance within required limits. This description includes the following: • The manner in and extent to which the Contractor will implement a formal, documented, calibration program. • The extent to which calibration standards will be traceable to the National Institute of Standards and Technology, some other nationally recognized standard, or an alternate method that gives the basis for the calibration. • The procedures used by workers who perform calibrations. • The training program used to train personnel who perform calibrations and maintain calibration equipment. • The provisions for calibrating equipment and instruments used to accept items, processes, procedures, or services. • Corrective actions where out-of-calibration	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	conditions occur. • The use of qualified personnel performing calibrations.	
14.6.2 Design This section briefly describes how quality assurance is integrated into design activities.	6. **Design –** The Contractor describes the control of as-built drawings and timing of design verification. a. As Built Drawings – The Contractor describes how accurate as-built drawings will be controlled and maintained during the construction and pre-operational testing processes to show the actual configuration. This description includes the following: • The administrative interface process for as-built markup and updating of design output documents during construction and pre-operational testing. • The Contractor's measures for ensuring consistency among design requirements, physical configuration, and documentation. • The Contractor's measures for maintaining this consistency throughout the construction and pre-operational testing processes as changes occur. b. Completion of Design Verification – The Contractor describes how the timing of design verification will be controlled to ensure it is completed before the design output is used by the construction organization (e.g., before installing an item that is Important to Safety).	Both documents address QA issues associated with design activities in a comparable manner. The CAR Guide focuses on the control of as-built drawings and the timing of design verification and provides a significantly greater level of detail than DOE-STD-3009.
14.6.3 Procurement This section briefly describes how quality assurance is integrated into the procurement process. Describe also how prospective suppliers are evaluated, selected, and their acceptability monitored.	7. **Procurement** – The Contractor describes how the procurement of items and services will be controlled during construction and pre-operational testing to ensure they meet established requirements and perform as specified. This description includes the following: a. The Contractor's measures to ensure that prospective suppliers and subcontractors are	Both documents address QA issues associated with the procurement process in a comparable manner. The CAR Guide focuses on the construction and pre-operational testing phase providing a significantly greater level of detail than DOE-STD-3009.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	evaluated and selected based on specified criteria. b. The controls applied to maintaining the Contractor's Project Approved Suppliers List (e.g., adding and removing suppliers and subcontractors from the list). c. The Contractor's measures to ensure adequate control of the procurement of long-lead items needed to support the construction and pre-operational testing phases. d. The Contractor's methods to systematically identify on a case-by-case basis any specific Contractor verification measures (e.g., inspections, surveillances, audits, and witness/hold points) required to ensure that procured items and services are acceptable for installation or use. e. The Contractor's methods for documenting, controlling, and/or preventing the installation or use of procured items and services that have not satisfied applicable acceptance criteria and requirements.	
14.6.4 Inspection and Testing for Acceptance This section briefly describes how quality assurance is integrated into inspection and testing of programs.	8. **Inspection and Acceptance Testing** – The Contractor describes how inspection and testing will be applied to the construction and pre-operational testing phases to ensure that established acceptance and performance criteria are used and to verify that items, services, and processes are acceptable to specified requirements. This description includes the Contractor's methods for ensuring the following: a. Inspection and acceptance testing are conducted using established acceptance and performance criteria. b. Inspection and acceptance testing and performance criteria are developed based on requirements. c. Inspection and acceptance testing activities are adequately planned, controlled, and documented. d. The status of inspection and acceptance testing	Both documents address inspection and acceptance testing as part of the QA program in a comparable manner. The CAR Guide focuses on the construction and pre-operational testing phases and provides a significantly greater level of detail than DOE-STD-3009.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	activities is effectively controlled. e. Items, services, or processes that do not conform to specified requirements are controlled to prevent inadvertent installation or use. Controls shall provide for identification, documentation, evaluation, and segregation when practical. Controls shall also provide for disposition of nonconforming items and for notification to affected organizations. f. Equipment used for inspections and acceptance tests is appropriate. g. Personnel performing inspections and acceptance tests are trained and qualified in the procedures and equipment to be used and are certified in the appropriate discipline as necessary (e.g., nondestructive examination qualifications).	
14.6.5 Independent Assessment This section briefly describes how internal independent assessments and external verifications and audits of the quality assurance program are performed.	10. **Independent Assessment** – The Contractor describes how independent assessments will be applied to the construction and pre-operational testing phases to measure construction quality, emphasize safety, measure the adequacy of work performance, and promote improvement. This description includes identifying the following: a. The audits and surveillances that will be performed during the construction and pre-operational testing processes (e.g., type, frequency, and expected coverage). b. The manner in and extent to which the Contractor plans to conduct performance-based independent assessments with emphasis on results, technical adequacy, and quality of work. c. The Contractor's definition of independence. An example definition is that personnel who conduct assessments shall not be directly responsible for the work processes being assessed but shall have sufficient authority and freedom from line organizations to carry out their responsibilities.	Both documents address the independent assessment aspects of the QA program in a comparable manner. The CAR Guide focuses on the construction and pre-operational testing phases and provides a significantly greater level of detail than DOE-STD-3009.
CHAPTER 15 EMERGENCY PREPAREDNESS	**9.0 EMERGENCY MANAGEMENT**	Emergency preparedness and emergency

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
PROGRAM The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(s), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)19, of the Order (Topic 19). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. This chapter is not intended to be the vehicle for review and approval of the emergency preparedness program. It is intended to describe the essential features of the program as it relates to facility safety. [NOTE: The cited text from DOE 5480.23 identifies emergency preparedness as a topic in the safety analysis report. Attachment 1, Topic 19 directs the Contractor to develop sufficient information to demonstrate appropriate commitment to the emergency planning requirements of the 5500 directive series as appropriate. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**9.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has established an integrated emergency management program to protect the facility and co-located workers, the public, and the environment and has complied with regulatory and authorization basis requirements. The requirements for the Emergency Response Plan (see Section I of this Guide) are complementary to the requirements for emergency management, so the review guidance for both are closely related. Emergency management describes the Contractor's management of incidents, accidents, and operational occurrences and commitments to emergency preparedness, while the Emergency Response Plan is a standalone document that describes how the commitments made in the Preliminary Safety Analysis Review (PSAR) are to be implemented.	management discussions are common to both DOE-STD-3009 and the CAR Guide. (See Endnote 2)
15.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**9.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes emergency management, including the following program elements: 1. Hazards Assessment 2. Emergency Response Organization 3. Offsite Response Interfaces 4. Categorization and Classification of Operational Emergencies 5. Notifications and Communications	Both DOE-STD-3009 and the CAR Guide include introductory material on emergency preparedness supporting the safety analysis that follows. However, the CAR Guide provides specific details regarding the elements of the emergency preparedness program to be included.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	6. Consequence Assessment 7. Protective Actions and Re-Entry 8. Emergency Medical Support 9. Emergency Public Information 10. Emergency Facilities and Equipment 11. Termination and Recovery 12. Program Administration 13. Training and Drills 14. Exercises.	
15.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders, which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**9.3.2 Regulatory and Contractual Requirements** The requirements for review of emergency management are found in the Regulatory Process document, which states that the Contractor will submit a "draft Emergency Plan." The Contract further requires that the Emergency Response Plan shall comply with requirements of the following: • 40 CFR 68, "Chemical Accident Prevention Provisions" • 40 CFR 355, "Emergency Planning and Notification" • 29 CFR 1910.38, "Employee Emergency Plans and Fire Prevention Plans" • WAC 246-247, "Radiation Protection – Air Emissions" • DOE/RL-94-02, *Hanford Emergency Response Pla*n, Rev. 1. In addition, Safety Criterion 7.8-2 in the Safety Requirements Document (SRD) cited Section 3.10, "Emergency Preparedness of the Integrated Safety Management Plan (ISMP)" as an implementing code and standard. The ISMP, Section 3.10, adds additional implementing standard requirements: • 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals" • WAC 173-303-350, "Contingency Plan and	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing, surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	Emergency Procedures." The safety criteria applicable to this review were identified based on a reference or application to emergency management within the criterion itself. **...**	
15.3 SCOPE OF EMERGENCY PREPAREDNESS This section summarizes the spectrum of emergencies that the EPP is designed to encompass. Focus discussions on demonstrating that emergency preparedness planning adequately encompasses the facility hazards discerned in the hazard analysis. Use of bounding categories of emergencies (i.e., fire, spills, criticality) and bounding consequences from emergencies should be sufficient for documenting the scope of emergency preparedness.	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. **Hazards Assessment** – The Contractor provides an adequate hazards assessment, which is used to design the emergency management program so that it is commensurate with the facility's hazards. It should be recognized that aspects of emergency management may be driven more by regulatory requirements than by hazard assessment outcomes. [Safety Criteria 3.2-1, 7.8-1(7), 7.8-3, and 7.8-4]. **…**	Both documents address the identification of the potential emergencies to be included in the emergency preparedness program in a comparable manner. The CAR Guide focuses on the results of the hazards assessment in the pre-construction phase in association with the Safety Criteria identified in the Contractor's SRD.
15.4 EMERGENCY PREPAREDNESS PLANNING This section summarizes facility emergency preparedness planning. The summary should include activation of emergency organizations, assessment actions, notification processes, emergency facilities and equipment, protective actions, training and exercises, and recovery actions.	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 2. **Emergency Response Organization (ERO)** – The Contractor presents an ERO with clearly defined roles, responsibilities, and authorities that are commensurate with the conclusions of the hazards assessment and adequate to manage and control emergency response at the facility [Safety Criterion 7.8-1(3)]. 3. **Offsite Response Interfaces** – The Contractor adequately obtains commitments from outside organizations to provide data and services required	Both documents address the aspects of emergency preparedness planning, at the level of detail needed for construction activities. This includes emergency organizations, identification of offsite response staff, and other aspects of emergency management.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	to satisfy safety obligations before information or services are needed (Safety Criterion 7.1-4). The Contractor coordinates its emergency management with the DOE Hanford Site and local community emergency response plans (Safety Criterion 7.8-5). 4. **Categorization and Classification of Operational Emergencies** – The Contractor adequately provides for categorizing reportable incidents as soon as reasonably possible and in all cases within two hours of the event or condition's identification. The Contractor has the ability to conservatively categorize events at the highest level being considered if categorization of the incident is not clear. The Contractor also has the ability to elevate, maintain, or lower the incident categorization, as appropriate, as further information is obtained (Safety Criterion 7.7-4). **…** 12. **Program Administration –** The Contractor adequately describes the emergency management program administration, which includes maintaining technical support documents, plans, and procedures; coordinating emergency management activities; and maintaining appropriate auditable records [Safety Criterion 7.8-1(5)]. The Contractor adequately provides for periodic emergency management program audits and assessments (Safety Criterion 7.8-2). **…**	
15.4.1 Emergency Response Organization This section summarizes the emergency response organization that is activated in case of onsite and offsite operational emergencies. Delineate authorities and responsibilities of key individuals and groups, and identify the communication chain for notifying, alerting, and mobilizing the necessary personnel. Identify the position of the person with the overall responsibility for directing	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 2. **Emergency Response Organization (ERO)** –	Both documents address the details associated with the emergency response organization in a comparable manner. This includes the definition of roles and responsibilities, the authorities, and the commitment to develop a community emergency response plan.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
emergency responses This summary may be provided in this chapter or Chapter 17, "Management, Organization, and Institutional Safety Provisions." Describe interrelationships with federal, state, tribal, and local organizations for offsite emergency response and for the protection of the environment and the public. Briefly summarize and reference any prearranged plans, agreements, understandings, and/or other arrangements for mutual assistance by non-DOE entities.	The Contractor presents an ERO with clearly defined roles, responsibilities, and authorities that are commensurate with the conclusions of the hazards assessment and adequate to manage and control emergency response at the facility [Safety Criterion 7.8-1(3)]. 3. **Offsite Response Interfaces** – The Contractor adequately obtains commitments from outside organizations to provide data and services required to satisfy safety obligations before information or services are needed (Safety Criterion 7.1-4). The Contractor coordinates its emergency management with the DOE Hanford Site and local community emergency response plans (Safety Criterion 7.8-5). **…**	
15.4.2 Assessment Actions This section summarizes the processes by which the onset of an operational emergency is recognized. The methodology used to obtain meteorological information and estimate release rates and source terms needs to be identified. If computer models are used for consequence assessment, identify the specific models used and the plume methodologies employed (e.g., Gaussian plume).	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 3. **Offsite Response Interfaces** – The Contractor adequately obtains commitments from outside organizations to provide data and services required to satisfy safety obligations before information or services are needed (Safety Criterion 7.1-4). The Contractor coordinates its emergency management with the DOE Hanford Site and local community emergency response plans (Safety Criterion 7.8-5). 4. **Categorization and Classification of Operational Emergencies** – The Contractor adequately provides for categorizing reportable incidents as soon as reasonably possible and in all cases within two hours of the event or condition's	Both documents address assessment actions of the emergency response program. Although DOE-STD-3009 provides a focus on the acquisition of meteorological information, the CAR Guide allows for obtaining commitments from outside organizations to provide the data and services required to satisfy safety obligations. This allows the RPP-WTP to access the Hanford Site Emergency Management System for the needed data and modeling. The CAR Guide provides specific details regarding the elements of the emergency assessment program to be included.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	identification. The Contractor has the ability to conservatively categorize events at the highest level being considered if categorization of the incident is not clear. The Contractor also has the ability to elevate, maintain, or lower the incident categorization, as appropriate, as further information is obtained (Safety Criterion 7.7-4). 5. **Notifications and Communications –** The Contractor adequately provides for timely notifications and communications to the ERO, facility and co-located workers, offsite response agencies, and the public (Safety Criteria 7.8-1 and 7.8-2). 6. **Consequence Assessment** – The Contractor adequately provides for timely, continuous, and appropriate consequence assessments (Safety Criteria 7.8-1 and 7.8-2). **…**	
15.4.3 Notification This section summarizes the provisions for prompt initial notification of emergency response personnel and response organizations, including appropriate DOE elements and other federal, state, tribal, and local organizations. Summarize the follow-up notification processes, and how emergency public information is integrated into the emergency management program.	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 3. **Offsite Response Interfaces** – The Contractor adequately obtains commitments from outside organizations to provide data and services required to satisfy safety obligations before information or services are needed (Safety Criterion 7.1-4). The Contractor coordinates its emergency management with the DOE Hanford Site and local community emergency response plans (Safety Criterion 7.8-5). **…** 5. **Notifications and Communications –** The Contractor adequately provides for timely	Both documents address notification in a comparable manner. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009 in the areas of offsite response interfaces, and public information.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	notifications and communications to the ERO, facility and co-located workers, offsite response agencies, and the public (Safety Criteria 7.8-1 and 7.8-2). **…** 9. **Emergency Public Information –** The Contractor provides for adequate emergency public information in the areas of facilities, equipment, personnel, and public education (Safety Criteria 7.8-1 and 7.8-2). **…**	
15.4.4 Emergency Facilities and Equipment This section summarizes pertinent aspects of emergency facilities (i.e., location, function) and equipment (i.e., communication capabilities, hazardous material detection instrument ranges and types, dosimetry) required to support the facility emergency responses.	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 10. **Emergency Facilities and Equipment –** The Contractor designs the control room or control area to permit occupancy and actions to be taken to monitor the facility safely during normal operations and to provide safe control of the facility for anticipated operational occurrences and accident conditions. (See also Section 3.6, "Human Factors," in this Guide.) The Contractor adequately considers the effect that accidents at nearby facilities could have on the Contractor's facility to the extent that operator action is required to safely control the processes and bring them to a safe state. The Contractor also adequately evaluates the need for an alternate system that would allow the processes to be placed in a safe state if the primary control area is uninhabitable (Safety Criterion 4.3-7). The Contractor provides adequate emergency facilities and equipment to support emergency response [Safety Criterion 7.8-1(6)]. **…**	Both documents address emergency facilities and equipment in a comparable manner. The CAR Guide provides a significantly greater level of detail than DOE-STD-3009. The CAR Guide also identifies human factors as part of this subject.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
15.4.5 Protective Actions This section summarizes the protective actions that are required to minimize the exposure of workers and the public. Discussions should include provisions made for medical support and decontamination. Important elements of population evacuations should be summarized including evacuation times, routes, methods of alerting.	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 7. **Protective Actions and Re-Entry** – The Contractor provides adequate and appropriate protective action guidance and implementation, and re-entry planning (Safety Criteria 7.8-1 and 7.8-2). **…**	Both documents address protective actions to protect the worker and the public in a comparable manner.
15.4.6 Training and Exercises This section summarizes the emergency training program, including initial and annual retraining for all facility emergency response personnel. Include a summary of the drills and exercises that are an integral part of the emergency management program. The summary should address the range of different populations exposed to facility hazards (e.g., public, general facility population, facility visitors). Reference, as appropriate, Chapter 12, "Procedures and Training" if that chapter presents requested information.	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 13. **Training and Drills –** The Contractor adequately describes the emergency preparedness-training program that will provide initial and annual refresher training for the ERO, general employees, and response personnel from other agencies [Safety Criterion 7.8-1(4)]. 14. **Exercises –** The Contractor has adequate plans and resources to periodically exercise the emergency response plan to ensure that protection measures can be implemented in the event of an accident (Safety Criterion 7.8-3). **…**	Both documents address training and exercises for emergency preparedness in a comparable manner.
15.4.7 Recovery and Reentry This section summarizes the provisions for the recovery from an operational emergency and planned reentry provisions for the affected facility. Indicate the recovery organization and how the facility will transition from the emergency response organization to the recovery	**9.3.3 Regulatory Acceptance Criteria** The Contractor's emergency management program is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.)	Both documents address recovery and reentry in a comparable manner.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
organization.	… 7. **Protective Actions and Re-Entry** – The Contractor provides adequate and appropriate protective action guidance and implementation, and re-entry planning (Safety Criteria 7.8-1 and 7.8-2). …	
CHAPTER 16 PROVISIONS FOR DECONTAMINATION AND DECOMMISSIONING The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(t), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)20, of the Order (Topic 20). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. [NOTE: The cited text from DOE 5480.23 identifies provisions for decontamination and decommissioning as a topic in the safety analysis report. Attachment 1, Topic 20 directs the Contractor to demonstrate in the design and planning of construction and operation that adequate consideration of the ways the facility may require decontamination and ultimate decommissioning. Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**11.0 DEACTIVATION AND DECOMMISSIONING** **11.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes the Contractor's plans for deactivating and decommissioning the facility. The Contractor is responsible for 1) deactivation of the facility and 2) design of the facility to simplify decontamination and decommissioning and to reduce exposure to site personnel and the public. The Contractor will deactivate its facility, and the Department of Energy (DOE) will subsequently decommission the facility.	Decontamination and decommissioning requirements are common to both DOE-STD-3009 and the CAR Guide. (See Endnote 2)
16.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**11.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the draft plans for deactivation of the facility and the design features that will enhance decommissioning.	Both DOE-STD-3009 and the CAR Guide include introductory material on provisions for decontamination and decommissioning supporting the safety analysis that follows.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	The reviewer will also evaluate the Contractor's plans for preparing and retaining records important to deactivation and decommissioning. Descriptions of waste minimization plans will also be evaluated.	
16.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**11.3.2 Regulatory and Contractual Requirements** The requirements for reviewing the deactivation plan is found in the Regulatory Process document (DOE/RL-96-0003, Rev. 1), which states in part that "the draft deactivation plan is acceptable." The document also states that the Construction Authorization Request (CAR) submittal shall include a "description of the D&D features provided in the design and draft deactivation plan." This was modified in Table S4-1 of the Contract to show that the Contractor will submit a "revision to the deactivation plan" with its CAR. Related regulatory and contractual requirements are found in the Safety Requirements Document (SRD). The following safety criteria apply to decommissioning: Safety Criterion 8.0-1, which states, "There shall be an approved plan for deactivation of the facility before it is constructed. The objectives of the plan shall be to reduce radiation exposure to Hanford Site personnel and the public both during and following deactivation and decommissioning activities and to minimize the quantity of radioactive waste generated during deactivation, decontamination, and decommissioning. Features and procedures that simplify and facilitate decommissioning shall be identified during the planning and design phase based upon a proposed decommissioning method." Safety Criterion 8.0-2, which states, "Facilities shall be designed to simplify decontamination and	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing, surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	decommissioning, reduce exposure to site personnel and the public during these activities, and increase the potential for reuse. Features and procedures that simplify and facilitate decontamination, decommissioning, and minimization of contaminated equipment and the generation of radioactive waste during deactivation, decontamination, and decommissioning shall be identified during the planning and design phase based upon a proposed decommissioning method or conversion to other use." The implementing code and standard identified by the Contractor for deactivation and decommissioning are found in the Integrated Safety Management Plan (ISMP), Section 1.3.19, "Deactivation."	
16.3 DESCRIPTION OF CONCEPTUAL PLANS This section summarizes conceptual plans for D&D. This summary documents that planning of operations and design or modifications minimizes the potential for spread of contamination that would complicate or reduce effectiveness of future D&D or environmental restoration activities. Assessment of future D&D activities must be based on an evaluation of the type and magnitude of hazards and the complexity of processes. The evaluation considers the vulnerabilities to normal and abnormal events and operational plans to minimize contamination and prevent an increase in residual risk during or after decommissioning in a manner similar to the hazard analysis described in Section 3.3, "Hazard Analysis." The evaluation, however, is conceptual in nature and does not require the extent of documentation required of a SAR hazard analysis. The description of design features to facilitate D&D operations is limited to major modifications of existing	**11.3.3 Regulatory Acceptance Criteria** The Contractor's submittal on deactivation and decommissioning will be acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. **Deactivation and Decommissioning Planning and Recordkeeping** – The Contractor incorporates design provisions to facilitate deactivation and final decommissioning. These design provisions reduce radiation exposure to Hanford Site personnel and the public during and following deactivation and decommissioning activities and minimize the quantity of radioactive waste generated during deactivation (ISMP, Section 1.3.19, "Deactivation"). 2. **Deactivation and Decommissioning Plan** – The Contractor's deactivation plan provides details on how the following activities will be accomplished to deactivate the facility (ISMP, Section 1.3.19, "Deactivation"):	Both documents address plans for decontamination and decommissioning in a comparable manner. The CAR Guide includes details that relate to specific commitments in the ISMP for deactivation and decommissioning and provides a significantly greater level of detail than DOE-STD-3009.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
facilities.	a. Verification that the facility deactivation endpoint has been completed. b. Documentation of the regulatory status, conditions, and inventories of remaining radioactive and hazardous materials and health and safety requirements. c. Modification of the facilities, structures, support systems, and surveillance systems to confine and monitor the remaining contamination, radiation, and other potential hazards. d. Posting and securing of the facility. e. Removal of packaged radiological and chemical materials. f. Confirmation that security systems and procedures are adequate and in place to prevent unauthorized entry. The Contract requires that the draft deactivation plan 1) shall be integrated with all technical, regulatory, and business and finance aspects of the Contract, 2) shall be submitted to DOE for concurrence, 3) shall be consistent and integrated with the Resource Conservation Recovery Act (RCRA) Closure Plan, 4) and shall describe how the Contractor-provided facilities and equipment shall be deactivated. **…** 3. **Minimization of Contamination –** The Contractor shall have plans for minimizing contamination. Guidance for minimizing contamination is provided in Section 10,"Deactivation and Decommissioning," NUREG-1520 and includes the following: a. The Contractor's facility is designed, to the extent practicable, to minimize radioactive and hazardous chemical contamination of the facility (buildings, structures, and equipment) and the environment, to minimize the generation of radioactive waste, and to	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	facilitate eventual deactivation and decommissioning. The design incorporates features that are intended to contain contamination; detect contaminant migration through barriers; minimize the extent of contamination; and limit volumes and hazards associated with wastes from operations, deactivation, and decommissioning. Such features include such things as strippable coatings, low porosity and permeability barriers, filters, ventilation systems, glove boxes, closed containers, double containment and leak detection, overhead piping, monitoring devices and instrumentation, and catch basins. b. The facility design reflects consideration of the accident sequences and essential controls identified in the Preliminary Safety Analysis (PSA) (Section 4.0 of this Guide). c. The Contractor considers radiological survey needs in support of deactivation and decommissioning and should demonstrate that the facility has been designed to facilitate the following: routine area surveys to detect contamination, operational surveys to plan for and conduct deactivation and decommissioning, and final termination surveys to demonstrate compliance with facility end-point criteria. d. The facility is designed to minimize, to the extent practicable, the potential that the facility and site will require land-use restrictions and institutional controls following deactivation and decommissioning. e. The Contractor identifies the volumes and types of radioactive waste that will be stored onsite, describes the controls that will ensure containment of the waste while in storage, and ensures that the duration and effects of waste storage will be minimized. The Contractor demonstrates a firm	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	commitment to storing waste inside buildings with appropriate environmental controls rather than relying on outside storage of wastes in lagoons, scrap yards, or paved areas. If wastes are stored in outdoor areas, the Contractor includes adequate environmental monitoring provisions to promptly detect and assess environmental migration of contaminants in soil, surface water, and groundwater.	
CHAPTER 17 MANAGEMENT, ORGANIZATION, AND INSTITUTIONAL SAFETY PROVISIONS The purpose of this chapter is to provide information that will satisfy the requirements of DOE 5480.23, paragraph(s) 8.b.(3)(l), as amplified in Attachment 1, paragraph(s) 4.f.(3)(d)12, of the Order (Topic 12). This chapter also includes information, if applicable, that will partially satisfy the requirements of DOE 5480.23 paragraph(s) 8.b.(3)(b),(f), and (u) as discussed in detail in the Introduction of this Standard. [NOTE: The cited text from DOE 5480.23 identifies management, organization, and institutional safety provisions as a topic in the safety analysis report. Attachment 1, Topic 12 directs the Contractor to identify the structure of the organizations responsible for the design, construction, or operation of the facility and discuss the ways the organization deals with facility safety issues, interfaces with other groups, development of a safety culture, configuration and document control, occurrence reporting, staffing requirements ... Three other topics from DOE 5480.23 are also identified. They are - applicable statutes, rules, regulations and Departmental Orders; Principal health and safety criteria; applicable Facility design codes and standards.]	**2.0 ORGANIZATION AND ADMINISTRATION** **2.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes management systems and structures and the qualifications for key management positions. The review will also assess whether the Contractor plans, implements, and controls site activities in a manner that protects the safety of the facility and co-located workers, the public, and the environment.	The establishment of organizational and management systems to assure safety provisions are common to both DOE-STD-3009 and the CAR Guide. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
17.1 INTRODUCTION This section provides an introduction to the contents of this chapter based on the graded approach and includes objectives and scope specific to the chapter as developed.	**2.1 Purpose of Review** The purpose of this review is to determine whether the Contractor's submittal adequately describes management systems and structures and the qualifications for key management positions. The review will also assess whether the Contractor plans, implements, and controls site activities in a manner that protects the safety of the facility and co-located workers, the public, and the environment.	Both DOE-STD-3009 and the CAR Guide include introductory material on the Contractor's management systems and safety provisions supporting the safety analysis that follows.
17.2 REQUIREMENTS This section lists the design codes, standards, regulations, and DOE Orders which are required for establishing the safety basis of the facility. The intent is to provide only the requirements that are specific for this chapter and pertinent to the safety analysis, and not a comprehensive listing of all industrial standards or codes or criteria. SRIDs may be referenced as appropriate.	**2.3.2 Regulatory and Contractual Requirements** The requirements for the organization and administration descriptions are found in the Regulatory Process document (DOE/RL-96-0003, Rev. 1), which states that "the Contractor's safety-related activities are being conducted in accordance with its Integrated Safety Management Plan (ISMP)." To demonstrate this, the Contractor shall describe the proposed organization structure, the associated administrative program, and the management controls used to ensure the safety of the facility and co-located workers, the public, and the environment. Related regulatory and contractual requirements are found in the Contractor's Safety Requirements Document (SRD). The following safety criteria apply to organization and administration: Safety Criterion 1.0-1 states, in part, "A comprehensive radiological and process safety management program shall be used to eliminate or reduce the incidence, or mitigate the consequences of, accidental radioactive or chemical releases, process fires, and process explosions. This program shall address management practices, technologies, and procedures." Safety Criterion 1.0-2 states, "Principle emphasis shall be placed on the prevention of accidents,	The list of codes, standards, and DOE Orders required for establishing the safety basis for the RPP-WTP facility is arrived at through a contract-stipulated Integrated Safety Management process and the results are documented in the Contractor's SRD. Thus, the information pertinent to testing, surveillance, and maintenance expected under the CAR Guide encompasses that expected under DOE-STD-3009. (See Endnote 2)

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	particularly any that could cause an unacceptable release, as the primary means of achieving safety." Safety Criterion 1.0-9 states, "BNFL Inc. shall accept ultimate responsibility for the safety of the TWRS-P Facility." Safety Criterion 7.0-3 states, "The operating organizations shall become and remain familiar with the features and limitations of components included in the design of the facility. They shall obtain appropriate input from the design organization on pre-operational testing, operating procedures, and the planning and conduct of training." Safety Criterion 7.0-4 states, "The assignment and subdivision of responsibility for safety within the contractor's organization shall be kept well defined throughout the life of the facility." Safety Criterion 7.1-3 states, in part, "The separation between the responsibilities of the safety review organizations and those of the other organizations shall remain clear so that the safety review organizations retain their independence as safety authorities."	
17.3 ORGANIZATIONAL STRUCTURE, RESPONSIBILITIES, AND INTERFACES This section summarizes the overall structure of the organizations. Include in the summary the separate and distinct entities that are organized into a safety conscious and responsive organization to ensure and enhance the facility safety.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) 1. Corporate and plant policies contain a strong commitment to operating safely and protecting worker health and the environment. 2. The Contractor identifies and describes the responsibilities of the specific organizations and organizational groups responsible for performing activities Important to Safety during the facility design and construction phases. Organizational charts are included in the submittal.	Both DOE-STD-3009 and the CAR Guide include the definition of the Contractor's organizational structures and responsibilities to assure a corporate commitment to operating safely and protecting worker and public health and the environment. The CAR Guide provides a significantly greater level of detail in most areas than required by DOE-STD-3009. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	3. A commitment to provide clear management controls and communications exist among the organizational units responsible for designing and constructing the facility. 4. Substantive breadth, level of experience, and availability of personnel exist to complete the facility's design, construction, and pre-operational testing. Position descriptions clearly define the qualifications, responsibilities, and authorities for key supervisory and management positions responsible for health, safety, and the environment, including the construction manager, pre-operational testing manager, shift supervisor, and health, safety, and environmental managers (or similar positions). The descriptions are accessible to affected personnel and to the reviewer upon request. The Contractor describes how the organization (e.g., management and supervisory positions) will be structured to perform activities Important to Safety as the facility transitions from design to construction and from construction to operation. 5. In the organizational hierarchy, the health, safety and environmental oversight organization(s) are independent of the operational organizations, allowing them to provide objective audit, review, or control activities. As used here, "independent" means that neither organization reports to the other in an administrative sense; however, both may report to a common manager. Lines of responsibility and authority are clearly drawn. 6. The Contractor has identified who within the organization has the authority to shut down and restart operations. 7. The activities essential for effectively implementing the health, safety, and environmental programs are documented in formally approved written procedures that comply with a formal	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	document control program. 8. A simple mechanism for reporting potentially unsafe conditions or activities to the health, safety, and environmental organization and/or to upper management is available for all employees. Reported concerns are investigated, assessed, and resolved promptly. The Contractor promotes an open environment that supports safety and is absent of indications of any actions that discourage prompt and open reporting of safety concerns. 9. Effective lines of communication and authority are clearly defined and exercised among the organizational units involved in the engineering, health, safety, environmental, and pre-operational testing functions of the facility. 10. The Contractor establishes formal management control systems including configuration management, maintenance, quality assurance, training and qualification, written procedures, human factors, audits and assessments, incident investigations, and records management to ensure the availability and reliability of Important to Safety structures, systems, and components (SSCs). The detailed guidance for reviewing these functions is addressed in other sections of this Guide. 11. Arrangements are in place to provide emergency resources such as fire, police, ambulance/rescue units, and medical services during construction and pre-operational testing. This is addressed in more detail in "Fire Safety," Section 8.0, and "Emergency Management," Section 9.0, in this Guide.	
17.3.1 Organizational Structure This section summarizes the organization, including the interfaces with respect to the management of the facility beyond the operating organization.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: 1. Corporate and plant policies contain a strong commitment to operating safely and protecting	Both DOE-STD-3009 and the CAR Guide include the definition of the Contractor's organizational structures and responsibilities to assure a corporate commitment to operating safely and protecting worker and public health and the environment. The

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	worker health and the environment. 2. The Contractor identifies and describes the responsibilities of the specific organizations and organizational groups responsible for performing activities Important to Safety during the facility design and construction phases. Organizational charts are included in the submittal. 3. A commitment to provide clear management controls and communications exist among the organizational units responsible for designing and constructing the facility. **…**	CAR Guide provides a significantly greater level of detail in most areas than the DOE-STD-3009 guidance. A summary of the CAR Guide information is provided here for comparison purposes.
17.3.2 Organizational Responsibilities This section summarizes the organization's responsibilities and authorities; its interfaces with other organizations described in this chapter or other chapters of the SAR, including the line operating organization; and the general safety programs and issues for which it is responsible. Also discuss: • Technical and engineering support, maintenance, and modifications. • Safety issue discovery, communication, management, and resolution. • Independent safety review, audit, and compliance determination. • Safety analysis services, including USQ evaluation. • Support services such as utilities and other offsite support.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: **…** 9. Effective lines of communication and authority are clearly defined and exercised among the organizational units involved in the engineering, health, safety, environmental, and pre-operational testing functions of the facility. **…**	Both DOE-STD-3009 and the CAR Guide include the definition of the Contractor's organizational structures and responsibilities to assure a corporate commitment to operating safely and protecting worker and public health and the environment.
17.3.3 Staffing and Qualifications This section summarizes the bases for the staffing levels and the knowledge, skills, and abilities of facility personnel in organizations covered in this chapter. Describe the programs and provisions for monitoring safety performance of the staff.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: **…** 4. Substantive breadth, level of experience, and availability of personnel exist to complete the facility's design, construction, and pre-operational testing. Position descriptions clearly define the	Both DOE-STD-3009 and the CAR Guide include the definition of the Contractor's organizational structures, responsibilities, and qualifications to assure a corporate commitment to operating safely and protecting worker and public health and the environment.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	qualifications, responsibilities, and authorities for key supervisory and management positions responsible for health, safety, and the environment, including the construction manager, pre-operational testing manager, shift supervisor, and health, safety, and environmental managers (or similar positions). The descriptions are accessible to affected personnel and to the reviewer upon request. The Contractor describes how the organization (e.g., management and supervisory positions) will be structured to perform activities Important to Safety as the facility transitions from design to construction and from construction to operation. **…**	
17.4 SAFETY MANAGEMENT POLICIES AND PROGRAMS This section identifies and describes programs to enhance facility safety. **17.4.1 Safety Review and Performance Assessment** This section summarizes the programs and procedures used to ensure independent oversight, safety review, USQ determination, and appraisal of the safety performance of all of the organizations involved in the management of safety, such as industrial safety, fire inspections, and hazardous material control.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: **…** 5. In the organizational hierarchy, the health, safety and environmental oversight organization(s) are independent of the operational organizations, allowing them to provide objective audit, review, or control activities. As used here, "independent" means that neither organization reports to the other in an administrative sense; however, both may report to a common manager. Lines of responsibility and authority are clearly drawn. **…**	Both DOE-STD-3009 and the CAR Guide include the definition of the Contractor's safety management policies and programs.
17.4.2 Configuration and Document Control This section summarizes programs for controlling modifications to the facility or to its operation. Describe the programs for control of all documentation serving a safety related function, such as as-built facility drawings, operating procedures, training manuals, etc.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: **…** 10. The Contractor establishes formal management control systems including configuration management, maintenance, quality assurance, training and qualification, written procedures, human factors, audits and assessments, incident	Both DOE-STD-3009 and the CAR Guide include the implementation of configuration management and document control as part of the QA function. The CAR Guide contains several specific entries regarding configuration and document control as shown.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	investigations, and records management to ensure the availability and reliability of Important to Safety structures, systems, and components (SSCs). The detailed guidance for reviewing these functions is addressed in other sections of this Guide. **…** **4.12 PSAR Configuration Control** **4.12.1 Purpose of Review** The purpose of this review is to determine whether the Contractor has established adequate programs and procedures to ensure that safety is adequately preserved as changes are made to Important to Safety SSCs and that the PSAR will be maintained under configuration control to preserve the facility's safety. The PSAR needs to be periodically updated to reflect changes in the facility and procedures. At the CAR stage, these changes need not be evaluated to determine whether they involve unreviewed safety questions. For the CAR, the Contractor is only required to have a draft Unreviewed Safety Question Plan and does not need to submit a final Plan until the operations authorization stage. Therefore, the Plan is not effective during construction. Nonetheless, the Contractor is required to comply with RL/REG-97-13, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*, Revision 5, April 1999 (page 4). This position paper includes the CAR submittal (including the PSAR) as part of the authorization basis. Revisions to the CAR information may be made by the Contractor without prior regulatory approval if the following is met: "A safety evaluation is performed that demonstrates	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	that the revision does not do the following: • Involve deleting or modifying a standard previously identified or established in the approved SRD. • Result in a reduction of the commitment currently described in the Authorization Basis. • Result in a reduction in the effectiveness of any program, procedure, or plan described in the Authorization Basis." **4.12.2 Areas of Review** The reviewer will determine whether the Contractor's submittal adequately describes the configuration control, including the scope for and approach to configuration control. This section will be reviewed in conjunction with Section 3.1, "Configuration Management," and Section 3.8, "Records Management," in this Guide. **4.12.3 Acceptance Criteria** **4.12.3.1 Acceptability Review** The reviewer will determine whether the Contractor's submittal on PSAR configuration control contains sufficient information to evaluate the submittal against the criteria in Section 4.12.3.3, "Regulatory Acceptance Criteria," and is therefore ready for detailed review. If significant deficiencies are identified in the submittal, the Contractor will be requested to submit additional information before the start of the detailed review. **4.12.3.2 Regulatory and Contractual Requirements** The requirements for PSAR configuration control are found in the following general contractual requirement from the Regulatory Process document: • Approval Condition: "The radiological, nuclear,	

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	and process hazards associated with facility operation, including those from postulated accidents, have been…adequately documented in a *formally controlled* [emphasis added] Preliminary Safety Analysis Report (PSAR)**…**" Related regulatory and contractual requirements are found in the SRD. Specific safety criteria that apply to PSAR configuration control include the following: Safety Criterion 4.0-3, which states, "A system shall be used to control and maintain as-built records for Important to Safety SSCS through deactivation of the facility." Safety Criterion 9.1-5, which states, "The SAR shall be maintained as a controlled document." **4.12.3.3 Regulatory Acceptance Criteria** The PSAR configuration control program is acceptable if the Contractor has ensured that the PSAR will be maintained under configuration control to preserve the facility's safety. The reviewer should coordinate the review of this section with the review of Section 3.1, "Configuration Management," and Section 3.8, "Records Management," in this Guide.	
17.4.3 Occurrence Reporting This section summarizes provisions for investigating abnormal events and reporting procedures to DOE; selection and analysis of information for occurrence reports; the evaluation of operational experience and trends; and for the development of feedback, corrective action, and communicating lessons learned.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: (Alternative descriptions also may be acceptable if they are adequately justified and meet applicable requirements.) **…** 8. A simple mechanism for reporting potentially unsafe conditions or activities to the health, safety, and environmental organization and/or to upper management is available for all employees. Reported concerns are investigated, assessed, and	Both DOE-STD-3009 and the CAR Guide include administrative functions to assure occurrence reporting. The CAR Guide provides a significantly greater level of detail in most areas than the DOE-STD-3009 guidance. A summary of the CAR Guide information is provided here for comparison purposes.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	resolved promptly. The Contractor promotes an open environment that supports safety and is absent of indications of any actions that discourage prompt and open reporting of safety concerns. 9. Effective lines of communication and authority are clearly defined and exercised among the organizational units involved in the engineering, health, safety, environmental, and pre-operational testing functions of the facility. 10. The Contractor establishes formal management control systems including configuration management, maintenance, quality assurance, training and qualification, written procedures, human factors, audits and assessments, incident investigations, and records management to ensure the availability and reliability of Important to Safety structures, systems, and components (SSCs). The detailed guidance for reviewing these functions is addressed in other sections of this Guide. 11. Arrangements are in place to provide emergency resources such as fire, police, ambulance/rescue units, and medical services during construction and pre-operational testing. This is addressed in more detail in "Fire Safety," Section 8.0, and "Emergency Management," Section 9.0, in this Guide.	
17.4.4 Safety Culture This section summarizes the policies and programs used to: promote an interest in and involvement of all associated workers in facility safety; facilitate a questioning attitude toward safety related activities and equipment; and ensure that workers understand the potential risks to the facility and fellow workers as well the rewards and sanctions associated with personal safety performance.	**2.3.3 Regulatory Acceptance Criteria** The Contractor's organization and administration submittal is acceptable if the following criteria are met: **…** 8. A simple mechanism for reporting potentially unsafe conditions or activities to the health, safety, and environmental organization and/or to upper management is available for all employees. Reported concerns are investigated, assessed, and resolved promptly. The Contractor promotes an open environment that supports safety and is absent	Both DOE-STD-3009 and the CAR Guide include the definition of the Contractor's organization and administration to develop and maintain a safety culture to ensure safe design, construction, and operation of a new facility.

DOE-STD-3009 Outline/Content	RL/REG-99-05, CAR Guidance Outline/Content	Comments
	of indications of any actions that discourage prompt and open reporting of safety concerns. 9. Effective lines of communication and authority are clearly defined and exercised among the organizational units involved in the engineering, health, safety, environmental, and pre-operational testing functions of the facility. 10. The Contractor establishes formal management control systems including configuration management, maintenance, quality assurance, training and qualification, written procedures, human factors, audits and assessments, incident investigations, and records management to ensure the availability and reliability of Important to Safety structures, systems, and components (SSCs). The detailed guidance for reviewing these functions is addressed in other sections of this Guide. 11. Arrangements are in place to provide emergency resources such as fire, police, ambulance/rescue units, and medical services during construction and pre-operational testing. This is addressed in more detail in "Fire Safety," Section 8.0, and "Emergency Management," Section 9.0, in this Guide.	

Endnotes

1 While the outline of DOE-STD-3009 includes an "Executive Summary" section, under the RL/REG-99-05, such a section is not expected. However, the information expected per DOE-STD-3009 in the Executive Summary section is expected to be provided in Section 1 or other sections of the PSAR, although in more detail.

2 In DOE-STD-3009, the chapter title and the "Requirements" sections of each chapter expect a list of "design codes, standards, regulations, and DOE orders, which are required for establishing the safety basis of the facility." For the RPP-WTP, the list of codes, standards, and DOE orders required for establishing the safety basis of the facility is arrived at through a Contract-stipulated ISM process and the results thereof are documented in the Contractor's SRD. The Contractor is required to certify that the set of standards in the SRD "when properly implemented, will ensure adequate radiological, nuclear, and process safety, compliance with applicable laws and regulations, and conformance to the DOE-stipulated top-level standards and principles." The SRD is approved by the OSR and becomes a part of the Authorization Basis. The Contractor's PSAR submittal is reviewed against the requirements in the SRD. Thus, while process embodied in the RL/REG-99-05 for establishing the safety requirements is different, it provides equivalent but more tailored set of requirements.

3 DOE has required that the RPP-WTP safety analyses establish the identification and functions of important to safety SSCs. "Important to safety" SSCs are defined by the DOE defined regulatory program, and the RPP-WTP Contract, as a broader category than "safety" SSCs, defined by 10 CFR 830. Specifically, ITS SSCs are defined as those that "provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public," whereas safety SSCs are defined more narrowly by 10 CFR 830. (Concerning "undue risk," the risk goals for the RPP-WTP are found in DOE/RL-96-0006, part of the DOE-defined regulatory program. The risk goals were derived principally from Secretary of Energy Notice, SEN 35-91, "Nuclear Safety Policy.")

The identification and functions of these ITS SSCs are developed from the DOE-required integrated standards development process, which is part of the RPP-WTP safety management system. Note 4 provides details concerning how ITS SSCs are identified. This process was defined in RL/REG 96-0004 and endorsed by DOE in DOE/RL-96-25, *Policy for Radiological, Nuclear, and Process Safety Regulation of the River Protection Project Waste Treatment Plant Contractor*, and DOE/RL-96-26, *Memorandum of Agreement for the Execution of Radiological, Nuclear, and process Safety Regulation of the River Portection Project Waste Treatment Plant Contractor*. This process implements DEAR 970.5223-1, "Integration of Environment, Safety and Health into Work Planning," and DOE M 450.3-1, "The Department of Energy Closure Porcess for Necessary and Sufficient Sets of Standards," as they relate to nuclear, radiological and process safety.

4 The OSR-approved method to identify important to safety SSCs is similar in concept, but more elaborate, than the method defined in Appendix A to DOE STD 3009 for safety SSCs. As part of the standards-based ISM process, safety requirements and control strategies are identified from the facility hazard analysis by the Contractor's process review team, subject to OSR review and approval. Criteria for this identification are detailed in Appendix A and B of the SRD. These criteria were proposed by the Contractor as part of the ISM process and accepted by DOE in a December 1998, revision of the SRD, to address OSR review concerns that the Contractor had not, to that point, adequately explained how defense in depth and single failure protection would be implemented at the RPP-WTP.

Each postulated radiological accident is assigned one of four "Severity Levels" (Severity Level 1, 2, 3, or 4) depending on the unmitigated consequences of the accident. For example, SL-1 accidents include any accident with >25 rem unmitigated consequence to a worker or >5 rem to the public. The control strategies and safety functions that the SRD requires to be provided by the ITS SSCs vary, depending on the Severity Level of the corresponding accident.

Once the Severity Level is determined, criteria for ITS SSC performance are invoked that depend on the Severity Level specified. For example, the SSC control strategy for an SL-1 accident must:

- satisfy the single failure criterion
- be diverse and independent
- ensure that the frequency of release, after prevention and mitigation, must be less than 10^{-6} per year.

Similar, but less demanding criteria for ITS SSC performance, are provided for each of the other three accident Severity Levels in the SRD.

In contrast, safety class SSCs are expected, using Appendix A to DOE-STD-3009, to be those for which an unmitigated accident analysis indicates the potential for an exposure to the public of at least 25 rem. Such SSCs are a subset of the ITS SSCs associated with Severity Level-1 accidents. Every safety class SSC will be an ITS SSC associated with a Severity Level 1 accident, but every ITS SSC associated with a Severity Level 1 accident will not be a safety class SSC. The criteria for Severity Level 1 associated ITS SSCs (outlined above) ensure that the control strategies for safety class SSCs will be at least as robust as those provided by DOE-STD-3009 for these safety class SSCs.

Safety significant SSCs are those safety SSCs that are not safety class, but whose preventive or mitigative functions is a "major contributor to defense in depth and/or worker safety as determined from safety analyses." ITS SSCs are a broader set, since they are any SSCs that "provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the workers and the public," regardless of whether they are a "major contributor to defense in depth and/or worker safety." Every safety significant SSC will be an ITS SSC, but every ITS SSC will not be a safety significant SSC.

As specified in the DOE approved methodology for the RPP-WTP , however, safety class and safety significant SSCs are not identified explicitly. As discussed in the preceding paragraphs, both types of SSCs are, however, implicit subcategories of the ITS SSCs that are identified in the hazard and accident analysis portion of the standards based ISM process. Design requirements for ITs SSCs associated with SL-1 and SL-2 events meet the design requirements for corresponding SSCs under DOE O 420.1. For example, SSCs associated with SL-1 events are required to meet the single failure criteria in application of defense-in-depth. Similarly, for SSCs associated with SL-2 events, application of single failure criteria is to be considered. These two event categories encompass all events with a potential for exposure to the public in the "rem range" and consequently the associated SSCs should include all SSCs that may be candidates for Safety Class designation per DOE O 420.1.

5 Chapters 4 and 5 of the DOE-STD-3009 address expectations regarding Technical Safety Requirements (TSRs). These expectations are appropriate for an existing facility in operation or ready for operation (i.e., for which an FSAR has been completed). The RPP-WTP CAR Guide, on the other hand, is written to be applicable to a PSAR submittal. As such, the expectations regarding TSRs in the CAR Guide are limited to "potential safety limits for hazard control provisions and strategies for the Contractor's facility according to the applicable requirements of the contract," and "draft TSRs other than potential safety limits" for "the final hazard control provisions and strategies." The purpose of the "potential safety limits" and "draft TSRs" at the PSAR stage is primarily for evaluations of the adequacy of the Contractor's hazard evaluation and selection of control strategies. Complete set of TSRs is expected in the Contractor's FSAR submittal for Operations Authorization, consistent with DOE-STD-3009.

6 Chapter 8 of DOE-STD-3009 pertains to hazardous material protection. The RPP-WTP PSAR submittal is currently required to address hazardous materials only as they pertain to process safety. However, the contractor is responsible under the contract for following an integrated safety management process for assuring hazardous material protection for all hazardous materials on site. As such, the Contractor is responsible for obtaining all relevant permits and obeying pertinent state and federal laws and regulations. These include all OSHA and EPA regulations for hazardous materials protection. A requirement to address in the DSA the overall hazardous material protection program per Chapter 8 of DOE-STD-3009 will be added through future contract modification.

7 Here, and in several other instances, the DOE-STD-3009 expects historical performance data to be provided. Inasmuch as RPP-WTP is a new facility, this expectation cannot be met by the RPP-WTP. The discrepancy is caused by the fact that DOE-STD-3009 is written primarily for existing facilities, while the CAR Guide is written for a new facility under design and construction.

8 Chapter 9 of DOE-STD-3009 pertains to radioactive and hazardous waste management. The RPP-WTP PSAR submittal is currently not required to address hazardous waste management. However, the contractor is responsible under the Contract for obtaining all relevant permits and obeying pertinent state and federal laws and regulations. These include all OSHA and EPA regulations for hazardous materials protection and waste management. A requirement to address in the PDSA and DSA overall hazardous waste management program per Chapter 9 of DOE-STD-3009 will be added through future contract modification.