DOE—EM—SRP--2017
1st Edition

Environmental Management

Safety ▪ Performance ▪ Cleanup ▪ Closure

STANDARD REVIEW PLAN (SRP)

Achieving Readiness for Nuclear Facilities Review Module

Achieving Readiness for Nuclear Facilities Operation

FEBRUARY 2017

OFFICE OF ENVIRONMENTAL MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON D. C. 20585

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Standard Review Plan (SRP)

Achieving Readiness for Nuclear Facilities Operation

Review Module

Critical Decision (CD) Applicability					
CD-0	CD-1	CD-2	CD-3	CD-4	Post Operation
	✓	✓	✓	✓	

February 2017

FOREWORD

The Standard Review Plan (SRP)[1] provides a consistent, predictable corporate review framework to ensure that issues and risks that could challenge the success of Office of Environmental Management (EM) projects are identified early and addressed proactively. The internal EM project review process encompasses key milestones established by DOE O 413.3B, Change 3, *Program and Project Management for the Acquisition of Capital Assets,* DOE-STD-1189-2016, *Integration of Safety into the Design Process, and EM's internal business management practices.*

The Achieving Readiness for Nuclear Facilities Review Module (RM) addresses the requirements and guidance of DOE O 425.1D, *Verification of Readiness to Startup or Restart Nuclear Facilities*; DOE-STD-3006-2010, *Planning and Conducting Readiness Reviews (ORRs*); DOE-HDBK-3012-2015, *Team Leader's Good Practices for Readiness Reviews,* and DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*.

The SRP follows the Critical Decision (CD) process and consists of programmatic areas that address key functional areas necessary to operate a DOE Nuclear Facility. This Review Module expands on existing SRPs.

[1] *The entire EM SRP and individual Review Modules can be accessed on EM website at http://em.doe.gov*

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ACRONYMS

ALARA	As Low As Reasonably Achievable
CD	Critical Decision
CFR	Code of Federal Regulation
CGD	Commercial Grade Dedication
CM	Configuration Management
CON	Conduct of Operations
COR	Certification of Readiness
CSE	Cognizant System Engineers
DOE	Department of Energy
DSA	Documented Safety Analysis
EM	Environmental Management
EP	Emergency Preparedness
FPD	Federal Project Director
HDBK	Handbook
LOIs	Lines of Inquiry
MEL	Master Equipment List
MC&A	Nuclear Material Control and Accountability
M&TE	Measuring and Test Equipment
NARAC	National Atmospheric Release Advisory Center
NM	Nuclear Material
NMMSS	Nuclear Materials Management Safeguard System
NCS	Nuclear Criticality Safety
O	Order
ORR	Operational Readiness Review
OSH	Occupational Safety and Health
P	Policy
PC	Performance Criteria
POA	Plan of Action
QA	Quality Assurance
RCA	Readiness Certification Assurance
RCAPTS	Readiness Certification Assurance Process Tracking
RCO	Radiological Control Organization
RCRA	Resource Conservation and Recovery Act
RIS	Reporting Identification Symbol
RM	Review Module
RPP	Radiation Protection Plan
SAA	Startup Authorization Authority
SRP	Standard Review Plan
SSCs	Structures, Systems, and Components
STD	Standard
SME	Subject Matter Expert
SNR	Startup Notification Report
TSR	Technical Safety Requirements
USQ	Un-reviewed Safety Questions

I. INTRODUCTION

The Department of Energy (DOE) operates plants across the complex that are all unique in their design, systems, and purpose. Experience in the nuclear industry indicates that successful operating plants exhibit the following characteristics[2:]

1. Excellent plants are operationally focused. Operations leadership is not only observed in the control room, but is evident in day-to-day decision-making and determining plant priorities. There are high operational standards throughout the organization, including those in maintenance, work control and engineering.
2. They have exceptional equipment performance. The plant operates event free due to excellent material condition and a proactive focus on equipment performance. There is an intolerance for equipment problems that can challenge safety system performance and unit reliability or can burden the operators.
3. They use training to continuously improve performance. Focus is on training excellence and continuous improvement, not simply maintaining accredited training programs. The plant makes innovative uses of training to prepare workers for their tasks. More importantly, line managers are involved.
4. Excellent nuclear plants have strong leadership. Direction is simple, clear, and understandable. Priorities are well understood.
5. Workers are engaged and regularly offer input to solve problems and make improvements. There is teamwork and focus. Workers want to come to work.
6. Finally, excellent plants make a habit of being self-critical. They use self-assessments, performance indicators, corrective action programs and benchmarking to implement best practices.

How does a new facility know when it has achieved readiness? How are the above principles properly instilled in the operational staff of a new facility? This module was developed to help address these issues and incorporates lessons learned from across the DOE complex.

This RM expands on existing criteria review and approach documents and adds performance based expectations for a successful outcome in achieving readiness. It identifies what are the critical parameters of a particular element that must be demonstrated for the facility operator to declare itself ready to operate and obtain DOE approval to startup. By identifying the important performance based parameters that are crucial to a successful operating plant, the subjectivity of the review process outlined in DOE O 425.1D is reduced and it provides operating organizations a clear understanding of the expectations. The performance criteria in this module also incorporate lessons learned from previous startups and restarts in the DOE complex.

Additionally, DOE O 425.1D, *Verification of Readiness to Startup or Restart Nuclear Facilities* establishes the requirements for readiness verification for nuclear facilities, activities and operations. Attachment 1, 2.d.(5) and 2.e.(6) of the order states that prior to starting the contractor readiness review the contractor line management must have issued a formal written Readiness to Proceed Memorandum certifying that the facility is ready for startup or restart. They must also verify that the preparations for startup or restart have been completed. To meet expectations noted above requires the application of a systematic approach to demonstrate that a set of defined requirements has been met, that there is evidence to support that fact, and that the

[2] *Sustaining Excellence in a Challenging Environment, Institute of Nuclear Power Operations, May 30, 2002*

evidence has been verified as meeting the defined requirements. Simply put this is the foundational requirement to have a defined process for achieving operational readiness. Most all DOE sites look at DOE Order 425.1D as clearly requiring a formal readiness review process, but few realize the expectation for an *Achieving Readiness* process. So, what would such a process look like? This module provides guidance on how to establish the basic building blocks of such a process and identify performance expectations that demonstrate readiness so that it can be adapted to the unique mission needs and requirements for the diverse set of DOE sites.

II. PURPOSE

This RM provides the starting point for a set of corporate performance expectations that detail the basis for achieving readiness to operate a DOE nuclear facility. DOE contractors and review teams are expected to build on the RM content and develop additional project-specific Lines of Inquiry (LOI), as needed. The RM and the review process are intended to be used on an ongoing graded basis during the appropriate CD phase to ensure that issues are identified and resolved.

Since every DOE facility is unique, the degree of difficulty of the startup process should be graded to the level of complexity, the hazards involved, and the long-term mission of the facility. These details are required to be defined in the Plan of Action that describes the proposed approach a facility will take to achieve readiness. Consideration should be given to the performance expectations in determining the pre-requisites for conducting the readiness review.

While achieving readiness is a required element for CD-4, the verification process must be initiated early in the project process for the transition to nuclear operations to occur efficiently. As a minimum, readiness planning and related activities should be initiated in the design phase of the project after CD-1 approval.

III. ROLES AND RESPONSIBILITIES

If this RM is utilized to support an internal review or independent review it will depend on an experienced and qualified team. The team should be augmented with appropriate subject matter experts (SME) selected to complement the specific elements of this RM being reviewed. The specific types of expertise needed will be dependent on the type of facility being reviewed, as well as other factors such as complexity and hazards or risks.

To the maximum extent possible, personnel selected to participate in a review should have commissioning or operating program development and implementation experience within the DOE complex or related programs.

Management support is another necessary component to a successful review. Head of Field Organizations, as well as the Federal Project Director (FPD), must recognize the importance of the review and facilitate the resources necessary for its execution. This also requires appropriate interfaces with Environmental Management (EM) headquarters personnel who may direct or participate in the review process.

The roles and responsibilities for all involved in the review must be clear and consistent with the project site's review processes. The table below provides a compilation of typical DOE oversight review roles and responsibilities.

Position	Responsibility
Head of Field Organizations	Provides support and resources to the FPD and Review Team Leader in carrying out the review.
	Facilitates the conduct of the review. Allocates office space, computer equipment, and support personnel to the team as necessary to accomplish the review within the scheduled time frame
Federal Project Director	Coordinates with the Review Team Leader in the selection of subject areas for the review and in developing the site or project specific review
	In conjunction with the Contractor Project Manager, develops the briefing materials and schedule for the review activities.
	Coordinates the review team pre-visit activities and follows up review team requests for personnel to interview or material to review.
	Coordinates the necessary training and orientation activities to enable the review team members to access the facility and perform the review.
	Unless other personnel are assigned, acts as the site liaison with the review team. Tracks the status of requests for additional
	Coordinates the Federal site staff factual accuracy review of the draft report.
	Leads the development of the corrective action plan if required. Tracks the corrective actions resulting from the review.
Review Team Leader	In coordination with the FPD, selects the subject areas to be reviewed.
	Based on the project complexity and hazards involved, selects the members of the review team.
	Verifies the qualifications, technical knowledge, process knowledge, facility specific information, and independence of the Team Members.
	Leads the review pre-visit (as applicable).
	Leads the review team in completing the LOI for the various subject areas to be reviewed.
	Coordinates the development of and forwards to the FPD, the data call of documents, briefings, interviews, and presentations needed for the review.
	Forwards the final review plan to the sponsoring management for approval.
	Leads the on-site portion of the review.
	Ensures the review team members complete and document their portions of the review. Coordinates the characterization of the severity of the findings.
	Coordinates the review team response to factual accuracy comments by Federal and Contractor personnel on the draft report.
	Forwards the final review report to the sponsoring management for
	Remains available as necessary to participate in the closure verification of the findings from the review report.
Review Team Member	Refines and finalizes the criteria for the appropriate area of the review.
	Develops and provides the data call of documents, briefings, interviews, and presentations needed for his or her area of the review.

Position	Responsibility
	Completes training and orientation activities necessary for the review. Conducts any necessary pre-visit document review.
	Participates in the on-site review activities. Conducts interviews, document reviews, walk downs, and observations as necessary.
	Based on the criteria and review approaches in the Review Plan, assesses whether his or her assigned criteria have been met.
	Documents the results of the review for his or her subject areas. Prepares the review report.
	Makes recommendations to the Review Team Leader for the characterization of findings in his or her area of review.
	Resolves applicable Federal and Contractor factual accuracy comments on the draft review report.
	Prepares the final review report for his or her subject area of review.

IV. REVIEW SCOPE AND CRITERIA

This RM can be utilized to assess or gauge the readiness of individual or multiple programmatic elements at various times during the project lifecycle. The RM can also be utilized as advance guidance or reference for contractors and DOE oversight personnel who are responsible for the development and implementation of the programmatic elements to support nuclear operational readiness or personnel responsible for independently verifying readiness.

This module has been organized into key programmatic elements that are essential, depending on the projects scope, to safely build a foundation to achieve and demonstrate readiness. For each programmatic element listed below, Appendix A of this Module provides an example of program documents that would be generated and identifies a list of performance expectations that when met demonstrate operational readiness.

Review Topical Area	Identifier
Cognizant System Engineers	CSE
Conduct of Operations	CON
Configuration Management	CM
Criticality Safety	CS
Emergency Preparedness	EP
Environmental Compliance	EC
Fire Protection Program	FP
Industrial Hygiene	IH
Maintenance	MN
Management	MG
Nuclear Safety	NS
Occupational Safety and Health	SH
On-Site Transportation	OST
Operations – Procedure Management	OP
Personnel Training and Qualifications	TQ
Quality Assurance	QA
Radioactive Material Inventory Control	RM
Radiological Protection	RP
Startup Program	SP
Software Quality Assurance	SQA

Test Program	TP
Waste Management Program (Radioactive and Hazardous)	WM

Additionally, successful achievement of operational readiness starts with a well thought out and developed plan (i.e., integrated resource loaded and logic linked schedule). Planning for operational readiness involves understanding the true scope of what is to be accomplished (e.g., design, procurement, installation, testing, maintenance, procedures (operational and support), safety documentation, training, readiness confirmation) along with determining the applicable set of management requirements. Appendix B-E provides guidance for development and implementation of a systematic approach to show that a set of defined requirements have been met, that there is evidence to support that fact, and that the evidence has been verified as meeting the defined requirements. The examples provided are specific to the Y-12 Plant. The guidance does not attempt to identify the various processes utilized through the DOE complex.

V. REVIEW PLANS AND DOCUMENTATION

The results of a review will be used by the DOE FPD and/or contractor's management to help gauge the status and approach to begin operations. It is important to clearly document the methods, assumptions and results of the review. The overall SRP provides guidelines for preparing a Review Plan and a final report.

The following activities should be conducted as part of the Review Plan development and documentation/closure of the review:

- Subsequent to the selection, formation and chartering of the review team and receipt and review of the prerequisite documents, assignment of responsibilities for the development of specific lines of inquiry should be made.
- The review team members should develop specific LOIs for the subject areas listed in the respective appendices of this module.
- The individual LOIs should be compiled and submitted to the sponsor of the review for concurrence prior to starting the review.
- The project-specific review plan should be compiled with a consistent and uniform numbering scheme such that the results of each LOI can be documented and tracked to closure.

VI. REFERENCE MATERIAL

- DOE O 413.3B, Change 3, *Program and Project Management for Acquisition of Capital Assets*
- DOE O 425.1D, *Verification of Readiness to Startup or Restart Nuclear Facilities*
- DOE O 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*
- DOE-STD-3006-2010, *Planning and Conduct of Operational Readiness Reviews*
- DOE-HDBK-3012-2015, Team Leader's *Good Practices for Readiness Reviews*
- DOE O 226.1B, *Implementation of DOE Oversight Policy*
- DOE O 414.1D, *Quality Assurance;*
- DOE P 450.4C, Integrated *Safety Management System Policy*
- DOE-STD-1027-92 *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23*
- DOE-STD-1189-2016, *Integration of Safety into the Design Process*
- DOE-EM-SRP-2019, *Standard Review Plan Overview*
- 10 CFR 835, *Occupational Radiation Protection Program*

APPENDIX A - PERFORMANCE EXPECTATIONS

ID #	Performance Objectives and Criteria	Met?
Cognizant System Engineers (CSE)		
CSE-1	Have the following documents been developed and are adequate for this program element?	
	• System Engineer Program Plan • Startup Plan • Engineering Procedure Set (Operational Support) • CSE Qualification and Training Records • Shift Technical Engineer Qualification and Training Records (as applicable) **(CSE-1.1)**	
CSE-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Cognizant System Engineers program necessary to achieve readiness for nuclear operations.	
	Written program plan and procedures are established for the System Engineering Program which address the following; • Functions, responsibilities and authorities of CSEs; • Identification of systems (active safety-class, safety-significant, and active systems that are important to defense-in-depth functions), covered by the CSE program; • Identification of systems assigned for coverage across multiple shifts; • Graded approach rationale for system selection and CSE processes utilized; • Responsibilities for configuration management of assigned system(s); • Support for operations and maintenance; and, • Training and qualifications requirements. **(CSE-2.1)**	
	The CSE role and expectations in maintaining the configuration management of assigned system is clearly understood and formalized within procedures ensuring consistent approach by all CSEs. The following expectations should be established within the program procedures; • Establishment (including basis for) and retention of system requirements; • Description of how the current system configuration satisfies the requirements and performance criteria (i.e.; System Design Descriptions, etc.) • Process and performance of system assessments during various project phases. The process should describe how and frequency of periodic reviews of system operability (ability of the system to perform design and safety functions), configuration status, reliability (performance against established criteria), and system material condition.	

ID #	Performance Objectives and Criteria	Met?
	• Expectation of CSE Support (interface roles and responsibility and authority) to Operations and Maintenance that includes; o communication of operational status and maintenance activities; o evaluation of system parameters and performance; o operations and maintenance personnel training; o initiation and approval of design changes; o procurement support (CGD, Equivalency evaluations, etc.) o involvement with manufacturer and vendors; o trending data from operations and maintenance; o review/approval of maintenance work packages including acceptance test procedures; and o input to and review of operational documents revision. **(CSE-2.2)**	
	Qualification requirements for CSEs are consistent with those defined for Technical Support personnel in DOE O 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*. Qualification requirements demonstrate knowledge of the following; • System functional classification and basis; • Codes and standards applicable to assigned systems; and • System design, procurement, replacement, and related quality assurance requirements; and, • System interface with related facility safety bases including safety system functions, safety system performance criteria, and any relationship to specific administrative controls. **(CSE-2.3)**	
	CSE qualification process included system walkthrough which demonstrated knowledge of the existing condition of assigned system(s), status of related facility operations, and location and availability of vendor documents and vendor updates related to systems. **(CSE-2.4)**	
	A CSE continuing training program has been established and includes development of CSEs at both a professional and system specific level. **(CSE-2.5)**	
Conduct of Operations		
CON-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Conduct of Operation Applicability Matrix • ConOps Program Plan • Conduct of Operations Implementing Procedures • Operating Procedures • Process Mode Procedures • Drill Program Plan and Procedures • Abnormal and Emergency Procedures • Recovery Procedures • System Engineer Program • Shift Technical Engineer Program • Personnel Training and Qualification records **(CON-1.1)**	
CON-2	Verify through document reviews, interviews, and shift performance observations that the facility or project has demonstrated the following performance expectations necessary to achieve readiness for nuclear operations.	
	Operations management has demonstrated adequate performance of organizational leadership incorporating all facets of Conduct of Operations requirements through management directives, oversight, and mentoring of operations personnel. **(CON-2.1)**	
	Operations personnel have demonstrated proficiency in carrying out required directives as demonstrated through watch-standing, communications, performance of briefings, shift turnovers, and evolutions. **(CON-2.2)**	
	Operations personnel have demonstrated proficiency to perform plant operating procedures successfully at least once without change. **(CON-2.3)**	
	Plant equipment is operational at a level necessary to support demonstration of operating procedures in support of the requisite to show readiness for the level of operations being qualified. **(CON-2.4)**	
	Operations personnel have demonstrated proficiency in response to abnormal or emergency events. **(CON-2.5)**	
	Operations personnel have demonstrated discipline to the administrative procedures and directives that define required behaviors of watch-standers in the performance of evolutions across facility modes of operations. **(CON-2.6)**	
	Operations procedures are technically correct and properly guide operations personnel in the methods to operate the facility. **(CON-2.7)**	
	Supervisory watch-standers have demonstrated proficiency in operational requirements, leadership skills, and maturity to ensure Conduct of Operations disciplines are properly enforced. **(CON-2.8)**	
	Interviews with Operations supervisory and watch-standing personnel demonstrate an adequate level of knowledge to ensure safe operations and understanding of Technical Safety Requirements (TSR) and Safety Basis criteria. **(CON-2.9)**	

ID #	Performance Objectives and Criteria	Met?
	An adequate drill program is presented and demonstrated that ensures effective training as well as safe conduct. Drill program demonstrations included activities that require coordination with external organizations that included emergency response personnel and manning of Emergency Operations Centers. **(CON-2.10)**	
	Management has implemented programs to continuously monitor and assess Conduct of Operations performance to include feedback and improvement programs. **(CON-2.11)**	
	Required minimum plant watch-standing requirements are defined for all plant conditions. Operator rounds and log-keeping requirements in each plant condition are understood. **(CON-2.12)**	
Configuration Management		
CM-1	Have the following documents been developed and are adequate for this program element?	
	• Configuration Management (CM) Plan for Operations • Documented Safety Analysis (DSA) • Configuration Change Control Board – Charter Procedure • Change control documentation (Construction and Operational) • System Engineers as-built verification reports • Master Equipment List **(CM-1.1)**	
CM-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Configuration Management program necessary to achieve readiness for nuclear operations.	
	The Configuration Management Plan(s) addresses and connects the configuration management control from initiation of functional and performance requirements, into design, through construction and into operations. **(CM-2.1)**	
	The CM Plan includes; • CM training provided; • Assignment of key responsibilities and authorities; • Controlled interfaces; • Programs and procedures that implement the CM program; • Structures, systems, and components (SSCs) that are included and the basis for selection; and • Integration with the Conduct of Maintenance Plan (Work Control processes) that meet the CM and work control requirements of DOE O 433.1B, Maintenance Management Program for DOE Nuclear Facilities. **(CM-2.2)**	

ID #	Performance Objectives and Criteria	Met?
	A list (usually Master Equipment List (MEL)) has been developed and includes/identifies the SSC that are maintained under the CM Program. The MEL documents the design requirements that ensure and maintain the validity of the DSA "safety basis". In addition, the list should include SSCs whose functions are considered to be important to defense-in-depth or worker safety. The combination of the safety SSCs and defense-in-depth SSCs encompass the "vital safety systems." **(CM-2.3)**	
	The design authority for each SSC has been established and documented. **(CM-2.4)**	
	Formal documentation (Change Control Packages) is available which demonstrate both the change control process and documents the following change control reviews: • Technical review (including independent design reviews), • Management review, and • DOE-approved Unreviewed Safety Question Determination (USQD). **(CM-2.5)**	
	Examination of the change package demonstrates the following; • Technical reviews included interdisciplinary reviews, except where the change is so isolated as to not impact the efforts of more than one discipline; • Management reviews demonstrate that management considerations, such as funding, have been considered prior to approving the change for implementation; and, • USQD review documentation reflect the final configuration of the change as verified through maintenance testing and as-builts. **(CM-2.6)**	
	Management assessments or self-assessments that demonstrate review(s) to verify consistency among the design requirements, the physical configuration, and the documentation have been maintained throughout the project have been performed and are available for review. **(CM-2.7)**	
	Review of facility documents demonstrates that the Document Control process ensures that only the most recently approved versions of documents (revision control) are used in the process of operating, maintaining, and modifying the nuclear facility. **(CM-2.8)**	
	The CM program includes and there is evidence to demonstrate implementation of a temporary modification and equivalent change process. **(CM-2.9)**	
Criticality Safety		
CS-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Nuclear Criticality Safety Program Plan • DSA • TSR • Nuclear Materials Control and Accountability Plan • Nuclear Criticality Safety Program Evaluations & Calculations • Nuclear Criticality Safety Project Determinations **(CS-1.1)**	
CS-2	Verify through document reviews, interviews, and shift performance observations that the facility or project has demonstrated the following performance expectations necessary to achieve readiness for nuclear operations.	
	The facility has implemented a Nuclear Criticality Safety (NCS) Program that meets all applicable codes, standards and directives. **(CS-2.1)**	
	The NCS program, NCS safety-significant Structures, systems, and components (SSC), Specific Administrative Controls, and Design Features for Safety have been incorporated into the facility DSA/TSR. **(CS-2.2)**	
	A method for developing, reviewing, supplementing, and revising Criticality Safety Evaluations (CSE) and other NCS documentation has been established. **(CS-2.3)**	
	A method for reporting and resolving deviations from procedures, changes in process conditions, and other abnormal events has been established. **(CS-2.4)**	
	A method for performing reviews of nuclear operations to determine if procedures are being followed and process conditions remain unchanged has been established. **(CS-2.5)**	
	A method for monitoring, assessing, and auditing the effectiveness of the NCS program has been established. **(CS-2.6)**	
	Criticality Safety Evaluations for all fissile material processes in the facility or project, prepared in accordance with applicable codes, standards, and directives, have been approved. **(CS-2.7)**	
	All NCS requirements from the Cognizant Systems Engineers for the fissile material processes in the facility or project have been implemented. **(CS-2.8)**	
	NCS requirements implementation documentation (drawings, procedures, etc.) has been approved. **(CS-2.9)**	
	Fissile material, fissile material containers, and NCS requirements have been appropriately marked, labeled, and posted. **(CS-2.10)**	
	A training and qualification program for NCS personnel has been established in accordance with applicable codes, standards, and directives. **(CS-2.11)**	
	Operating personnel have been trained in nuclear criticality safety principles and the NCS requirements for the facility or project fissile material processes. **(CS-2.12)**	

ID #	Performance Objectives and Criteria	Met?
	Operating personnel demonstrate knowledge of and understand the NCS requirements for the fissile material processes in the facility or project. **(CS-2.13)**	
	Operating personnel demonstrate knowledge of response to abnormal events. **(CS-2.14)**	
	Guidelines for fire-fighting have been developed and integrated with the Fire Protection Program. **(CS-2.15)**	
	A Criticality Accident Alarm System has been provided in the facility in accordance with applicable codes, standards, and directives. **(CS-2.16)**	
Emergency Preparedness (EP)		
EP-1	Have the following documents been developed and are adequate for this program element?	
	• Emergency Management Plan • Drill Program Plan • Emergency Action Plan • Facility Emergency Classification • Hazard Surveys • Emergency Planning Hazard Assessment(s) (EPHA) • Emergency Action Levels (EALs) • Emergency Action Response – Recovery Procedures • Personnel Training and Qualification Records • Site Interface Documents (as applicable) • Service Agreements (Emergency and Medical external support – as applicable) **(EP-1.1)**	
EP-2	Verify through document reviews, interviews, and shift performance observations that the facility or project has demonstrated the following performance expectations necessary to achieve readiness for nuclear operations.	
	The contractor has completed a Hazards Survey that examines the features and characteristics of the facility and identifies the generic types of emergency events and conditions and the potential impacts of such emergencies to be addressed by the DOE Comprehensive Emergency Management System. The Hazards Survey identifies key components of the Operational Emergency Base Program that provides the foundation of basic emergency management requirements and an integrated framework for response to serious events involving health and safety, the environment, safeguards, and security. **(EP-2.1)**	

ID #	Performance Objectives and Criteria	Met?
	For facilities with inventories of hazardous materials that have the potential to pose a serious threat to workers, the public, or the environment, an EPHA has been completed that reflects both the magnitude and the diversity of the hazards and the complexity of the processes and systems associated with the hazards, and provides the technical planning basis for determining the necessary plans/procedures, personnel, resources, equipment, and analyses for the Operational Emergency Hazardous Material Program. **(EP-2.2)**	
	The emergency management program is documented in an emergency plan. The emergency plan describes the provisions to respond to an Operational Emergency. Emergency Plan Implementing Procedures (EPIPs) describe how the emergency plan is implemented. An individual has been designated to administer the facility/site emergency management program. **(EP-2.3)**	
	An Emergency Response Organization (ERO), a structured organization with overall responsibility for initial and ongoing emergency response and mitigation, has been established or the contractor has been integrated into a facility wide ERO. **(EP-2.4)**	
	Plans and procedures to classify emergency events (as an Alert, Site Area Emergency, General Emergency.) have been established. These documents include specific EALs for the spectrum of potential Operational Emergencies identified by the EPHA; include protective actions corresponding to each EAL; establish the criteria for quickly determining if an event is an Operational Emergency; and require categorization of an event as an Operational Emergency as promptly as possible, but no later than 15 minutes after event recognition, identification, or discovery. **(EP-2.5)**	
	Procedures have been developed that include the following; implement the separate protective actions of evacuation and sheltering of employees: • Account for employees after an emergency evacuation has been completed; • Include predetermined protective actions for onsite personnel and the public; • Include methods for controlling, monitoring, and maintaining records of personnel exposure to hazardous materials; • Include methods for controlling access to contaminated areas and for decontaminating personnel or equipment exiting the area, and • A predetermined set of criteria and notifications which need to be met for defining termination of and recovery from an Operational Emergency event. **(EP-2.6)**	

ID #	Performance Objectives and Criteria	Met?
	There are plans in place to implement a readiness assurance program consisting of evaluation, improvements and ERAPs that includes an annual self-assessment of their emergency management programs. The readiness assurance program includes the following: • Performance of No-Notice Exercises; • Demonstration of continuous improvement in the emergency management program by implementation of corrective actions for findings (e.g., deficiencies, weaknesses); • System for incorporating and tracking lessons learned from training, drills, actual responses, and a site-wide lessons learned program; • Participation in the DOE Corporate Lessons Learned Program; and • Performance indicators (including performance measures and metrics) that capture and track objective data regarding the performance of emergency management programs in key functional areas. **(EP-2.7)**	
	Provisions and effective interfaces have been established for prompt initial notification of workers and emergency response personnel and organizations, including appropriate DOE elements and other Federal, State, Tribal and local organizations for Operational Emergencies. Emergency public information efforts have also been coordinated with DOE (if appropriate); State, local and Tribal governments; and Federal emergency response organizations, as appropriate. **(EP-2.8)**	
	The contractor has documented and maintains site emergency medical support agreements. External facilities and assets have developed local emergency medical support procedures, capabilities, personnel responsibilities, and equipment and consumables to transport, accept, and treat contaminated and injured personnel. **(EP-2.9)**	
	A program to ensure that vital records, regardless of media, essential to the continued functioning or reconstitution of an organization during and after an emergency are available per 36 CFR 1236 (Electronic Records Management). **(EP-2.10)**	
	The contractor at Operational Emergency Hazardous Material Program facilities must also have provisions in place to establish a Joint Information Center (JIC). The JIC must be established, directed, and coordinated by the senior Cognizant Field Element public affairs manager or a designee. **(EP-2.11)**	
	A comprehensive, coordinated, and documented program of training and drills is an integral part of the emergency management program to ensure that preparedness activities for developing and maintaining program-specific emergency response capabilities is in place. Initial training and periodic drills to all workers who may be required to take protective actions (e.g. shelter-in-place; assembly, evacuation) have been completed. **(EP-2.12)**	

ID #	Performance Objectives and Criteria	Met?
	Emergency-related information and training on site-specific conditions and hazards to offsite personnel have been provided to those who may be required to participate in response to an emergency at the facility. **(EP-2.13)**	
	Facilities and equipment which support emergency response are available, operable, and maintained. At a minimum, facilities include an adequate and viable command center, personnel protective equipment, detectors, and decontamination equipment. Provisions for use of an alternate location if the primary command center is not available have been established. **(EP-2.14)**	
	A formal exercise program that validates all elements of an emergency management program over a 5-year period has been established and implemented. Exercises have been conducted, controlled, evaluated, and critiqued effectively and reliably. Lessons-learned were developed which resulted in corrective actions and improvements. **(EP-2.15)**	
	The contractor's ERO has demonstrated through drills; Effective control at the scene of an event/incident and integrate ERO activities with those of local agencies and organizations that provide onsite response services: • An adequate number of experienced and trained personnel, including designated alternates, are available on demand for timely and effective performance of ERO functions; • Participation of Offsite response organizations in site-wide exercises (and plans are in place to include them in drills at least once every three years); • That initial emergency notifications are promptly, accurately and effectively communicated to workers and emergency response personnel/organizations; • That appropriate accurate and timely follow-up notifications are made when conditions change, when the emergency classification (as an Alert, Site Area Emergency, General Emergency) is upgraded, or when the emergency is terminated; • Demonstrate the ability to perform an effective response to a medical emergency; and • That a formal system is in place to effectively record, sequence, validate, and track the flow and chronology of emergency information. **(EP-2.16)**	
	Estimates of onsite and offsite consequences of actual or potential releases of hazardous materials are computed and assessed correctly and in a timely manner throughout the emergency. Consequence assessments are: integrated with event classification and protective action decision-making; incorporated with facility and field indications ad measurements; and coordinated with offsite agencies. Facilities have access to NARAC or have procedures in place to activate or request National Atmospheric Release Advisory Center (NARAC) capabilities.	

ID #	Performance Objectives and Criteria	Met?
	Consequence assessments incorporate monitoring of specific indicators and field measurements. Continuous, effective and accurate communication among response components and/or organizations can be reliably maintained throughout an Operational Emergency. **(EP-2.18)**	
Environmental Compliance		
EC-1	Have the following documents been developed and are adequate for this program element?	
	• Environmental Management Plan • Regulatory and Permitting Management Plan • Pollution Prevention and Waste Minimization Plan • Soil Erosion and Sediment Control Plan • Wetlands Permits • Operational Environmental Management Plan • Operational Permits • EPA Hazardous Waste Generation Registration (as applicable) • Hazard Assessment(s) • Environmental Reporting (Notifications) and Application Process procedures • Annual Site Environmental Report • Environmental Compliance Issues/Corrective Actions Lessons Learned across the DOE Complex **(EC-1.1)**	
EC-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Environmental Compliance program necessary to achieve readiness for nuclear operations.	
	Project staffing plans, position descriptions, and qualifications for the Environment Compliance personnel are in place. **(EC-2.1)**	
	Documented processes are in place to flow down Environmental Compliance requirements, such as pollution prevention and waste minimization, to subcontractors, vendors, and suppliers. **(EC-2.2)**	
	Goals (policy and/or performance) to protect human health and the environment under the Environmental Compliance program are documented in procedures that insure environmental regulations, permit and compliance agreements requirements are adequately met. **(EC-2.3)**	
	The level and knowledge of compliance with applicable waste generator requirements, and if applicable, operational or closure permit requirements for waste storage, treatment, and disposal is demonstrated during personnel interviews. **(EC-2.4)**	
	The Operations and Emergency drill programs include hypothetical spill or release to demonstrate that equipment, personnel and the level and knowledge of the operating permit requirements and/or environmental regulations. These drills have been performed and documented for all permitted facilities. **(EC-2.5)**	
Fire Protection		

ID #	Performance Objectives and Criteria	Met?
FP-1	Have the following documents been developed and are adequate for this program element?	
	• Fire Protection Program Description • Fire Hazard Analysis • Control of Combustibles • DSA • TSR – Fire Protection Related • Test and Inspection Reports (TSR and non-TSR systems & components) • Facility Emergency Packet • Emergency Services Baseline needs Assessment • Acceptance Test Packages for Fire Detection and Suppression Systems • Emergency/Alarm Response Procedures • System Design Description for Fire Protection and Detection System **(FP-1.1)**	
FP-2	Verify through document reviews, interviews, and shift performance observations that the facility or project has demonstrated the following performance expectations necessary to achieve readiness for nuclear operations.	
	The facility has instituted a Fire Protection Program meeting requirements of all applicable standards and regulations. **(FP-2.1)**	
	Fire Hazard Analysis has been completed and approved. **(FP-2.2)**	
	An Authority Having Jurisdiction is identified and qualified to adjudicate fire protection technical issues. **(FP-2.3)**	
	The fire protection design is adequate to protect the facility and personnel as required by all applicable standards and regulations. **(FP-2.4)**	
	Facility operating procedures implement required actions to ensure safe operations and direct action in case of fire emergency. **(FP-2.5)**	
	Fire protection equipment is located throughout the facility in accordance with identified requirements and design. **(FP-2.6)**	
	Fire protection equipment is in good working order and tested as required. **(FP-2.7)**	
	The facility maintenance plan incorporates a program that ensures periodic required maintenance and testing of fire protection equipment. **(FP-2.8)**	
	Testing records are available for fire protection equipment and demonstrate a satisfactory condition and functionality for installed equipment. **(FP-2.9)**	
	Personnel are adequately trained in fire protection response. **(FP-2.10)**	

ID #	Performance Objectives and Criteria	Met?
	Coordination and integration has been established with site emergency response personnel to provide professional fire response personnel and oversight. **(FP-2.11)**	
	Combustible loading throughout the facility meets design basis requirements. **(FP-2.12)**	
	Facility emergency and/or alarm response procedures are in place to direct personnel actions. **(FP-2.13)**	
	Personnel staffing and assignment support for fire protection is adequate. **(FP-2.14)**	
Industrial Hygiene		
IH-1	Have the following documents been developed and are adequate for this program element?	
	• Chemical Control/Procurement Forms • Noise Surveys • Hearing Conversation Program • Respiratory Protection Program • First Aid and Medical Treatment (chemicals) • Ergonomics Program Procedure • Occupational Medicine Procedure • Biological Monitoring for Industrial Chemicals • Industrial Hygiene Air Sampling Reports • Job Hazard Analysis • Temperature Extremes Procedure • Personnel Protective Equipment (equipment/procedures) • Exposure Assessment Procedure • Blood Borne Pathogens Procedure **(IH-1.1)**	
IH-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Industrial Hygiene program necessary to achieve readiness for nuclear operations.	
	The facility or project has developed and implemented an Industrial Hygiene (IH) Program that meets the requirements of applicable DOE regulations, standards, and contractual requirements. **(IH-2.1)**	
	Written procedures, goals, and objectives are established for the IH Program. **(IH-2.2)**	
	Professionally and technically qualified industrial hygienists direct, manage, and implement the IH program. **(IH-2.3)**	
	Procedures are in place to identify IH-related hazards in the workplace (i.e., chemical, physical, biological, and ergonomic hazards). **(IH-2.4)**	
	Procedures are in place to assess and document worker exposure to chemical, physical, biological, and ergonomic hazards. **(IH-2.5)**	

ID #	Performance Objectives and Criteria	Met?
	A process is in place to ensure that calibrated IH sampling and monitoring equipment/instrumentation is available to support the IH exposure assessment program. **(IH-2.6)**	
	Procedures/processes require the use of recognized exposure assessment and testing methodologies and accredited and certified analytical laboratories. **(IH-2.7)**	
	Initial or baseline surveys and periodic resurveys and/or exposure monitoring is conducted for all work areas or operations to identify potential worker health risks. **(IH-2.8)**	
	IH coordinates with planning and design personnel to anticipate and control health hazards that proposed facilities and operations would introduce. **(IH-2.9)**	
	IH coordinates with cognizant occupational medical, environmental, health physics, and work planning personnel**. (IH-2.10)**	
	Policies/procedures are established to mitigate risk from identified and potential occupational carcinogens. **(IH-2.11)**	
	A database is available to accurately manage, report, and trend IH sampling and monitoring data. **(IH-2-11)**	
	IH control measures are established based on the following hierarchy: 1. Elimination or substitution of the hazard. 2. Engineering controls. 3. Work practices and administrative controls that limit worker exposure. 4. Personal protective equipment. (**IH-2.13)**	
	Respiratory protection equipment tested under the DOE Respirator Acceptance Program for Supplied-air Suits (DOE-Technical Standard-1167-2003) is used when National Institute for Occupational Safety and Health-approved respiratory protection does not exist for DOE tasks that require such equipment. **(IH-2.14)**	
Maintenance		
MN-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?

	• Maintenance Program Description (including);
	  o Work Control Process/procedures
	  o Pre and Post-job Briefs
	  o Stop Work Process
	  o Post Maintenance Testing
	• Maintenance Implementation Plan
	• Maintenance Planning Guide
	• Measuring and Test Equipment (M&TE) – Calibration Program
	• Lockouts/Tagouts (LO/TO) Program (Plan or procedures)
	• Electrical Safety Program
	• Document Control
	• Maintenance Personnel Qualification & Training Records
	• Special Process Programs (i.e.: Welding)
	(MN-1.1)	

MN-2	Verify through document reviews, interviews, and maintenance evolutions observations that the facility or project has demonstrated the following performance expectations necessary to achieve readiness for nuclear operations.	
	The facility has developed and implemented a Maintenance Implementation Plan which meets the requirements of DOE Orders and directives. **(MN-2.1)**	
	Roles and responsibilities are clearly defined and implemented to enable execution of the Maintenance Program. **(MN-2.2)**	
	The facility organization ensures engineering personnel have assignment and accountability in maintenance planning and performance. **(MN-2.3)**	
	Maintenance plans, procedures, and policies have been prepared and meet requirements of the approved Maintenance Implementation Plan. **(MN-2.4)**	
	Facility management has a formal program in place for senior management to actively monitor and assess work control practices in the facility. **(MN-2.5)**	
	Maintenance planning includes all requirements to satisfy the DSA/TSR requirements. **(MN-2.6)**	
	Personnel performing maintenance have met formal training requirements for tasks to be performed to include processes and procedures for work control. **(MN-2.7)**	
	The facility demonstrates through performance of planned evolutions the capability to plan and perform maintenance in accordance with the facility policies and procedures. **(MN-2.8)**	
	The facility demonstrates discipline in implementing work control processes. **(MN-2.9)**	

ID #	Performance Objectives and Criteria	Met?
	System and component calibration requirements are identified and a formal program is in place to ensure maintainability. **(MN-2.10)**	
Management		
MG-1	Have the following documents been developed and are adequate for this program element?	
	• Project Management Plan • Commissioning Plan • Maintenance Plan • Testing Program Plan • Readiness Plan • Startup Plan • Hot Functional Testing Plan • SMP Program Descriptions • Personnel Selection, Training, and Qualification Management Plan • Plant Staffing Plan, Roles and Responsibilities • Various Oversight Board Charters (Startup Review Board, Joint Test Group, etc.) • Integrated Safety Management System Plan • Workforce Safety and Health Program Plan • Safety First Program • Employees Concern Program • Administrative Support Programs (HR, etc.) **(MG-1.1)**	
MG-2	Verify through document reviews, interviews, and observations that management, organization and institutional safety provisions have been developed and implemented necessary to achieve readiness for nuclear operations.	
	Facility line management has clearly identified, documented, and integrated the Safety Basis Safety Management Programs with the Site's Integrated Safety Management System (ISMS), R2A2s, documented startup plan, and Quality Assurance Program (QAP). **(MG-2.1)**	
	Verify through document reviews, interviews, and observations that management, organization and institutional safety provisions have been developed and implemented necessary to achieve readiness for nuclear operations. **(MG-2.2)**	
	Senior management's key expectations for safe and secure work performance are appropriately established, communicated, understood and demonstrated by workers and managers. **(MG-2.3)**	

ID #	Performance Objectives and Criteria	Met?
	Clear, unambiguous and appropriate roles, responsibilities, authorities and accountabilities (R2A2s) and lines of authority for safe and effective work performance – including administration and implementation of SMPs – at all levels of management and within the workforce are established, understood, maintained, and demonstrated. Flow down of roles and responsibilities from the General Manager to the floor level workers and staff enable penetration through middle management. **(MG-2.4)**	
	Line managers at all levels demonstrate competence commensurate with their responsibility and accountability for safe, secure and effective work performance, including administration and implementation of safety management program activities. **(MG-2.5)**	
	Organizational charts and documentation (e.g., procedures and other appropriate mechanisms) are in place that: • Clearly define roles, responsibilities, authorities, and accountabilities; • Clearly establish line management's responsibility, • Ensure safety and security are maintained at all levels, and • Ensure adequate staffing levels are maintained. **(MG-2.6)**	
	An approved ISMS Description (ISMSD) exists and operating personnel exhibit an understanding of the institutional safety programs, their responsibilities for safety, and the mechanisms for ensuring safe performance of work. **(MG-2.7)**	
	A sound safety infrastructure system and nuclear safety culture exists as demonstrated by; • Operations performance; • Emergency and Operational drills demonstrations; and • Personnel interviewed convey a level of knowledge and understanding of their roles in support of a sound safety infrastructure system and culture. **(MG-2.8)**	
Nuclear Safety		
NS-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Authorization Agreement • Contract – List B DOE Directives & Consensus Standards • Safety Management Programs • USQD Procedure • Safety Evaluation Report for DSA and TSR • DSA and TSR • Conduct of Operation Manual or Program Description • Conduct of Operations Applicability Matrix • Project Management Plan • TSR Flowdown Matrix • Training & Qualifications for Nuclear Safety Personnel • Safety Basis Surveillances **(NS-1.1)**	
NS-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Nuclear Safety program necessary to achieve readiness for nuclear operations.	
	Processes or procedures are in place to support development of rule compliant Documented Safety Analysis (DSAs) and Technical Safety Requirements (TSRs) for each nuclear facility/activity. **(NS-2.1)**	
	The safety basis documentation addresses appropriate hazards/risks associated with facility operation including the Fire Hazards Analysis. **(NS-2.2)**	
	TSR surveillance procedures confirm operability of safety systems. **(NS-2.3)**	
	Evidence is available that demonstrates that the safety management programs have been effectively implemented with respect to adequacy of procedures, sufficient number of qualified personnel, and adequacy of facilities and equipment. **(NS-2.4)**	
	Site assessments related to natural phenomena hazards are complete and up-to-date. **(NS-2.5)**	
	Managers and staff, with responsibility for USQ related activities, have been trained and qualified to perform their assigned tasks. **(NS-2.6)**	
	Change processes (design process, software, work control process, procedure development process, etc.) incorporate a requirement to utilize the USQ process when evaluating/approving proposed changes that could affect the facility safety basis. **(NS-2.7)**	
	USQDs have been evaluated performed, documented, and retained in accordance with the applicable procedures. Completed USQDs contain sufficient detail and technically content. **(NS-2.8)**	
	Annual submittals (to DOE) of summary of the USQDs records are available. **(NS-2.9)**	

ID #	Performance Objectives and Criteria	Met?
	As applicable, evidence is available that demonstrate actions taken upon discovery of a Potential Inadequacy in the Safety Analysis (PISA) were timely and appropriate. **(NS-2.10)**	
	Training of facility personnel has been performed and documented to the latest revision of the facility safety basis and its implementing work instructions. **(NS-2.11)**	
	Procedures have been established for identifying and tracking identified nuclear safety issues to closure (including extent of condition and effectiveness evaluations). **(NS-2.12)**	
Occupational Safety and Health		
SH-1	Have the following documents been developed and are adequate for this program element?	
	• Occupational Safety & Health Plan • Worker Safety and Health Program • Operations and Maintenance Plan • Work Control Program (Plan or procedure) • Stop Work Procedure • Safety First Program • Safety Surveillances • Hoisting and Rigging • LO/TO • Facility Specific Procedures (i.e.: confined space, chemical control, etc.) • Activity (or Job) Hazard Analysis Process • Operational Procedures (which include hazard specific operations or controls) **(SH-1.1)**	
SH-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Occupational Safety and Health program necessary to achieve readiness for nuclear operations.	
	The OSH Program, WSHP, and implementing procedures incorporate requirements of applicable regulations, standards, and contracts. **(SH-2.1)**	
	The OSH Program contains a written policy, goals, and objectives. **(SH-2.2)**	
	There are formalized mechanisms in place to involve workers in the development of safety and health goals and objectives and in the identification and control of hazards in the workplace. **(SH-2.3)**	
	Procedures have been established for workers to report, without reprisal, job-related injuries, illnesses, incidents, and hazards and to make recommendations about ways to control these hazards. **(SH-2.4)**	

ID #	Performance Objectives and Criteria	Met?
	Procedures permit workers to stop work or decline to perform an assigned task because of a reasonable belief that it poses an imminent risk of death, serious physical harm, or other serious hazard to workers. **(SH-2.5)**	
	Procedures or processes have been established to identify workplace hazards and the possibility for interactions between hazards such as radiological hazards. **(SH-2.6)**	
	Hazard controls are based on the following hierarchy: 1. Elimination or substitution of the hazard 2. Engineering controls where feasible 3. Work practices and administrative controls that limit worker exposures 4. Personal protective equipment **(SH-2.7)**	
	Procurement processes address hazards when selecting or purchasing equipment, products, and services. **(SH-2.8)**	
	A worker safety and health training program (including initial and periodic training) has been implemented to ensure all workers exposed, or potentially exposed, to hazards are provided with the training and information on those specific hazards. **(SH-2.9)**	
	Processes are in place to flow down OSH requirements to subcontractors, vendors, and suppliers. **(SH-2.10)**	
	Work planning and control processes, to ensure safety and health, are included in the planning, control, and execution of work. **(SH-2.11)**	
	Performance of work site job and task walk downs, job hazard analysis, hazard control selection, and associated work control documents are consistent with applicable programmatic requirements and procedures. **(SH-2.12)**	
	Job hazard analysis provide controls for unique hazards associated with the activity, such as hazardous energy, hoisting and rigging, elevated work, confined spaces, welding, and electrical safety. **(SH-2.13)**	
	Processes are established to monitor and evaluate safety performance. **(SH-2.14)**	
	Procedures and processes ensure prompt reporting of injuries, illnesses, and near miss incidents. **(SH-2.15)**	
On-Site Transportation		
OST-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Transportation Plan • Transportation Safety Plan • Waste Container Selection, Marking, Labeling, movement control procedure(s). • DSA and TSRs **(OST-1.1)**	
OST-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate On-Site Transportation program necessary to achieve readiness for nuclear operations.	
	The site level Transportation Safety Document (TSD) address requirements of 10 CFR 830 and, as applicable, have been flow-down into implementing procedure(s). **(OST-2.1)**	
	The minimum safe packaging requirements including necessary design, fabrication, and quality assurance elements are addressed in the TSD and flowed down to implementing procedures. **(OST-2.2)**	
	The TSD includes a description of transportation systems and controls to restrict personnel, public access, that minimizes the probability and consequences of a credible accidents. **(OST 2.3)**	
	The description of process and analysis used to determine and ensure that equivalent level of safety requirements (technically justified) are established and implemented. **(OST-2.4)**	
	Procedures include site description, including maps identifying boundaries, railways, and roadways to clearly delineates offsite and onsite areas. **(OST-2.5)**	
	Procedures address provisions for effective emergency response and recovery under credible accident conditions. **(OST-2.6)**	
	Procedure address a process for accomplishing non-routine packaging and transportation activities. **(OST-2.7)**	
Operations – Procedures Management		
OP-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Document Control Procedure • Instruction for and Procedure Use and Adherence procedure • Operations Procedures (normal, abnormal, emergency, recovery, etc.) • USQD procedure • SME Matrix • Procedure Change Review Packages (USQ screening, transmittals, reviews, and approvals) • Job or Activity Hazard Analysis supporting procedures. **(OP-1.1)**	
OP-2	Verify through document reviews, interviews, and shift performance and drill evolutions observations that the facility or project has demonstrated the following performance expectations necessary to achieve readiness for nuclear operations.	
	Operations management has formally defined requirements for procedures and their use during operations. **(OP-2.1)**	
	A document control system is in place which provides for formality in procedure record keeping and revision control. **(OP-2.2)**	
	Operations management has methods to ensure procedure revisions are formally incorporated including training of personnel. **(OP-2.3)**	
	Formal procedures govern the methods for procedure changes including appropriate level of approvals. **(OP-2.4)**	
	Operations procedures have cognizant engineering review and approvals prior to implementation including review and approval of revisions. **(OP-2.5)**	
	A process is formalized which provides procedure preparation requirements. **(OP-2.6)**	
	Operations procedures adequately implement requirements of the DSA/TSRs. **(OP-2.7)**	
	Elements of the ISMS, worker safety and health, and environmental programs are adequately incorporated into the facility procedures. **(OP-2.8)**	
	Facility personnel demonstrate proficiency in use of operating procedures through the completion of evolutions and casualty drill training. **(OP-2.9)**	
Personnel Training and Qualifications		
TQ-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Personnel, Selection, Training and Qualification Management Plan • Control of Work Procedure • Job and Activity Hazard Analysis (Procedure and worksheets) • Task Analysis Worksheet • Training Needs Analysis • Qualification Standards • Training and Program Description Maintenance • Training Modules • Training and Personnel Qualification Records. **(TQ-1.1)**	
TQ-2	Verify through document reviews, interviews, and observations that the facility or project has demonstrated the following performance expectations necessary to achieve readiness for nuclear operations.	
	A formal training organization is established which is empowered to ensure training requirements are met throughout the organization. **(TQ-2.1)**	
	Senior plant management support and emphasize the importance of the training organization and its mission. **(TQ-2.2)**	
	The facility has an approved Training Implementation Matrix and Training Plan that meets requirements of DOE Orders and directives. **(TQ-2.3)**	
	Qualification standards document the requirements for training of personnel to fulfill roles and responsibilities. **(TQ-2.4)**	
	Personnel assigned to perform training are qualified and experienced through formal training and are certified by plant management. **(TQ-2.5)**	
	A program exists which ensures timely training of personnel whenever modifications to facility or procedures are implemented. **(TQ-2.6)**	
	Testing standards are developed that adequately confirm that training attributes are learned and understood. **(TQ-2.7)**	
	Methods for ensuring testing security are implemented. **(TQ-2.8)**	
	Training records of personnel are readily available for review. **(TQ-2.9)**	
	Personnel demonstrate proficiency in operations, drill conduct, and interviews that confirm adequate training commensurate with responsibilities. **(TQ-2.10)**	
Quality Assurance		
QA-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Quality Assurance Plan • Quality Assurance Implementation Plan • QA Implementation Procedures • Contractor Assurance Program Plan • Overall Assessment Schedule • External QA Audits/Assessments (DOE Phase 1 and Phase 2) • QA Products of Implementation (Causal Analysis, Corrective Actions, Nonconformance Reports, etc.) • Supplier Evaluation Process (Approved Suppliers List, etc.) • QA Trending and Reporting Data • Records Management (including Quality Assurance Records) • Operating Experience Program (Lessons Learned) • Suspect Counterfeit Program • Configuration Management (include change control) • Training and Qualification program for QA Personnel (Lead Auditor, etc.) • M&TE Program • Various support Program specific to site work processes (i.e.: Weld inspection, etc.) **(QA-1.1)**	
QA-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate QA and contractor assurance program necessary to achieve readiness for nuclear operations.	
	The Phase 1 QA review (focused on Approval for Implementation of QAP/QIP) has been completed by either EM-HQ or the DOE Site Project Office (independent). The contractor's QA program should have been approved for the project scope (programmatic approval Phase 1) prior to contract award as part of the DOE supplier's selection process.) **(QA-2.1)**	
	As necessary, the contractor has coordinated with DOE HQ or the DOE Site Project Office to schedule Phase 2 QA implementation reviews at various stages of the project prior to the start of activities affecting nuclear safety (i.e., safety basis, design, software development, etc.). **(QA-2.2)**	
	There is evidence that demonstrate that the contractor's preparation for the various phase 2 reviews have addressed issues identified as part of Phase 1 programmatic review of QAP/QIPs and other QA processes as applicable to the scope of work such as commercial grade dedication (CGD), Software Quality Assurance for safety and non-safety software, code of record, suspect/counterfeit items, procurement, and contractual QA requirements flowed down to subcontractors and vendors. **(QA-2.3)**	
	There is evidence that demonstrate that noted issues from the Phase 2 QA review have been captured and addressed by the contractor's corrective action process. **(QA-2.4)**	
Radioactive Material Inventory Control		
RM-1	Have the following documents been developed and are adequate for this program element?	

ID #	Performance Objectives and Criteria	Met?
	• Nuclear Materials (NM) Control and Accountability (MC&A) Plan • Radioactive Source Control Plan • Radiation Protection Program (Plan and procedures) • Radioactive Source Control Plan • Hot Functional Testing Plan **(RM-1.1) (RM-1.1)**	
RM-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Radioactive Material Inventory Control program necessary to achieve readiness for nuclear operations.	
	The Officially Designated Federal Security Authority has approved an initial survey of the facility Safeguards and Security Program. **(RM-2.1)**	
	The facility has a DOE-approved MC&A Plan that describes; • An MC&A Organization that functions independent of operational organizations and has unfettered access to facility management; • How the MC&A Organization is integrated with the facility/site Safeguards and Security and Protective Force organizations. • The procedures for shipping and receiving accountable nuclear materials. • The MC&A Training for all facility staff with NM responsibility and details the MC&A staff and NM operators MC&A training. • How the MC&A Organization includes the mission of conducting assessments/self-assessments of the facility MC&A program. • How the MC&A Organization includes oversight of all facility measurements conducted to provide metrics for the accounting of NMs. **(RM-2.2)**	
	The facility has been issued at least one Reporting Identification Symbol (RIS) for reporting NM transactions to the Nuclear Materials Management Safeguards System (NMMSS). **(RM-2.3)**	
	The MC&A Organization includes an accounting function for systematic records of all accountable NMs. The accounting data are backed up regularly. All accountable materials are located in a Material Balance Area and carry a NMMSS Project Number. Each Material Balance Area is identified by specific Category (I, II, III, or IV) and does not contain NM of a higher category than the Material Balance Area designation. The accounting system functions on a graded safeguards basis and has a Configuration Management Plan and a Disaster Recovery Plan. **(RM-2.4)**	

ID #	Performance Objectives and Criteria	Met?
	The MC&A Organization in conjunction with NM operations conducts inventories of all accountable NM in accordance with the MC&A Plan. **(RM-2.5)**	
	The facility has a Radiological Control Organization (RCO) with plans and procedures identifying responsibilities for a Sealed Source Program. **(RM-2.6)**	
	The facility has a Radioactive Source Control Plan addressing the following provisions: • The requirements of the RCO and Sealed Source Custodians for accountability and control of Sealed Sources; • A system for the accounting of sealed sources; • The requirements for the physical control of sealed sources including transfer to a new location or Custodian; • The requirements for training sealed source Custodians include 10 CFR 835.901(b); • A program for conducting assessments and self-assessments of the sealed source program; • The requirements for conducting inventory of all sealed sources at least every six months; • The requirements for receiving and documenting the receipt of sealed sources and conducting receipt monitoring; • The requirements for conducting sealed source leak testing at least every six months; and • The requirements for disposal of sealed sources. **(RM-2.7)**	
	Physical protection of NM is addressed on a Graded Safeguards basis in the Site Security Plan and MC&A Plan. **(RM-2.8)**	
	The RCO has a DOE-approved Radiation Protection Program (RPP) Plan that is compliant with the provisions of 10 CFR 835, *Occupational Radiation Protection Program,* and addresses the following NM elements; • NM activities with an As Low As Reasonably Achievable (ALARA) approach to all operations; • Measurement instruments and methods used to monitor radiological materials in the facility; • Training requirements and a training program for radiological workers; • The flow-down of procedures for the implementation of the requirements of 10 CFR 835 in the radiological activities of the facility; and • The program of internal audits that will be conducted for all functional elements no less frequently than 36 months.	

ID #	Performance Objectives and Criteria	Met?
	The facility's Startup Plan includes the following elements; • Responsibilities and training requirements of the NM Operators, NM Custodians, the RCO, MC&A Organization, Facility Security Officer, and Protective Force; • Identifies approved procedures incorporating the ALARA principle for all NM operations; • Specifies all radiological monitoring and required instruments and PPE are in place and fully functional; • Identifies required Radiological Work Permits for all NM activities/operations; • Identifies any MC&A metrics required in the course of the Startup with nuclear materials; and • Establishes requirements for all pretest briefings and post-test critiques. **(RM-2.10)**	
Radiological Protection		
RP-1	Have the following documents been developed and are adequate for this program element?	
	• Documented Radiation Protection Program (RPP) • Internal/External Dosimetry Technical Basis Documents • Air-Monitoring Technical Basis Document • Radiological Operating Procedures covering fundamental RP program elements (instrumentation, calibration, dosimetry, radiological surveys and monitoring, posting and labeling, Radiation Work Permits, ALARA and design review, protective clothing, training, reports, records, emergency response, audits). • Training programs (radiological worker, radiological control technician, radiological engineer, dosimetry personnel, radiological control supervision). • Radiological Surveys **(RP-1.1)**	
RP-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Radiological Protection Program necessary to achieve readiness for nuclear operations.	
	The contractor RPP effectively describes the scope and content of RP program implementation and has been approved by DOE. **(RP-2.1)**	
	External and Internal Dosimetry Monitoring Programs are accredited (or excepted from accreditation) by the Department of Energy Laboratory Accreditation Program (DOELAP) for Personnel Dosimetry and Radiobioassay. Accreditation is current and reflects the dosimetry systems in use. **(RP-2.2)**	
	An adequate number of trained and qualified RP staff (professional and technical) are available to support RP program implementation. Procedures are in place to ensure the timely call-in of additional RP support during off-hours/backshifts as necessary. **(RP-2.3)**	

ID #	Performance Objectives and Criteria	Met?
	Sufficient radiological instrumentation is available, calibrated and operability checked prior to use. Instrumentation is appropriate for the types and energies of radiation encountered. **(RP-2.4)**	
	Requirements for personnel monitoring (external and internal) have been established and monitoring is performed for personnel likely to receive ≥100 mrem/year. Thresholds for special monitoring (extremity dosimetry, multiple dosimetry) are established and implemented as necessary. **(RP-2.5)**	
	Area monitoring and radiological survey programs are conducted at established frequencies and are effective in identifying sources of exposure and radiological conditions in the workplace. The results of radiological surveys are documented and available for review and work planning. **(RP-2.6)**	
	Radiological areas and materials are effectively posted and labeled to ensure worker awareness and minimize exposure. **(RP-2.7)**	
	Radiation Work Permits (RWPs) or similar written authorization methods are used to provide positive controls for entry and work in radiological areas. Developed RWPs effectively communicate radiological conditions, personal protective equipment, exposure controls, and limiting conditions for planned radiological work activities. **(RP-2.8)**	
	A process is in place to ensure workers read/are briefed on radiological conditions and RWP requirements prior to performing work in radiological areas. Worker qualifications (radiological training, respirator qualification, bioassay) are regularly checked and verified prior to entry to radiological areas. **(RP-2.9)**	
	A formal ALARA program is in place to facilitate the review and minimization of facility radiological exposures. Components should include the establishment of an ALARA Committee, radiological goals, detailed ALARA review of significant radiological work activities, radiological design review of facility changes or modifications, and establishment and periodic review of a facility specific Administrative Control Levels for worker exposure. **(RP-2.10)**	
	Personnel exit monitoring for contamination is performed at the egress of contamination, high contamination, and airborne radioactivity areas. Such monitoring is also performed at the egress to Radiological Buffer Areas established adjacent to the above areas. **(RP-2.11)**	
	Procedures are in place to control the survey and release of equipment and material removed from potentially contaminated areas. All such material is surveyed and evaluated against the limits in 10 CFR 835 (for release to controlled areas) or DOE O 458.1 (for release outside controlled areas) prior to release. **(RP-2.12)**	

ID #	Performance Objectives and Criteria	Met?
	A radioactive sealed source program is in place and ensures accountable sealed sources are routinely inventoried and leak-tested. **(RP-2.13)**	
	If required by the facility's fissile material inventory, a nuclear accident dosimetry program meeting the requirements of 10 CFR 835.1304 is in place and effectively implemented. **(RP-2.14)**	
	Radiological records (including personnel monitoring, facility and area monitoring, instrument calibration, and administrative records) are maintained in accordance with 10 CFR 835.701. **(RP-2.15)**	
	Reports of personnel monitoring results are made to individuals on an annual basis, and upon request when terminating employment, consistent with the requirements of 10 CFR 835.801. **(RP-2.16)**	
	RP internal audits are being conducted at a frequency that ensures all RP functional program elements are reviewed every three years. Scope of the audits includes both program content and implementation; audit results and findings are reported and dispositioned in accordance with facility procedures. **(RP-2.17)**	
Startup Program		
SP-1	Have the following documents been developed and are adequate for this program element?	
	• Commissioning Plan • Maintenance Program Plan • Testing Program Plan • MT&E Program • Startup Plan • Startup Review Board Charter • Startup Personnel Training and Qualification • Startup Review Board or Joint Test Group Charter **(SP-1.1)**	
SP-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Startup program necessary to achieve readiness for nuclear operations.	

ID #	Performance Objectives and Criteria	Met?
	An adequate startup plan has been developed for starting the operations that includes plans for graded operations and testing after startup to simultaneously confirm operability of equipment, the viability of procedures, and the performance and knowledge of the operators. The plan should address at a minimum the following attributes as appropriate: • Approach to full operations • Mode changes • Management oversight • Criteria for release to full operations • Any remaining testing or design verification necessary • Special considerations from the Safety Evaluation Report or other permits • Any condition that involves operations that is not routine • **(SP-2.1)**	
	Senior management are actively involved in plant operations oversight during startup activities. **(SP-2.2)**	
	Senior management required training to provide oversight during startup is formally documented. **(SP-2.3**)	
	Records documenting senior management training are complete. **(SP-2.3)**	
	Required hold points in startup sequencing are identified and actions necessary to clear hold points are defined. **(SP-2.5)**	
	If surrogate materials are required, the materials are identified along with any necessary controls for use of the materials. **(SP-2.6)**	
	A senior experienced testing oversight board is established to provide overall oversight and management of the startup program. **(SP-2.7)**	
Software Quality Assurance		
SQA-1	Have the following documents been developed and are adequate for this program element? The content maybe included with other documents.	
	• Software Management Program Plan • Software Quality Assurance Plan • Support Software Program • Software Configuration Management • Software Change Control Program • Software Acquisition Procedures • Software Problem Reporting Program • Software Inventory **(SQA-1.1)**	
SQA-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate SQA program necessary to achieve readiness for nuclear operations.	

ID #	Performance Objectives and Criteria	Met?
	The facility or its support organizations has developed and has in place a Software Management Program Plan and Software Quality Assurance Plan for each identified software installed in the facility and needed to support the facility. **(SQA-2.1)**	
	The facility or its support organizations has prepared and approved procedures that meet the DOE requirements for software maintenance and operations. **(SQA-2.2)**	
	Roles and responsibilities are clearly defined and implemented to enable execution of the software maintenance and software quality assurance plans. **(SQA-2.3)**	
	Facility management has in place a formal program to actively monitor and assess the maintenance of software within the facility to ensure all plans and procedures are met. **(SQA-2.4)**	
	For any software that requires periodic testing during operations, an in-use software test program and procedures have been defined, documented and approved. **(SQA-2.5)**	
	The Facility has in place approved plans and procedures to "roll-back" software to a previous version should it be necessary to maintain operations. **(SQA-2.6)**	
	The Facility has in place approved plans and procedures to perform emergency software releases to maintain operations. **(SQA-2.7)**	
Test Program		
TP-1	Have the following documents been developed and are adequate for this program element?	
	• Commissioning Plan • Maintenance Plan • Testing Program Plan • Hot Functional Test Plan • Turnover Plan • Startup Plan **(TP-1.1)**	
TP-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Testing program necessary to achieve readiness for nuclear operations.	
	Specific testing and/or test plan logic is documented to control test sequencing. **(TP-2.1)**	
	A Conduct of Testing program is developed and implemented. **(TP-2.2)**	
	Test records are complete and easily accessed. **(TP-2.3)**	

ID #	Performance Objectives and Criteria	Met?
	Test Engineers are trained, qualified, and demonstrate testing proficiency. **(TP-2.4)**	
	Methods for control of system testing boundaries are formally documented. **(TP-2.5)**	
	Post CD-4 testing plan is established and approved to proceed towards full operations. **(TP-2.6)**	
	A formal test equipment (MT&E) program is in place and test equipment is available and qualified. **(TP-2.7)**	
	Test Plans are prepared and approved. **(TP-2.8)**	
	All required testing attributes are identified and included in test plan logic and test plans. **(TP-2.9)**	
Waste Management Program (Radioactive and Hazardous)		
WM-1	Have the following documents been developed and are adequate for this program element?	
	• Waste Management Plan • Waste Certification Program Plan • Waste Characterization • Sampling and Analysis Plan • Material Handling, Storage and Disposal Plan • Resource Conservation and Recovery Act (RCRA) Planning Documents • Transportation Plan • Waste Disposal Plan • Transportation Safety Plan • Radiological Records Management • Radioactive Waste Management Basis • Cost/Benefit Analysis Documentation Supporting Disposal • DOE O 435.1 Commercial Use Exemption (If commercial use is requested for waste streams) • Technical Specifications for waste containers, tamper indicating devices (TIDs), container liners, container closure mechanism, etc. • Quality assurance receipt inspections for items critical to waste certification • Nonconformance reports and issues management causal analysis and closure management documentation • Pollution prevention and waste minimization techniques are utilized to minimize the generation of additional wastes • Receipt and Transportation of Radioactive Materials **(WM-1.1)**	
WM-2	Verify through document reviews, interviews, and observations that the facility or project has developed and implemented an adequate Waste Management program necessary to achieve readiness for nuclear operations.	

ID #	Performance Objectives and Criteria	Met?
	Waste management areas are under access control and the waste is protected from foreign object or environmental damage. **(WM-2.1)**	
	Waste management areas are properly identified and posted as to types of waste stored in the area. **(WM-2.2)**	
	Waste is properly segregated by type (e.g., Low-level Radioactive, Mixed Low-Level Radioactive, Transuranic Waste, Hazardous, etc.) to ensure commingling and generation of additional waste is minimized. **(WM-2.3)**	
	Emergency response equipment (e.g., spill cleanup and containment materials) is present and available for use in waste staging and storage areas. **(WM-2.4)**	
	The organization has established and properly identified 120-day waste staging areas for use. **(WM-2.5)**	
	The organization has established and properly identified 1 year waste storage areas for use. **(WM-2.6)**	
	If 180-day or 1-year staging/storage low-level radioactive timeframes are expected to be exceeded, proper notification and approval to allow waste to remain beyond specified timeframes are authorized by the responsible DOE representative. **(WM-2.7)**	
	A training plan exists that details all key regulatory training requirements RCRA, Toxic Substances Control Act (TSCA), Department of Transportation (DOT), Waste Certification Official, etc.) for personnel that handle, manage, package, certify and transport waste. **(WM-2.8)**	

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APPENDIX B- OUTLINE FOR THE PLANNING AND ACHIEVING OPERATIONAL READINESS

Successful achievement of operational readiness starts with a well thought out and developed plan (i.e., integrated resource loaded and logic linked schedule). Planning for operational readiness involves understanding the true scope of what is to be accomplished (e.g., design, procurement, installation, testing, maintenance, procedures (operational and support), safety documentation, training, readiness confirmation) along with determining the applicable set of management requirements. Key planning steps include:

1. Define the scope of the startup/restart including but not limited to:
    a. Establish to functional needs to accomplish the mission goal;
    b. Determine the manner in which the functional needs will be met;
    c. Determine the required or impacted system, structures and components (SSCs);
    d. Identify and analyze the hazards, develop and implement controls;
    e. Determine the impact on existing safety documentation;
    f. Identify the direct and support personnel required along with their specific training needs;
    g. Identify the need for or changes to technical procedures including surveillance procedures; and
    h. Identify maintenance impacts (reliability analysis) and note if vendor training may be needed.
2. Determine the type and, if applicable, the level of readiness confirmation.
    a. Is a readiness review required?
    b. Will a Readiness Assessment (RA) or Operational Readiness Review (ORR) be required?
    c. Will DOE be required to perform a separate readiness review?
    d. Provide input to the quarterly update to the Startup Notification Report (SNR).
3. Develop a Project Execution Plan and integrated resource loaded schedule.
    a. Assemble the project team;
    b. Establish the specific requirements and standards that must be met to accomplish the scope;
    c. Using the requirements, establish the Performance Criteria that will be used to provide the basis for the certification and verifications expected by DOE Order 425.1D;
    d. Using the Performance Criteria, identify tasks and assign responsibilities for their completion.
    e. Capture the tasks needed in a schedule
    f. Determine resources needed for each task.
    g. Develop an estimate based on the resource loaded schedule.
4. Develop readiness documents.
    a. Plan of Action (POA)
    b. Startup Plan [when needed (e.g., when Core Requirement 11 applies)]

5. Establish or apply the Certification Assurance Process to be used to enable line management to certify and verify that operational readiness has been attained.
6. Prepare to safely and compliantly operate the facility, activity or operation.
7. Certify Readiness.

Information about each of the steps noted above are further detailed below.

1. Define Scope of Startup/Restart

Defining the scope of the startup/restart is crucial to ensuring success in achieving operational readiness. Line management (often supported by an assigned Project Manager) is responsible for defining the scope of the startup/restart.

It is recommended that an individual with startup experience (i.e., Readiness Leader) participate in defining the scope as this person is required to develop a Readiness Review Level Determination. The scope definition should be facilitated by "workshop" type reviews with representatives from each of the functional disciplines involved. For example:

- project engineer;
- design authorities;
- process and systems engineers;
- construction;
- maintenance;
- utilities;
- procedures;
- procurement;
- training;
- safety analysis;
- nuclear criticality safety; and
- environmental, safety, health, waste management, safeguards, and security functions.

Reviews must include facility walk downs and an understanding of any facility changes (i.e., additional emergency lighting, ventilation, temperature control, emergency notification system changes, etc.) needed to support a mission capable operational end state.

Do not let the understanding of the scope be limited by funding sources. Rather, understand what must be accomplished to achieve a fully operational and productive process that will accomplish mission needs including changes to existing building equipment that may be outdated, not operational, or not sufficient for the desired mission.

Definition of the scope should focus on identifying what is required to perform the startup/restart. Some of this information may not be known at the beginning of the process, but the information should be generated as soon as possible. Identification of the actions for achieving operational readiness will be defined based on the scope.

As part of the definition of the scope, a startup/restart project description must be prepared to

document the scope. This is required to provide the basis for the subsequent evaluation to determine the type of readiness confirmation that will be needed, as discussed in section 2 below.

2. Determine Type and Level of Readiness Confirmation

The breadth and depth of the required readiness confirmation depend upon the hazards and complexity of the startup/restart. The readiness confirmation that will be needed uses a graded approach. Formal readiness reviews fall into one of two major categories, a Readiness Assessment (RA) or an Operational Readiness Review (ORR). The ORR is the most complex and rigorous of the reviews. Consistent with these review categories, readiness assessments may apply a further graded approach to RAs using methods such as checklist RAs.

The RA/ORR has a breadth and depth that is consistent with the complexity and risks of the particular project being started or restarted. DOE Order 425.1D specifies conditions that require a DOE RA. However, DOE may determine that the complexity and hazards associated with a particular startup/restart also warrant the conduct of a separate DOE RA. DOE may also elect to shadow/validate the Contractor RA or conduct a DOE RA concurrently with the Contractor RA. When an ORR is required, DOE is required by DOE Order 425.1D to conduct their own ORR after the contractor ORR is completed and pre-start findings are resolved. The same is true when a DOE RA is required. When DOE conducts a readiness review (either RA or ORR), then DOE is typically the Startup Authorization Authority (SAA). When neither a RA nor ORR is determined to be required (e.g., hazardous non-nuclear startup), then the readiness confirmation process is exited. The responsible Manager may opt to use a tailored version of the same process for achieving operational readiness without the need to perform a subsequent readiness review. To support the accurate scope, schedule, and cost estimate the determination of the appropriate readiness review should be determined prior to submittal of a Project Execution Plan, or for line item projects prior to submittal of the Critical Decision 2 package for DOE approval.

Using the startup/restart scope description generated during the scoping process, the Readiness Review Level Determination can be drafted by the experienced Readiness Leader. At sites that use Operational Safety Boards or similar method to advise operations management, it is recommended that the readiness review level be validated by that group and approved by line management responsible for the operation of the process being started or restarted. Once approved, this will determine if an RA or ORR is required for the startup/restart. If an RA or ORR is required, the final determination should be submitted to the Senior Manager responsible for the facility, who has final authority for determining the level of review required.

A. Readiness Review is Required (RA or ORR)

When a startup/restart requires a readiness review, then a number of specific activities need to be accomplished.

- Assign a Readiness Leader (this person is knowledgeable and experienced it expectations for successful completion of readiness review);
- Provide the information needed to include the startup/restart on the SNR that is

updated periodically and sent to DOE;

- Further develop and finalize the scope of the startup/restart through the use of the Readiness Certification Assurance Process Tracking (RCAPTS) (see step 5) (or other site specific performance criteria tracking process). Selecting the applicable Performance Criteria in RCAPTS helps define the scope by identifying the needed evidence documentation and hence identifying the tasks needed to generate that documentation. Regardless of the type or level of readiness review, RCAPTS will support the achievement of operational readiness through its highly tailorable approach;
- Develop estimate based on scope of project and performance criteria selected;
- If a Checklist RA is appropriate, then use the Checklist form and follow the specific guidance for checklist RAs. The process for Checklist RAs should involve the early evaluation of the items on the checklist forms for applicability to the particular startup or restart scope. A Plan of Action is required to be prepared for Checklist RAs;
- Proceed to Step 3, Develop the Integrated Schedule and Project Plan. A detailed resource loaded and logic linked schedule should be developed regardless of the review level to ensure Performance Criteria from RCAPTS and other tasks are identified early and captured in a logical sequence.

B. Startup Notification Report

The SNR, updated periodically, is used by DOE to approve the type of planned readiness confirmation review and the associated Startup Authorization Authority. DOE approval of the SNR is required for RAs or ORRs prior to the start of the readiness review. The SNR is used by DOE and contractor management for startup and restart planning.

The SNR is required by DOE Order 425.1D to identify known nuclear startups/restarts at least 12 months prior to the planned date for actual operations to start. The SNR identifies each item and specifies whether an RA or ORR will be required to confirm readiness to commence or resume operations. Startups/restarts cannot be placed in the SNR until the required Review Level Determinations have been completed and approved. Failure to include startups and restarts requiring either an RA or an ORR in the SNR may result in delays since the review cannot start until DOE and SAA approval of the review level is obtained.

When a previously unreported startup/restart requiring either an RA or ORR is identified that will occur before the next SNR update, a separate (or addendum) SNR must be provided to ensure timely agreement on the details of the readiness review process for that startup/restart. The addendum, which can be in the form of a letter to DOE, must contain the information required for the SNR plus a justification for the need for early approval.

After initial input, each SNR update may reflect items such as date changes, funding holds, or contact changes. Any major scope changes that can affect the approved review level must be re-submitted for formal DOE approval.

3. Develop Schedule

Startups and restarts should implement project management processes as discussed in DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets, and

associated Guides that will result in the mobilization of the knowledge, skills, tools, experience, and techniques required to:

1. Execute the specific scope of work within an established budget and schedule, and
2. Meet the needs and expectations of the end user, program sponsor, and DOE to accomplish mission objectives.

DOE Guide 413.3-16A, Project Completion/Closeout Guide, provides insights into processes for achieving readiness. This Guide provides for a Commissioning Plan that should be used early in a major project to document the strategy for how the project will achieve and verify operational readiness. The startup strategy would flow into the Project planning and ultimately into the CD-2 schedule.

Depending on the risk of the particular startup/restart and the cost or production impact, project management processes are applied in a graded manner. For larger projects project managers are typically assigned to manage the entire project through the completion of the readiness confirmation reviews and startup authorization. In all cases line operational management is ultimately responsible for attaining operational readiness and certifying that it has been achieved. The project manager is their agent for accomplishing that end.

A key project management tool is the generation of the integrated project schedule. Startups or restarts undergoing a readiness confirmation review need detailed schedules prepared during project planning, concurred in by the functional support organizations including those knowledgeable of the readiness process and approved by the responsible operational line management and, when assigned, the project manager. For the more complex projects, these schedules often first appear at a summary level in the initial Project Execution Plan for approval by management. If the summary schedule is not based on a very detailed logic-linked schedule then there is a risk that must be managed. The project schedule must include the tasks required to attain full operational startup as well as the activities associated with the applicable readiness confirmation reviews.

It is recommended that the project team select the set of requirements that will govern the tasks that need to be accomplished[3]. Then use this tailored set of requirements to establish the key project activities that will deliver the evidence to ensure the selected requirements are met and ensure these are in the Project Schedule.

Once developed in the manner discussed above, the resource-loaded integrated schedule defines the path to attaining operational startup in a logical, sequential, and disciplined manner to ensure success. Changes to the scope, budget, or schedule, regardless of how minor, should be trended into the projects estimate at completion (EAC). The readiness leader, as a core member of the project team, is responsible for ensuring that requested changes to the Operational Readiness Scope are documented, evaluated, and, when needed, submitted for approval. The project manager is responsible for ensuring that the preparation,

[3] If used the RCAPTS software will ensure that the set of requirements are clearly identified along with the typical expected evidence that will demonstrate they are fully met. RCAPTS also integrates with Primavera Project Planner software such that performance criteria can be easily brought into a schedule.

approval, and maintenance of the integrated readiness baseline schedule is implemented.

An example schedule template for Y-12 is provided in Appendix A to assist in the development of schedules for projects of various complexities and categories of readiness confirmation reviews. For specific technical areas (i.e., criticality safety, procedures, testing, etc.) the schedule templates typically list single sets of activities. To ensure accurate project duration the duplication of the above-mentioned activities will need to be incorporated into the project schedule. The template schedule contains each of the possible RCAPTS Performance Criteria based on the initial RCAPTS setup. Those that are not applicable may be dissolved. The project controls representative should also delete other activities not applicable to a given startup/restart and add activities unique to the startup/restart.

4. Develop Readiness Documents

Depending on the type of readiness confirmation reviews, different readiness documents may be required. For a Checklist RA the checklist itself may serve as the combined Plan of Action (POA) and Implementation Plan (IP) (POA/IP) and the final report. A Startup Plan may be required for more complex readiness reviews including checklist reviews.

More complex startups/restarts individual POAs (see Step 4a) and Startup Plans (see Step 4b) must be prepared.

The Startup Plan is required when Core Requirement 11 applies, but it may be used when advantageous to the startup.

For major new nuclear facilities, a Commissioning Plan should be prepared early in the design process to set forth the overall approach to achieving operational readiness. Guidance is available on preparing this plan in DOE G 413.3-16A, Project Completion/Closeout Guide.

A. Plan of Action

Once the Performance Criteria (RCAPTS) have been selected and line management has agreed, it is possible to begin to prepare the POA. The timing for developing the POA should permit final approval well in advance (at least 4 months or more for complex startups) of the projected start of the readiness review.

The POA is a critical plan that defines the scope and prerequisites for the readiness review. Description of the scope in the POA should be specific. Justifications for excluding CRs from the scope of an ORR typically require that a timely, independent review that addressed the CRs or portion of the CRs in a technically satisfactory manner may be used as justification for not including a CR or portion of a CR.

The prerequisites should be detailed, applicable to specific individual core requirements, measurable, and achievable. They must be mappable to the RCAPTS Performance Criteria. Because the POA defines the scope of the final readiness confirmation review, it is appropriate that a focused review be performed to validate completeness and adequacy of the RCAPTS Performance Criteria to achieve operational readiness consistent with the POA.

The POA must identify the review team leader for the Readiness Review as well as the SAA and anticipated date for the start of the RA or ORR. Since DOE must approve the SAA, this position is identified early and is listed in the approved SNR. The review team leader must be qualified to manage and conduct the readiness review. The basis for qualification includes:

- Technical familiarity with the activities and functional areas being reviewed.
- Previous performance-based review or assessment experience or training (e.g., qualified Level I Lead Assessor).
- Demonstrated leadership and managerial skills.
- Readiness Confirmation Review experience or formal training.
- Independence from the project or operation to be reviewed.

The POA should be developed using a graded approach commensurate with the scope and complexity of the startup/restart. A critical task is to ensure that the Performance Criteria specified in RCAPTS will fully meet the POA prerequisites or either the POA prerequisites or the RCAPTS Performance Criteria be changed so they are consistent. The POA should describe how performance of the startup/restart will be demonstrated and clearly indicate where simulations and surrogate materials will be used.

Once the POA is developed, if Core Requirement 11 is included, then a Startup Plan is required. Even if Core Requirement 11 is not required, a Startup Plan may be beneficial. When used, the Startup Plan is typically prepared near the end of the project but prior to the end of the RCA Process (RCAPTS) (see Step 5).

B. Startup Plan

A Startup Plan is required to be developed whenever core requirement 11 is identified within the scope of the readiness confirmation review.

The Startup Plan documents the oversight and controls necessary for deliberate operational activities after startup/restart authorization has been granted. Typically, the Startup Plan addresses those actions or functions (e.g., testing with real material, final operator certification where provisional certifications were needed, etc.) that could not be demonstrated during the review process.

In developing the plan, make sure to clearly delineate (and include a summary level outline schedule that clearly illustrates) the graded and systematic approach to full operations. You should describe both the management and facility activities/tasks necessary to achieve full operations, including any follow-on testing that may be needed. When testing is to be done during the startup phase, be sure to have the testing plan/instruction/procedure developed and included as a demonstrated part of the readiness confirmation.

5. Readiness Certification Assurance Process

NOTE: This section of the guide will be expanded to provide greater details on the approach and processes associated with this key part of the Guide.

The Readiness Certification Assurance (RCA) process, as first noted in Step 2b, provides a framework for ensuring that line management (e .g., Production/operations, Engineering, Maintenance, ES&H, etc.) accomplishes their tasks necessary for attaining operational readiness with high quality deliverables. The RCA process of attaining the expectations for achieving operational readiness is shown in Appendix C. The RCA process is designed to assign responsibility and obtain agreement as to ownership of requirements and expectations (i.e., performance criteria), therefore instilling accountability across various organizations for the declaration of readiness to operate a nuclear facility and validating the accuracy of the declaration.

As part of the RCA process, the RCAPTS software replaces paper-based administrative tasks performed by responsible managers and readiness personnel. RCAPTS is used from the early planning stages of a Project to the point of operational readiness certification. It supports the identification of tasks needed to produce the evidence documentation for the validation of requirements prior to the formal readiness certification required by DOE Order 425.1. It has also been applied for startups, not subject to DOE Order 425.1, as a means to provide structure to the process for preparing for operations. The RCAPTS software system allows simultaneous information sharing between performers, Readiness Assurance personnel, senior management, oversight groups, and startup authorities, saving time and avoiding missteps.

A key element for the successful completions of the RCA process is the development of documentation and other deliverables that are of high quality and meet procedural expectations. Ensuring that a high level of quality is achieved will support an efficient readiness confirmation process. To this end the Readiness Leader makes use of the Readiness Assist Team (RAT) to help the project team ensure that applicable requirements (i.e., performance criteria) are met with adequate assurance of quality and that performance can be demonstrated without problems. As project deliverables are completed or in final draft form, a member of the RAT will review the documentation or observe use of technical procedures to validate that requirements are met and expectations (defined in RCAPTS) are accomplished. In the RAT approach, problems or concerns are provided to the person responsible for the particular document. While these are tracked, they are not documented as formal findings.

Completion of the RCAPTS confirmation prepares operations and support organizations for safe and compliant operations and at the same time provides for the completion of a successful Readiness review. When the RCA process has been completed then operational readiness can be certified (see Step 7).

6. Prepare for Reviews

The focus of achieving operational readiness is not to prepare for the review, but to prepare to safely and compliantly operate the facility, activity or operation being started or restarted. If not for the requirement to perform a readiness review prior to starting operations, the operation, activity or facility should be able to safely and compliantly operate. Since a review must be done there are preparations/planning above and beyond getting ready to operate that can be done to speed the review process and ensure that the review team is fully

supported.

Several activities can help to prepare operations personnel (from production, facility, RadCon, maintenance, etc.) for the readiness confirmation reviews and associated demonstrations and interviews.

The Readiness Leader should:

- Ensure that the evidence files in RCAPTS are complete and that the material is correctly filled for the core requirements and functional areas. Where evidence items change, the Readiness Leader should be on the formal distribution list.
- Using RCAPTS, make sure all the prerequisites listed in the POA are met and affected groups are ready to support operations.
- Hold a pre-review briefing with the review team leader to discuss planned demonstrations, simulations, and use of surrogate materials. It is vital that the review team expectations are well understood and that the review team clearly understands what will be provided or demonstrated for their review.
- Working with the review team leader, develop a schedule for the evolutions to be demonstrated and the formal interviews requested by the review team. Schedules should be published and updated as needed.
- Provide at least a briefing to operators, supervisors, and support personnel when formal interviews are planned with these individuals so they understand what to expect and how to respond to interview questions.
- Mark up (redline) procedures being used for demonstrations during the review using existing guidance.
- Establish points of contact for the review team to interface with during the review and brief the points of contact on expectations for information exchange, typically RATS.
- Determine the logistical needs of the review team and provide for those needs (i.e., location, computer support, phones, technical editor, etc.)
- During the fieldwork portion of the review, schedule a startup/restart team meeting to make sure that items noted by the review team during their daily debriefings with the startup/restart team are being addressed and questions are receiving prompt responses with technically complete answers.

When operational preparations are complete and the line management and the project manager are confident that, were it not for the requirement to conduct a readiness review, actual operations could safely and compliantly begin, then they can certify that they are ready for the start of the readiness review [see Step 7].

7. Receive Certification of Readiness

If a Checklist RA is being done, then the Certification of Readiness (COR) is accomplished by the signature of the Responsible Manager on the appropriate checklist form.

If a non-checklist RA is being done, then a COR letter is prepared by the Responsible Manager for the signature of the Startup Authorization Authority. This is only done after the completion of the RCA Process using RCAPTS. This letter certifies to the review Team

Leader (RA or ORR) that the startup or restart has attained a fully operational state of readiness and the contractor review is authorized to begin. This COR is referred to as a Readiness to Proceed Memorandum in DOE O 425.1D.

8. Manageable List of Open Items

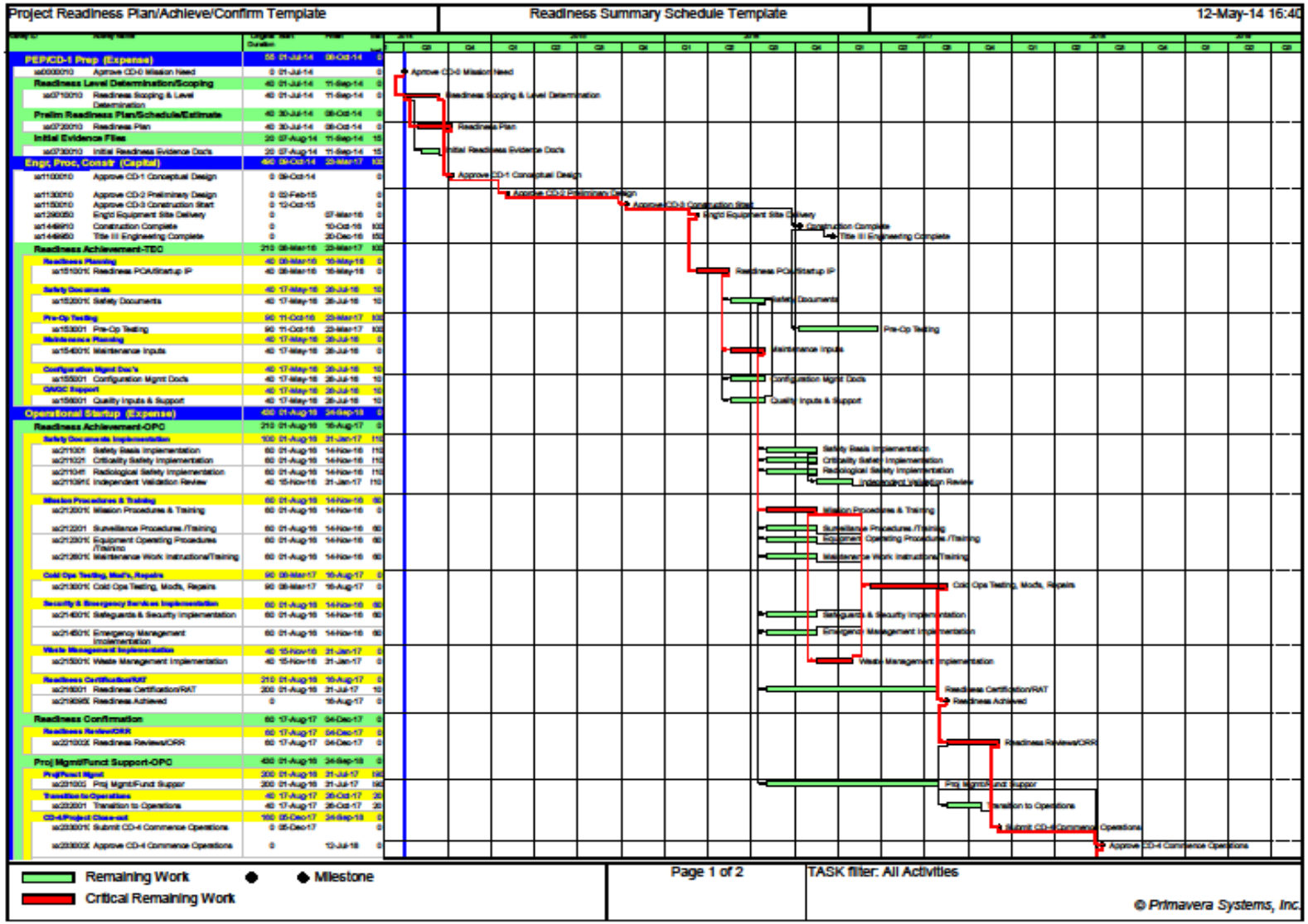
While it is strongly discouraged, the COR may contain a list of manageable items that were not able to be completed prior to the start of the formal confirmation review. The manageable list of open prestart items must have a well-defined schedule for closure to allow the RA/ORR team to review the closure process. There should be no unresolved issues in the path toward closure of these prestart items, and the items must not interfere with the ability of the review team to evaluate performance.

The acceptability of open prestart items at the time of the COR must consider the following:

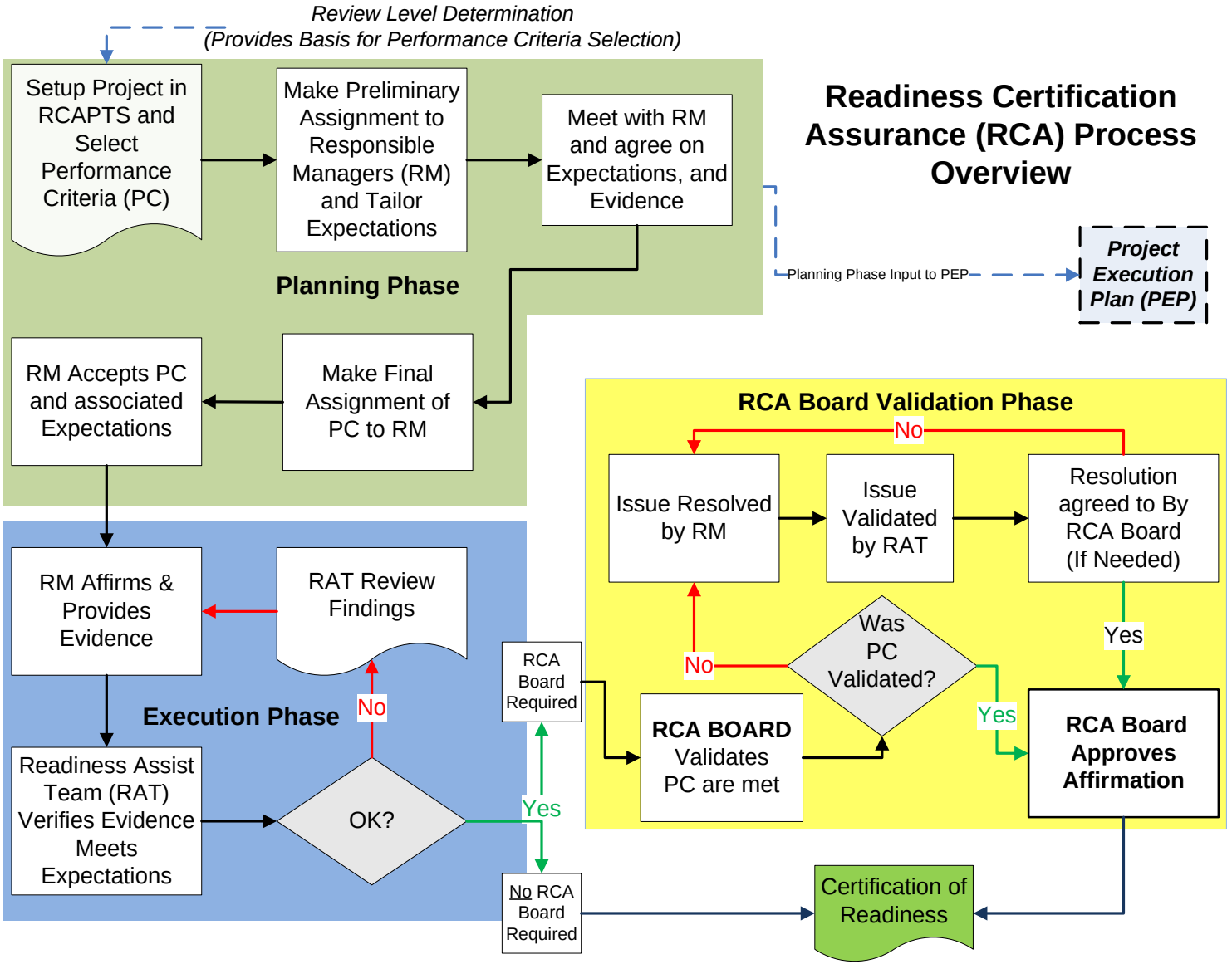
- Each open item that is a prerequisite to commencing operations must be identified as a part of the COR.
- The number of open items must be small. In determining how many open items are acceptable, one principle should be that every area to be evaluated by the review must be sufficiently complete to permit evaluation. For example, a single finding or multiple findings that in aggregate mean that some key program has not yet been developed and put in place would not be acceptable since the review would be unable to confirm the adequacy of the program. Only if that program were to be in place prior to the end of the review (with sufficient time to evaluate the program) would a finding of this sort be acceptable.
- Each open item must be defined with an explicit corrective action plan. The corrective action plan must be included with the identified open items in the COR. The schedule for completion of the corrective actions must be consistent with the timing for the completion of the review. Open items such as "the required environmental permits have not been requested or approved" would not be acceptable in that additional procedures and activities are potentially dictated by the corrective actions to the identified open item.

In summary, the open items should be few in number, well defined with a well-defined corrective action plan, able to be completed on a schedule that is consistent with the review schedule and not of such a nature individually or in aggregate to preclude an adequate evaluation by the review team.

APPENDIX C - EXAMPLE SUMMARY SCHEDULE FOR OPERATIONAL READINESS



APPENDIX D - Y-12 READINESS CERTIFICATION ASSURANCE PROCESS OVERVIEW



APPENDIX E - DOE READINESS DIRECTIVES AND GUIDE LIST

This is a listing of the inventory of Commissioning / Transition to Operations Directives and Guidance as of May 2015.

DOE Directives

1. DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets.
2. DOE Order 425.1D, Verification of Readiness to Start Up or Restart Nuclear Facilities.

Technical Standards

1. DOE-STD-3006-2010, Planning and Conducting Readiness Reviews.
2. EM SRP, Checkout, Testing and Commissioning Plan Review Module, March 2010,
3. EM SRP, Readiness Review Module, March 2010, EM SRP, Preparation for Facility Operations.

DOE Guides

1. DOE Guide 413.3-16A, Project Completion/Closeout Guide.

DOE Handbooks

1. DOE-HDBK-3012-2003, Guide to Good Practices for Operational Readiness Reviews, Team Leader's Guide.

Other Supporting Documents

1. Commissioning Experience Report, Office of Environmental Management (EM), Facilities Commissioning Working Group of the Tank Waste Corporate Board, January 2015.
2. U.S. General Services Administration, Commissioning Guidance for buildings -
3. U.S. Environmental Protection Agency, EPA Building Commissioning Guidelines.
4. ACG Commissioning Guideline, For Building Owners, Design Professionals and Commissioning Service Providers, AABC Commissioning Group, 2005.
5. ASHRAE Guideline 0-2013, The Commissioning Process, ASHRAE, 2013.
6. ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for the Commissioning Process, ASHRAE, 2007.
7. IEC 62337, Commissioning of Electrical, Instrumentation and Control Systems in the Process Industry – Specific Phases and Milestones, IEC, Edition 2.0, 2012.
8. IAEA Specific Safety Guide No. SSG-28, Commissioning for Nuclear Power Plants, IAEA, 2014.
9. Killcross, Martin, Chemical and Process Plant Commissioning Handbook, A Practical Guide to Plant System and Equipment Installation and Commissioning, Elsevier, 2012, ISBN–13: 978-0-08-097174-2. http://martinkillcrosscommissioning.com/home