CCN: 124103

Concurrence Sheet

Required Reviewers

Title	Name	Concurrence required (Check appropriately)	Initials	Date	Order
Project Manager	J. P. Betts	☒		9/20/05	
Deputy Project Manager	C. M. Albert	☒	CMA	9/20/05	
Deputy Project Director	S. F. Piccolo	☐			
QA Manager	G. T. Shell	☐			
Safety Assurance Manager	C. M. Davis	☐			
Assistant Project Manager - PT / HLW	A. K. Beckman	☐			
Assistant Project Manager - LAW / BOF / LAB	W. T. Clements	☐			
Business Manager	C. E. Rogers	☒	CER	9/15/05	
Contracts Manager	C. E. Rogers BKG	☒	CER	9/15/05	
Operations Manager	J. W. Wilson	☐			
Process Deployment Manager	P. W. Schuetz	☐			
Acquisition Services Manager	K. M. Chalmers	☐			
Engineering Manager	L. T. Lamm	☐			
E&NS Manager	D. Klein	☐			
Research and Technology Manager	W. L. Tamosaitis	☐			
Construction Manager	M. J. Lewis	☒	See after WI		
Project Controls Manager	D. S. Hardin	☐			
BNI Legal	D. M. Curtis	☐			

Additional Reviewers

Title	Name	Initials	Date	Order
N/A if None				

Written Response Required: ☐ Yes ☐ No

RITS Action: ☐ Yes ☐ No **Due Date:**

ORP Actionee: **WTP Responsible Manager:**

C. M. Davis — *Print/Type Applicable Line Manager's Name* — *Signature* — 15 Sep 05 *Date*

V. G. Edens — *Print/Type Originator's Name* — *Signature* — 15-SEPT. 05 *Date*

Edens, Victor

From: Lewis, Michael J (WTP)
Sent: Monday, September 19, 2005 6:09 PM
To: Edens, Victor
Cc: Rogers, Ed; Albert, Craig; Davis, Clay
Subject: ISMS Systems Description - Annual Update

Vic, sorry it took so long to get through this thick document, but I do not sign off without reading.

In general, I can not disagree with the revision, but the document seems to have grown to where it is too big and too cumbersome to manage effectively. It could probably be said in half the paper.

Figure 2-3, page 2-53 references area project managers, this is not consistent with the new org.

Section 5.5.4, page 5-11 refers to the site manager, that is now Manager of construction.

Otherwise, I have now read it all and am OK with the revisions from last years plan.

MIKE LEWIS
BNI RPP/WTP Manager of Construction
Location: WTP Site, Building T1, Office 209
Office: (509) 373-8387
Cell: (509) 531-2057

U.S. Department of Energy
Office of River Protection
Mr. R. J. Schepens
Manager
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

CCN: 124103

SEP 2 0 2005

Dear Mr. Schepens:

CONTRACT NO. DE-AC27-01RV14136 – HANFORD TANK WASTE TREATMENT AND IMMOBILIZATION PLANT INTEGRATED SAFETY MANAGEMENT SYSTEM DESCRIPTION REVISION FOR FISCAL YEAR 2006

Attached is the Hanford Tank Waste Treatment and Immobilization Plant revised Integrated Safety Management System (ISMS) Description document (24590-WTP-ISMSD-ESH-01-001, Rev. 3) for your review and approval. This revision incorporates necessary changes noted during the FiscalYear 2005 ISMS Annual Review and Evaluation.

If you have any questions regarding the document, please contact Victor Edens at 371-2077.

Very truly yours,

J. P. Henschel
Project Director

VGE/blu

Attachment - 24590-WTP-ISMSD-ESH-01-001, Rev. 3, Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Description

BECHTEL NATIONAL, INC.
2435 Stevens Center Place
Richland, WA 99352
tel (509) 371-2000

CCN: 124103

cc:

Betts, J. P. w/o	WTP	MS14-3C
Eschenberg, J. w/a (2 hard copies, 1 electronic)	ORP	H6-60
Henschel, J. P. w/o	WTP	MS14-3C
Lewis, M. J. w/o	WTP	MS10-A
Rogers, C. E. w/a	WTP	MS14-3C
Short, J. J. w/o	ORP	H6-60
Vega, S. A. w/a	ORP	H6-60
DOE Correspondence Control w/a	ORP	H6-60
PDC w/a	WTP	MS11-B

Attachment

WTP Project Integrated Safety Management System Description

24590-WTP-ISMSD-ESH-01-001, Rev. 3

Document title:

WTP Project Integrated Safety Management System Description

Contract number: DE-AC27-01RV14136

Department: Safety Assurance

Author(s): V. G. Edens

Principal author signature:

Document number: 24590-WTP-ISMSD-ESH-01-001, Rev 3

Checked by: C. M. Davis

Checker signature:

Date of issue: 20 September 2005

Issue status: Approved

Approved by: J. P. Henschel

Approver's position: Project Director

Approver signature:

River Protection Project
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2435 Stevens Drive
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History Sheet

Rev	Date	Reason for revision	Revised by
0	6 September 2002	Initial Issue	G. Von Nieda
1	30 January 2003	Revised to incorporate changes in WTP project organizational structure, functional responsibilities, and implementing mechanisms.	C. Kuhn
2	9 August 2004	Annual revision to incorporate necessary revisions after the FY 2003 program evaluation and annual report	V.G. Edens
3	15 September 2005	Annual revision to incorporate necessary changes for consistency and alignment with functional changes over the year, which includes incorporating applicable information from Section 3.0 into 4.0.	V.G. Edens

Contents

Tables

Figures

Executive Summary

This Integrated Safety Management System Description (ISMSD) document describes the Integrated Safety Management System (ISMS) for the Hanford Tank Waste Treatment and Immobilization Plant (WTP) project. The WTP project ISMS is implemented and maintained to ensure that all work under the WTP project contract for the design, construction, and commissioning of the WTP is performed in a manner that protects the employees, the public, and the environment. This goal is achieved by integrating safety into the planning and execution of all project work. For purposes of this document, "safety" encompasses environmental, safety, and health-related work activities.

Project Scope

The scope of work in the WTP contract is to design, construct, and commission a waste treatment and immobilization plant for processing nuclear defense process wastes stored at the Tank Farm facility of the US Department of Energy (DOE) Hanford Site. The WTP contractor has full responsibility for the WTP from transition of the conceptual design through the completion of transition to the operations contractor.

The WTP will treat and immobilize highly radioactive and mixed hazardous wastes stored in underground tanks at the Hanford Site for safe disposal. The WTP processes will (1) pretreat the waste to separate it into two fractions: low-activity waste (LAW) and high-level waste (HLW), (2) immobilize the LAW for onsite disposal, and (3) immobilize the HLW for ultimate disposal.

The current project activities include work planning and resource allocation, research and technology (R&T) development, engineering design, procurement (acquisition services), construction, training, and procedure development. The current project ISMSD excludes work control processes, programs, procedures, and training required for the operation and maintenance phases of the project.

The project ISMS was developed and will continue to be maintained and improved throughout the evolution of the project. The ISMSD will be reviewed and updated annually to reflect changes to implementing mechanisms and to address changes in project safety goals, objectives, or contract requirements.

The WTP Project Director has ultimate responsibility for project safety. The Project Director establishes the overall vision for the project and instills a culture of excellence for safety that supports BNI's "zero accident" objective. The health and safety of all employees and subcontractors of the WTP project are of paramount importance. The Project Director, through the Project Manager, ensures that all work activities comply with the authorization bases and applicable regulatory and contractual requirements, and has ultimate authority and responsibility to stop unsafe or unsatisfactory project activities. The Project Director promotes a safety culture in the workplace that encourages work identification, hazard analysis, hazard control, and feedback and improvement. These safety responsibilities and objectives are communicated through the project management chain.

ISMS Integration

Contractual and applicable legal requirements flow down into activity implementing procedures. This flowdown, described in Figure ES-1, shows how safety is implemented from the Project Director to the workers. WTP project line management is responsible for safety. Line management ensures that applicable safety controls are in place and incorporated in implementing procedures. Workers are required to comply with the applicable procedures and controls when performing work. This flowdown of safety responsibilities and the integration of safety requirements and controls from the institutional

level to the work level implementing procedures ensure that WTP project personnel and subcontractors conduct work while protecting the workers, public, and environment.

ISM Project Development Process Integration

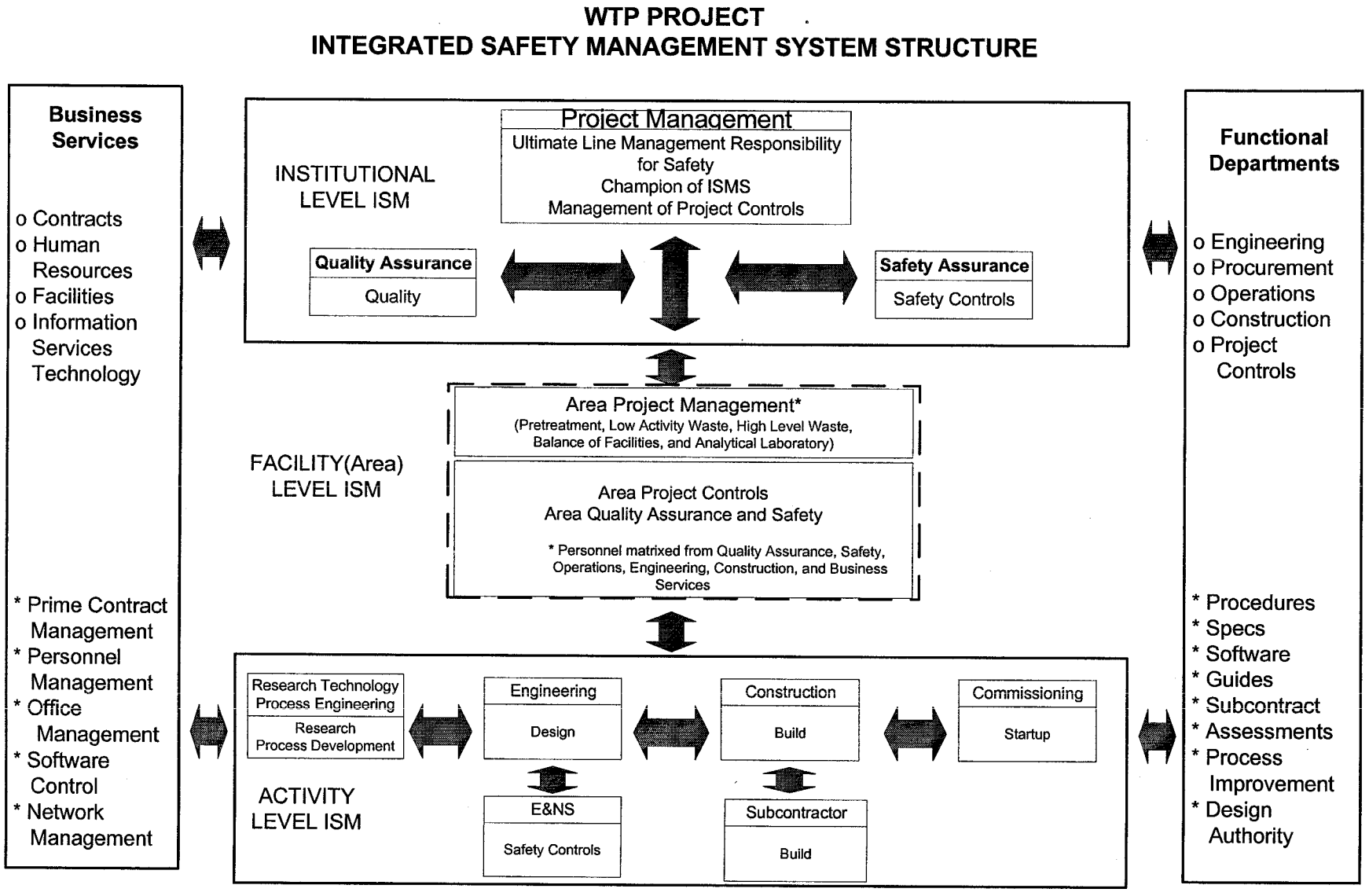
The integration of design, construction, and commissioning is accomplished by the project processes established to develop, design, build, and start up the WTP. R&T and Process Engineering obtain industry best practices, standards, and lessons learned for development and improvement of the engineering design and resolution of technical issues. Engineering transforms these technologies and processes into the plant and systems design. Construction and Operations also provide constructability and operability input to Engineering for improvement. During the design phase, preliminary and final design reviews are conducted by multidiscipline teams to ensure safety and provide for feedback and improvement.

Construction builds the plant and systems to the engineering design drawings and specifications. Throughout construction, field engineering utilizes a change notice process to provide feedback to engineering for resolution of issues and plant improvement. As the plant systems are assembled, a series of pre-operational tests (cold and hot tests) is performed to validate design operability. Commissioning startup personnel will provide feedback to engineering and construction for resolution of issues.

ISM System Description Document Organization

Project requirements and responsibilities are prescribed by project documents and implementing procedures. The WTP project integrates safety through the organizational structure to safely accomplish the project scope of work. Section 1.0 (Introduction) provides information on the ISMS drivers and DOE's expectations for the ISMS. Section 2.0 (WTP Project Infrastructure for ISMS Implementation) describes how institutional and project and functional-level ISMS is implemented through the use of the processes and procedures. Similarly, Sections 4.0, 5.0, and 6.0 describe ISM implementation for functional management areas (Engineering, Construction, and Commissioning) and their respective activities. Section 7.0 (Maintaining an Approved ISMS) describes how the WTP project ISMS is maintained to preserve its integrity. Section 8.0 describes the BNI Safety Impact Plan. As the WTP project evolves, this ISMSD will be reviewed annually and updated as needed to ensure that it remains current and reflects the status of the project.

Figure ES-1 WTP Integrated Safety Management System Integration



Acronyms

AB	Authorization Basis
ABAR	Authorization Basis Amendment Request
ALARA	as low as reasonably achievable
APC	Accident Prevention Council
APM	Assistant Project Manager
ASC	ALARA Subcommittee
BNI	Bechtel National, Inc.
BOD	*Basis of Design*
CAA	*Clean Air Act of 1970*
CAR	Construction Authorization Request
CCE	continuing core expectation
CCR	competence commensurate with responsibility
CECP	*WTP Construction Environmental Control Plan*
CFR	Code of Federal Regulations
CM	configuration management
CRAD	criteria, review, and approach document
CS	craft supervision
CWP	construction work package
C&T	Commissioning and Training
DCD	Design Criteria Database
DEAR	Department of Energy Acquisition Regulations
DNFSB	Defense Nuclear Facilities Safety Board
DOE	US Department of Energy
E&NS	Environmental and Nuclear Safety
EAP	Emergency Action Plan
Ecology	Washington State Department of Ecology
ECP	Employee Concerns Program
EMP	Emergency Management Program
EMS	Emergency Management System
EPCRA	*Emergency Planning and Community Right-to-Know Act*
EPA	US Environmental Protection Agency
ES&H	Environmental, Safety, and Health
ESQ&H	environmental, safety, quality, and health
FAM	functional area manager
FRAM	Functions, Responsibilities, and Accountability Manual
HLW	high-level waste
HWMA	State of Washington *Hazardous Waste Management Act*
ICD	Interface Control Document

IHLW	immobilized high-level waste
IS&H	industrial safety and health
ISM	Integrated Safety Management
ISMP	*Integrated Safety Management Plan*
ISMS	Integrated Safety Management System
ISMSD	Integrated Safety Management System Description
IT	Information Technology
ITS	important to safety
JHA	job hazard analysis
LAW	low-activity waste
LCAR	Limited Construction Authorization Request
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NOC	notice of construction
ORP	DOE Office of River Protection, Richland, Washington
OSHA	Occupational Safety and Health Administration
OSR	DOE Safety Regulation Division (former Office of Safety Regulation)
PAAA	Price-Anderson Amendments Act
PAS	Project Administrative Services
PBS	people-based safety
PDC	Project Document Control
PE	Process Engineering Flowsheet Group
PEP	*Project Execution Plan*
PMT	Process Management Team
POD	plan of the day
PPE	personal protective equipment
PRA	probabilistic risk assessment
PSAR	Preliminary Safety Analysis Report
PSC	Project Safety Committee
PSP	Personal safety plan
QA	Quality Assurance
QAM	Quality Assurance Manual
QARD	Quality Assurance Requirements Document
QC	Quality Control
R&T	Research and Technology
RAMI	reliability, availability, maintainability, and inspectability
RCRA	Resource Conservation and Recovery Act
RFE	responsible field engineer
RPP	Radiation Protection Program
RS	responsible superintendent
SA	Safety Assurance

SE	Safety Evaluation
SEPA	State Environmental Policy Act
SIPD	Standards Identification Process Database
S/QC	Safety/Quality Council
SRD	*Safety Requirements Document*
SSC	structures, systems, and components
STARRT	Safety Task Analysis Risk Reduction Talk
TFC	tank farm contractor
TSCA	*Toxic Substances Control Act*
WBS	work breakdown structure
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1.0 Introduction

1.1 Background

Bechtel National, Inc. (BNI), with Washington Group International, Inc., as its principal subcontractor, has contracted with the US Department of Energy (DOE) - Office of River Protection (ORP) to design, construct, and commission a new Hanford Tank Waste Treatment and Immobilization Plant (WTP) at the DOE Hanford Site (DOE Contract DE-AC27-01RV14136 [DOE 2000a]). The WTP contractor has full responsibility for the WTP from transition of the conceptual design through the completion of transition to the operations contractor.

The DOE contract ("WTP contract") between BNI and DOE mandates the development, implementation, and maintenance of an Integrated Safety Management System (ISMS) for the WTP project.

1.2 WTP Project Safety Policy

The WTP contractor is committed to design, construct, and commission the WTP in a way that is technically sound and cost-efficient and that protects the workers, the public, and the environment. This goal is supported through implementation of the project ISMS. The project ISMS provides the foundation for conducting work safely through the conscious integration of safety into work planning, execution, and management at all levels. The project ISMS focuses on management accountability and active worker involvement to create a safety culture that permeates the organization and results in the safe performance of project activities.

1.3 Purpose

The purpose of this document is to describe the WTP project management system, which integrates safety philosophies, expectations, and priorities to ensure that the safety objectives and project contractual goals and obligations are met. This ISMS ensures that safety is integrated into work performed in compliance with the WTP contract. In the context of this ISMS, "safety" encompasses environmental protection, safety, and health. The ISMS described herein complies with the following DOE Acquisition Regulation (DEAR) clauses:

- DEAR 952.223-71, *Integration of Environment, Safety, and Health into Work Planning and Execution* (June 1997)
- DEAR 970.5204-78, *Laws, Regulations, and DOE Directives* (June 1997)

1.4 Scope

The ISMS described in this document applies to the WTP design, construction, and commissioning contractor who manages work for the project, as well as to the onsite subcontractors that perform work for the project. If the DOE and the WTP contractor deem the subcontracted work sufficiently complex or hazardous, the subcontractor is required to have and document its own safety management system that is compatible with and complements the project ISMS.

The WTP contract scope is to design, construct, and commission the WTP. The WTP project safety management system ensures project activities are performed in a manner that protects workers, the public, and the environment. This goal is achieved by integrating safety into the planning, execution, and

monitoring of the project through all phases of the contract. As the project progresses from construction to commissioning and subsequent turnover to the future operations contractor, the ISMS will be revised and maintained current through the ISMS annual review and update process.

1.5 Contractual and Regulatory Drivers for ISMS

DOE, in response to Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 95-2, committed to implement ISMS across the DOE complex through the DOE Policies P450.4, P450.5, and P450.6. These policies, along with DEAR clauses 952.223-71 and 970.5204-78, require DOE contractors to follow ISMS objectives, guiding principles, and functions, and to describe the approach for implementing and tailoring an ISMS to the contractor's site/facility, activities, and hazards. The WTP project is required by the WTP contract to develop, implement, and maintain an ISMS.

Section C Standard 7, *Environment, Safety, Quality, and Health* (ESQ&H), of the WTP contract defines the WTP contractor responsibilities for non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and quality assurance. This standard identifies specific ESQ&H deliverables.

WTP contract Section B.8, *Conditional Payment of Fee, Profit, or Incentives,* defines minimum requirements for the ESQ&H program. The minimum requirements are:

- BNI shall develop, obtain DOE approval of, and implement an ISMS in accordance with the provisions of Section I Clause I.105, *Integration of Environment, Safety and Health into Work Planning and Execution,* of the contract.
- BNI shall establish the minimal ISMS performance requirements in the approved ISMS description document, or similar document.

Attachment E in Section J of the WTP contract (List B-DEAR 970.5208.78) lists the applicable regulatory drivers and additional directives for the WTP project (Table 1-1). List B includes the four DOE Safety Regulation Division (OSR) safety directives for nuclear, radiological, and process safety that are applicable to the project (the "000" documents). These OSR regulatory model documents define the DOE approved processes to evaluate work and associated hazards. They are used by the project to establish a tailored set of radiological, nuclear, and process safety standards that DOE approves for implementation.

Table 1-1 WTP Project Safety Drivers

ATTACHMENT E (with document title/date updates) - LIST OF APPLICABLE DIRECTIVES
(LIST B-DEAR 970.5204.78)

(a) Environmental, safety and health requirements appropriate for work conducted under this contract that have been determined by a DOE approved process to evaluate the work and the associated hazards and identify an appropriately tailored set of standards, practices, and controls:

Document Number	Title
24590-WTP-SRD-ESH-01-001-02	Safety Requirements Document, Volume II
DOE/RL-96-0003	DOE Process for Radiological, Nuclear, and Process Safety Regulation of the RPP Waste Treatment Plant Contractor

Table 1-1 WTP Project Safety Drivers

Document Number	Title
DOE/RL-96-0004	Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor
DOE/RL-96-0005	Concept of the DOE Process for Radiological, Nuclear, and Process Safety Regulation of the RPP Waste Treatment Plant Contractor
DOE/RL-96-0006	Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for the RPP Waste Treatment Plant Contractor
RL/REG-97-13	Office of River Protection Position on Contractor-Initiated Changes to the Authorization Basis
RL/REG-98-05	Inspection Program Description for the Regulatory Oversight of the RPP-WTP Contractor
RL/REG-98-06	Corrective Action Program Description
RL/RE-98-14	Office of Safety Regulation Position on New Safety Information and Back-Fits
ORP M 440.1-2	Industrial Safety and Health Oversight Plan for the Waste Treatment Plant Contractor
DOE M 140.1-1B	Interface with the Defense Nuclear Facilities Safety Board
DOE M 231.1-1	Environment, Safety and Health Reporting Manual
DOE M 232.1-1A	Occurrence Reporting and Processing of Operations Information
DOE M 435.1-1	Radioactive Waste Management Manual
DOE O 231.1	Environment, Safety, and Health Reporting
DOE O 241.1	Scientific and Technical Information Management
DOE O 350.1	Contractor Human Resource Management Programs
DOE O 414.1A	Quality Assurance
DOE 0 430.1A	Life-Cycle Asset Management
DOE O 442.1A	Department of Energy Employee Concerns Program
DOE/EM-0093	Waste Acceptance Product Specifications for Vitrified High Level Waste Forms
DOE/ORP-2000-06	River Protection Project-Project Management Plan
DOE/RL-88-21	Double-Shell Tank Unit Permit Application
DOE/RL-94-02	Hanford Emergency Management Plan
DOE/RL-96-0002	Top-Level Safeguards and Security Requirements for TWRS Privatization
DOE/RW-0333P	Office of Civilian Radioactive Waste Management Quality Assurance Requirements and Description for the Civilian Radioactive Waste Management Program (QARD)
DOE/RW-0351P	Waste Acceptance System Requirements Document (WASRD)
PL-W375-MG00004	Safeguards and Security Program Plan

The project complies with contractual radiological, nuclear, process, and industrial safety and environmental protection requirements, and applies good management practices and corporate business requirements, as appropriate. The drivers cited in the WTP contract for development of the project ISMS are identified in Table 1-2.

Table 1-2 ISMS Drivers in the WTP Contract

ISMS Driver	Topic
Contract Clause I.105, Compliance with DEAR 952.233-71	Integration of Environment, Safety, and Health into Work Planning and Execution (June 1997) (Currently presented in 48 CFR 970.5223-1 [December 2000])
Contract Clause I.117, Compliance with DEAR 970.5204-78	Laws, Regulations, and DOE Directives (June 1997) (Currently presented in 48 CFR 970.5204-2 [December 2000])
Contract Clause B.8	Conditional Payment of Fee, Profit, or Incentives
Contract Section C, Standard 7, clause (e) (2) (ii), Compliance with 10 CFR 800 series	Appendix A to Subpart B, 10 CFR Part 830, General Statement of Safety Basis Policy, Section D, Integrated Safety Management
Contract Section H, Special Contract Requirements H.22	Subcontractor Environment, Safety, Quality, and Health Requirements

The following documents were reviewed as guidance for the development of the WTP project ISMS, and their application was tailored to the scope of the project:

- DOE G 450.4-1B, *Integrated Safety Management System Guide* (March 2001)
- DOE P 450.4, *Safety Management System Policy* (October 1996)
- DOE P 450.5, *Line Environment Safety and Health Oversight* (June 1997)
- DOE P 450.6, *Secretarial Policy Statement Environment, Safety, and Health* (April 1998)
- DNFSB/TECH-16, *Integrated Safety Management* (June 1997)
- DNFSB/TECH-19, *Authorization Agreements for Defense Nuclear Facilities and Activities* (April 1998)

1.6 ISMS Overview

The ISMS approach is a performance-based system that provides a framework for conducting work safely across the DOE complex. It is based on a set of written policies, rules, orders, and standards used for implementation of ISMS. ISMS is an overarching system in which safety is a primary requirement for planning and conducting work, and a fundamental responsibility of all personnel. It is a dynamic system and uses a feedback process to ensure continuous improvement that is responsive to the changes in DOE missions and work scope. ISMS is self-evolving; as the work scope changes and the project progresses, the ISMS will continue to provide for the safety of the worker, the public, and the environment.

The six primary components of ISMS, as established by DOE P450.4, are:

1 Objective
2 Principles
3 Functions

4 Implementation
5 Responsibilities
6 Mechanisms

The organization of the ISMS description document (ISMSD) follows the project phases. Section 1.0 contains WTP project background, safety policy, the purpose of ISMS, and the contractual and regulatory drivers (Tables 1-1 and 1-2) for the ISMS. This section identifies and summarizes the ISMS guiding principles and core functions components of ISMS. The remaining chapters of this ISMSD describe ISMS implementation, responsibilities, and mechanisms.

The first three components of an ISMS are universally applied across the DOE complex. The last three are specific to each DOE site or project. Following are the eight guiding principles and the five core functions of an ISMS and how they are applied to the WTP project:

ISMS Guiding Principles:

1 **Line Management Responsibility for Safety.** *Line management is directly responsible for the protection of the workers, the public, and the environment.*
2 **Clear Roles and Responsibilities.** *Clear and unambiguous lines of authority and responsibility for ensuring safety are established and maintained at all organizational levels within the project and its contractors.*
3 **Competence Commensurate with Responsibilities.** *Personnel possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.*
4 **Balanced Priorities.** *Resources are effectively allocated to satisfy safety, programmatic, and operational needs. Protecting the workers, the public, and the environment is a priority whenever activities are planned and performed.*
5 **Identification of Safety Standards and Requirements.** *Before work is performed, the associated hazards are evaluated and an agreed-upon set of safety standards and requirements are established which, when implemented, provide adequate assurance that the workers, the public, and the environment are protected from adverse consequences.*
6 **Hazard Controls Tailored to Work Being Performed.** *Engineered safety features and administrative controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards.*
7 **Operations Authorization.** *The conditions and requirements to be satisfied for operations activities to be initiated and conducted are clearly established and agreed upon.*
8 **Worker Involvement.** *Employees participate and have ownership in the processes for work planning, hazard analysis, work execution, and resolution of safety concerns.*

ISMS Core Functions:

1 **Define the Scope of Work.** *Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.*
2 **Analyze the Hazards.** *Hazards associated with the work are identified, analyzed, and categorized.*
3 **Develop and Implement Hazard Controls.** *Applicable standards and requirements are identified and agreed upon, controls to prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.*
4 **Perform Quality Work within Controls.** *Readiness is confirmed and work is performed safely.*

5 **Provide Feedback and Continuous Improvement.** *Feedback information is gathered on the adequacy of controls, opportunities for improving the definition and planning of work are identified and implemented, line and independent oversight is conducted, and, if necessary, regulatory enforcement actions occur.*

The application of the above ISMS components to the project is discussed in Section 2.0 of the ISMSD. The simplified model shows the use of the five core functions performed in the sequence shown to complete quality work in a safe manner. There may be iterations in the process among the first three functions for work planning to determine the right scope of work and establish the right set of controls before the performance of work. In the WTP project there is an interrelationship between multiple functional levels of design, construction, and startup, and the association of the ISMS core functions to each project phase. It is important to properly align the work scope through each project phase and to use the same basic safety management system within each phase of the project. This system is applied to ensure proper interface of operational and constructability needs with the project design. It also ensures proper interface of safety analysis with the project design and effective development of project procedures and personnel competencies to complete the design, construction, and commissioning contract.

1.7 ISMSD Organization

The ISMSD organization was established to follow the project logical progression and to allow the reader to locate topics based on understanding basic structure of the document.

Section 1: Introduction. *Includes the project background, safety policy, ISMS drivers and ISMS process overview.*

Section 2: WTP Project Infrastructure for ISMS Implementation. *Describes the project infrastructure used to develop and implement the ISMS.*

Section 3: Process Engineering Flowsheet Group and Research and Technology (R&T). *Discusses ISMS related roles and responsibilities of these two organizational activities for modeling, testing, and optimizing waste treatment processes.*

Section 4: Engineering. *Describes the process for producing an engineering design for a WTP that meets applicable standards, codes, and regulations and that will be constructable and operable.*

Section 5: Construction. *Presents the construction management process used to build the Waste Treatment Plant in a manner that ensures that the facilities are constructed safely in accordance with project requirements.*

Section 6: Startup and Commissioning. *Describes the processes for systematic development and execution of start- up test activities to verify acceptance of plant systems and components; also describes the project training program during all project phases.*

Section 7: Maintaining an Approved ISMS. *Provides guidance and expectations for maintaining the integrity of an approved ISMS.*

Section 8: Safety Impact Plan. *Describes the process for implementing corporate requirements that mirror ISMS, specifically leading indicator activities.*

2.0 WTP Project Infrastructure for ISMS Implementation

2.1 Scope

Section 2.0 describes the infrastructure that supports the development and implementation of an ISMS on the WTP project. Section 2.0 topics include the following:

- Project implementation of the ISMS
- ISMS implementing mechanisms
- Project business infrastructure supporting the ISMS
- Application of ISMS core functions and guiding principles for the WTP project
- Project ISMS interface with the DOE

2.2 Implementation

The fundamental objective of the ISMS is to "Perform Work Safely." This is achieved by implementing project processes that provide rigor and discipline to work execution. Project protocol directs that all work be done safely through appropriate work planning and execution in accordance with ISMS core functions and guiding principles. Policy 24590-WTP-G63-MGT-001, *Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy,* states that the WTP project work is performed according to the ISMS. Figure 1-1 in Section 1.0 provides a diagrammatic overview of that protocol depicting application of the core functions and guiding principles.

The overview is depicted as an iterative loop beginning with definition of the scope of work and establishment of expectations. Priorities are set and resources are allocated. Hazards of the work are identified and analyzed. Controls to mitigate those hazards are developed and implemented. Work is accomplished within the framework of those controls. Activities observed during the execution of the work are discussed and analyzed through engineering design reviews for design work and by post-job reviews for construction. Ideas and suggestions from these reviews are fed back to adjust the priorities and resources or to reanalyze hazards or revise work controls, resulting in improved safety and efficiency. Section 2.5 explains the WTP ISMS protocol in detail. Project activities are completed in accordance with the safety management system that ensures a safe transition from design to construction, from construction to commissioning, and finally from commissioning to plant operation.

The primary project activities include process operations, R&T, engineering design, construction, start-up, and commissioning. Application of Integrated Safety Management (ISM) to these activities is supported by the functional management areas of Business Services, Quality Assurance (QA), Environmental and Nuclear Safety (E&NS), Process Engineering and Flowsheet group, and Safety Assurance (SA). The safety oversight function is divided between E&NS and SA as described in 24590-WTP-QAM-QA-01-001, *Quality Assurance Manual* (QAM). The following sections describe the project infrastructure for ISMS implementation for these activities. The organizational structure defines responsibilities, and requirements flow down to action level through programs, plans, and procedures. It also discusses the inter-functional integration and implementation of the project safety management requirements and mechanisms.

2.2.1 Project Requirements and Standards

Development of the ISMS began with the identification of project requirements and standards. Programmatic requirements for the project flow down from applicable industry standards and from DOE requirements and regulations mandated by contract. These requirements are documented in DOE Acquisition Regulation DEAR 970.5204-78 clause 17, *Laws, Regulations, and DOE Directives (June 1997)*, under List B of the WTP contract (DOE 2000a). List B, found as Attachment E of the WTP Contract Appendix J, provides environmental, safety, and health requirements appropriate for work conducted under this contract to evaluate the work and the associated hazards and identify an appropriately tailored set of standards, practices, and controls. Section 1.5 discusses the contractual and regulatory drivers for ISMS and the complete List B.

Standard 7 of the WTP contract also describes the Environmental, Safety, Health and Quality Assurance program requirements. Figure 2-1 shows the flow-down of these standards and requirements from the project-level programs to work-level implementing procedures. Project plans, program manuals, and procedures define the roles and responsibilities for implementing requirements and standards.

2.2.2 Project Management Structure and Organization

The WTP contract (DOE 2000a) to design, construct, and commission the WTP is managed by a Project Director and a staff of senior management personnel.

The Project Director has directed the development and implementation of this formal and comprehensive ISMS, which is the foundation for performance of WTP project work. WTP safety management encompasses environment, safety, and health in 24590-WTP-G63-MGT-001, *Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy.* Each person on the WTP project is responsible and accountable for safety.

QAM Policy Q-01.1 provides the organization chart (QAM Figure 1) for the top-level (i.e., direct reports to the WTP Project Director, Project Manager, or Operations Manager) WTP contractor, and summarizes the overall WTP project management and organization responsibilities. Project management (defined as any management level within the line or support organizations, including contractor management, that is responsible and accountable for directing and conducting work) has the responsibility to ensure that a project ISMS is instituted and implemented in the execution of project work as directed by the Project Manager. Flow-down of project requirements and safety responsibilities to the worker level is documented through approved plans, programs, and procedures.

Line management is given ownership and enlists worker involvement (24590-WTP-G63-MGT-001) in ISMS functions for their respective lines of responsibility. All project personnel have the responsibility to perform work safely. Project line management has ultimate responsibility for ensuring that workers conduct activities safely in accordance with approved procedures.

2.2.3 ISMS Infrastructure

Requirements and standards in List B of the WTP contract form the basis for implementation of safe work processes in accordance with the ISMS five core functions and eight guiding principles.

Project ISMS Infrastructure includes:

- The project contractual requirements and standards identified in Section 2.2.1

- Corporate-level programs that prescribe business processes such as management, prioritization of activities, allocation of resources, budget, and cost management
- Specific project programs and procedures that implement safety requirements at project, facility, and activity levels

Safety is integrated throughout the WTP organizational structure by approved plans, programs, and procedures to accomplish project completion in a safe manner (Figure 2-3). Project management has set the policy for integrating safety throughout the project. WTP line management is responsible for safety (Section 2.2.2). Through this integration, WTP personnel (both direct hire and subcontractors) contribute to the safety of the worker, the public, and the environment. Institutional ISM is applied through Business Services, QA, E&NS, SA, Engineering, Construction, Acquisition Services, and Operations.

Institutional and functional activity is integrated by the functional management's work control processes, which are consistent with institutional guidance. Line management responsibility for day-to-day safety is maintained through work authorization. Work is planned using the project work breakdown structure (WBS) and with division of responsibilities defined in the organizational breakdown structure (OBS).

Project activity work authorization is determined by project status. The Manager of Engineering is the WTP project technical design authority, and oversees Design Agency responsibilities and activities. Engineering work activities are conducted in accordance with procedures as authorized by the Manager of Engineering. The Manager of Construction is responsible for authorizing construction work at the WTP construction site during the construction phase (defined as a "standard industrial hazards facility" where daily work is authorized by construction supervisory personnel). This work is performed in accordance with construction work packages (CWPs) and controls that comply with safety and health requirements in accordance with the Occupational Safety and Health Administration (OSHA). Workers participate directly in the planning and performance of work, as well as post-work reviews that generate feedback and suggestions for improvement.

During the commissioning phase, work will be authorized by the Facility Commissioning Manager. During the operations phase, the facility managers will authorize work.

2.2.4 Graded Approach Used in Meeting ISMS Requirements

The scope, depth, and rigor of the application of controls to a specific work activity are addressed by the use of a graded approach. The purpose of grading is to select controls to be applied to various work activities, taking into account the importance of these controls to safety. Grading is beneficial if a single or uniform control for a work activity does not add value or reduce risk. The grading process provides the flexibility to design and implement controls that best suit the work activity.

The extent to which an ISMS graded approach is used for a work activity is based upon the following:

- Consequence of the hazards associated with a work activity
- Likelihood of hazards associated with a work activity
- Controls provided commensurate with hazards

The extent to which safety controls apply to a work activity is based on an evaluation of the above factors as well as plans or regulatory commitments associated with the work activity. Other plans or regulatory

commitments include, but are not limited to, those associated with emergency planning, physical plant security, safeguard contingency planning, radiological controls, environmental controls, fire protection, in-service inspection, in-service testing, operator qualification and requalification, process control, and worker and offsite dose control.

The varying degrees of grading of the controls applied depend on function, complexity, consequence of failure, reliability, repeatability of results, and economic considerations. Risk is a fundamental consideration in determining to what extent controls should be applied. Risk is a quantitative or qualitative expression of possible impacts or loss (e.g., project, financial, safety) that considers both the probability of an event occurring (and causing harm or loss) and the consequences of the event.

2.3 Project Business Infrastructure Supporting the ISMS

At the company level, the ISMS starts with documents that describe the scope of work to be accomplished. The WTP scope of work is defined by the WTP contract. Work priorities are established by BNI, the contractor. Project work and commitments are formalized in project documents including Authorization Basis (AB) documents. Budgets are developed using estimates generated by line organizations. These budgets include sufficient resources to identify hazards, plan and implement mitigation strategies, and execute work safely.

2.3.1 Project Execution

The document 24590-WTP-PL-TE-01-012, *Project Execution Plan* (PEP), describes the WTP contractor's overall approach to managing the WTP project. The project is managed by a qualified staff, organized and assigned responsibilities and authorities as defined in Appendix A of the PEP. For the design phase of the project, E&NS is the lead for programmatic aspects of environmental licensing/permitting and nuclear, radiation, and process safety support; SA is the lead for occupational safety and health support, including environmental monitoring and compliance.

Budgeting for nuclear and process safety assessments, radiological safety, AB development and maintenance, environmental permitting, and licensing is the responsibility of the E&NS Manager. The SA Manager budgets for day-to-day construction site safety, health, and environmental oversight as well as occupational safety and health support to design. The SA organization also maintains the ISMS. The document 24590-WTP-PL-PROC-01-002, *Project Control Plan*, describes the project control strategies, including how each functional manager provides input into the Project Cost Baseline. The safety cost estimates are classified as a combination of level-of-effort and task-based estimates. E&NS and SA develop their respective level-of-effort staff levels by position and by grade. Scoping statements are developed to define the specific roles and responsibilities for each safety function (management, regulatory safety, safety implementation, and environmental protection). Safety managers coordinate their level-of-effort staff input with each other whenever a potential overlap of responsibility occurs, thus avoiding potential staff duplications or omissions.

Scoping statements are used to establish the basis for the task-based estimate. This portion of the environmental, safety, and health estimate is developed by determining the resource hours and other direct costs required to complete specific tasks or activities. When activities and resources have been defined, a schedule with appropriate logic and resource requirements is created. When activities have been resource-loaded in the project schedule, safety managers and Project Controls conduct reviews to determine the reasonableness of the total safety estimate of hours.

Performance incentives have been structured to ensure a strong financial motivation for the contractor to achieve DOE goals for project cost, schedule, and operational performance, which include safety requirements. The reporting system for project performance is based on the technical work, schedule, and cost profile as defined in the baseline. In addition, the project provides required accident occurrence, accident investigation, and safety reports. The contractor prepares a monthly status report and a comprehensive quarterly report that analyzes the overall status of the WTP project and key metrics.

2.3.2 Business, Budgets, and Contracts Process

The DEAR requirements cited in WTP contract Clause I-105 (48 Code of Federal Regulations [CFR] 952.223-71) require that safety functions and activities be integrated into work processes. This section of the WTP project ISMSD document describes how safety functions and activities are integrated into the WTP business process. The objective of the WTP business process is to ensure that contract requirements are translated into work, with tasks properly identified, prioritized, and funded so that the work is accomplished safely.

2.3.3 Assessment of Project Funding Requirements

DOE has approved the WTP project baseline (CE-24590-PCA00001) as documented in the WTP contract. The baseline costs include an estimate of the funding necessary to meet all compliance requirements, maintain safe conditions for WTP facilities and operations, and ensure safety of the workers, the public, and the environment. Changes to the project baseline are analyzed to address any requirements that could impact safety. Project work is performed in accordance with procedures that implement the requirements specified in the WTP contract, AB documents, DOE directives, and federal, state, and local environmental regulations and permits.

2.3.4 Prioritization of Tasks and Allocation of Resources

The project establishes and controls sufficient funding for safety activities to ensure that project work is executed safely and complies with contractual and applicable regulatory requirements.

Project tasks and allocation of resources are prioritized in the WTP project baseline. Changes to the baseline are managed and controlled through the project procedure 24590-WTP-GPP-GAB-00103, *Trend Program.*

2.3.5 Project Work Breakdown Structure

The WTP project WBS identifies DOE-funded work performed for the WTP project. It is a logical forecast of project activities that defines and displays the work to be performed in accomplishing the project objectives. The WBS is developed to satisfy the following:

- Facilitate a systematic planning process that prevents inadvertent omission of key project activities
- Divide work into manageable units
- Provide a framework for defining specific tasks within a project from which budgets and schedules can be developed

This structure displays work in logical groupings as a mechanism for managing and reporting progress against the work. Procedure 24590-WTP-GPP-GAB-00101, *Work and Organizational Breakdown Structures (WBS/OBS),* provides the process for developing and maintaining this structure.

2.3.6 Project Baseline Development

Document CE-24590-PCA00001, *Project Baseline*, was developed as a WTP contract deliverable (WTP contract, Table C.5-1.1, item 1.5). The WTP baseline consists of technical scope, schedule, and related cost estimates. The baseline provides a basis for monitoring performance and identifying changes to the project.

2.3.7 Managing Work within Funding Controls

The approved WTP project baseline is the basis for authorizing work. The work authorization process is described in the PEP.

The project tracks technical, cost, schedule, and performance of work against the approved baseline plan. Approved project control methods and tools are used to monitor performance, as described in the following project procedures:

- Procedure 24590-WTP-GPP-GAB-00108, *Funding Control,* establishes the requirements necessary to monitor and control costs and commitments by Budget and Reporting classification within the cumulative Budget Authorization limits provided with the WTP contract.
- Procedure 24590-WTP-GPP-GAB-00105, *Budgeted Cost of Work Scheduled,* establishes the process for how the budgeted cost of work scheduled is calculated and utilized in support of the monthly performance measurement process.
- Procedure 24590-WTP-GPP-GAB-00106, *Budgeted Cost of Work Performed,* provides the process for calculating the budgeted cost of work performed and for utilizing that calculation in support of the monthly performance measurement process.
- Procedure 24590-WTP-GPP-GAB-00110, *Performance Measurement,* provides the process for project controls performance measurement and reporting.

Project baseline changes are developed, approved, and controlled in accordance with procedure 24590-WTP-GPP-GAB-00108, *Funding Control,* and 24590-WTP-GPP-GAB-00103, *Trend Program.* When a prospective change that significantly impacts project cost, schedule, and/or scope is identified, a thorough change analysis is performed as early as practical to determine if the change can be mitigated or avoided.

As part of the project's lessons learned and continuous improvement processes, functional managers evaluate Project Controls performance to identify cost and schedule variances. This information is used to prepare and implement corrective actions to ensure that identified problems are corrected before they become unrecoverable.

Procedure 24590-WTP-GPP-GAV-00102, *Contract Changes and Pending Item,* defines the method used to evaluate an activity, event, condition, or situation that may have an impact, including a commercial impact, on the WTP project, but which does not yet have formal client approval. Unavoidable changes are reviewed within the Trend Program and the Prime Contract Change Process for their impact on the WTP contract. A change to the WTP scope, schedule, contract terms, or funding that is imposed by any agency not within the WTP contractor's direct control is considered a contract change. Contract changes typically are imposed by an authorized Contracting Officer in accordance with provisions of Section H.2 of the WTP contract.

WTP Special Contract Requirements H.22 (*Subcontractor Environment, Safety, Quality, and Health Requirements*) include the minimum requirement: H.22 (a) an environmental, safety, health, and quality assurance program is compliant with applicable local, state, federal and DOE regulatory requirements. Onsite work performed by a subcontractor that involves complex or hazardous work must comply with requirements in WTP contract Clause I.105, *Integration of Environment, Safety and Health into Work Planning and Execution*. This clause is added to subcontracts as part of the acquisition process. In performance of work under these subcontracts, the subcontract must satisfy all federal, state, and local statutes, regulations, ordinances, etc., regarding safety and health. In addition, the subcontractors are required to comply with, at a minimum, 24590-WTP-PL-IS-01-001, *WTP Nonradiological Worker Safety and Health Plan,* and provide a safety plan consistent with or exceeding the requirements of 24590-WTP-PL-IS-01-001. Additionally, subcontractors must submit their safety and health plan to the WTP contractor for review.

The E&NS and SA managers are responsible to develop the safety standards and requirements for all subcontracts. These standards are incorporated into the *Subcontractor Safety and Health Requirements* (Exhibit G), which are then included in the Request for Proposal and subsequent awarded contract. The subcontractor's submitted plan is reviewed by the appropriate safety manager for conformance to the requirements in Exhibit G. This plan is based on utilizing a graded approach to the work performed under the contract. In addition, safety requirements are addressed in the General Conditions of each subcontract or purchase order pro forma for noncommercial supplies and services.

2.4 ISMS Implementing Mechanisms

The project ISMS is implemented using approved procedures that provide rigor and discipline to work execution. These mechanisms ensure that appropriate safety requirements and controls are incorporated into activities at all project levels. ISMS implementing procedures establish the requirements and responsibilities for:

- Planning work (including identification of safety hazards associated with the work)
- Identification of appropriate safety controls suitable to the type of hazard and commensurate with the level of risk presented by the hazard
- Execution of work in accordance with the established safety controls
- Assessment of completed work to determine actions for continuous improvement

The following sections describe the project ISMS implementing mechanisms that address the ISMS drivers (Section 1.5). The WTP project ISMS structure is given as Figure 2-3.

2.4.1 Document Management System

The project implements its contractual environmental, safety, health, and quality assurance obligations (Contract Standard 7), regulatory standards, and business practices through a set of interrelated requirements documents (project AB and planning documents). Therefore, an integrated document management system is an essential element in implementing the project ISMS.

Three document types are illustrated in the hierarchy shown in Figure 2-1. These are:

1 Contract and regulatory drivers
2 Programmatic, management, regulatory compliance, and authorization bases

3 Implementing procedures

The document hierarchy shows that project requirements originate in the WTP contract and regulatory drivers. Programmatic, management, regulatory compliance, and technical bases documents commit the project to appropriate requirements and provide the flow-down of those requirements to implementing procedures. These three levels of documents provide the foundation for developing work processes and the defining plans and procedures used to implement design, construction, commissioning, hot commissioning, and hazardous waste processing operations of the WTP.

At the first level, applicable state and federal laws and legal requirements are incorporated in the WTP contract. These obligations require that the project maintain compliance with federal, DOE, state, and local regulations and requirements for (1) worker safety and health; (2) radiological, nuclear, and process safety; (3) QA; and (4) environmental protection.

The second level consists of project-specific (project approach and requirements) documents that integrate and define the WTP programmatic, management, regulatory compliance, and technical bases. These documents are established in coordination with DOE and, in the case of AB documents, are approved by DOE.

Table 2-1 Project Requirements Documents

Project Documents	Scope (associated section of ISMSD)
Safety Requirements Document (SRD)	The document 24590-WTP-SRD-ESH-01-001-02, *SRD Volume II,* provides the set of safety criteria and standards that, when implemented, will ensure adequate protection of the public and workers. (Section 2.4.3)
Integrated Safety Management Plan (ISMP)	The document 24590-WTP-ISMP-ESH-01-001, *Integrated Safety Management Plan,* is a road-map document that summarizes the project approach to integrated safety management of activities related to radiological, nuclear, and process safety.
Radiation Protection Program for Design and Construction (RPP)	The document 24590-WTP-RPP-ESH-01-001, *Radiation Protection Program for Design and Construction,* implements the requirements for the regulatory basis that ensures the radiological safety of facility workers, collocated workers, visitors, and the onsite members of the public. (Section 2.4.5)
Preliminary Safety Analysis Report to Support Construction Authorization (PSAR)	The PSAR identifies WTP facility hazards and accident analysis; important-to-safety structures, systems, and components; and technical safety requirements associated with radiological, nuclear, and process (chemical) safety. The PSAR also identifies project safety management requirements, commitments, and processes by which top-level principles, regulations, and standards applicable to radiological, nuclear, and process safety are to be satisfied. (Section 2.4.4)
Quality Assurance Manual (QAM)	The QA Manual QAM is structured to capture and integrate into a single cohesive QA program, the requirements that apply to the project as stated in the contract (DE-AC27-01RV14136).
Non-AB Documents	**Scope (associated section of ISMSD)**
Project Execution Plan (PEP)	The document 24590-WTP-PL-TE-01-012, PEP, is a description of BNI's overall approach to managing the WTP project. (Section 2.3.1)

Table 2-1 Project Requirements Documents

Project Documents	Scope (associated section of ISMSD)
Project Control Plan	The document 24590-WTP-PL-PROC-01-002, *Project Control Plan,* describes the specific WTP project systems and processes used to the control cost, scope, and schedule baseline. (Section 2.3.1)
Project Control System Description	The Project Control System Description (part of the PEP) provides information on how BNI produces accurate planning, budgeting, reporting, and change control data.
Non-AB Documents (continued)	**Scope (associated section of ISMSD) (continued)**
Operations Requirements Document	The document 24590-WTP-RPT-OP-01-001, *Operations Requirements Document,* identifies design requirements to ensure cost efficient operations and provide for lifecycle cost estimates, planning, and informed decision-making. (Sections 2.4.1, 4.5.3.1).
Functional Specification	The document 24590-WTP-PL-G-01-001, *Functional Specification,* reflects contract technical requirements and allocates the requirements to functional elements.
Basis of Design (BOD)	The document 24590-WTP-DB-ENG-01-0010, *Basis of Design,* defines the design requirements and design codes and standards that serve as the basis for the continued design of the WTP and for the transition from conceptual design through the completion of commissioning for turnover to a future operations contractor. (Sections 4.5.3.1, 4.5.3.6.1, and 4.6.2.3.1).
Interface Control Documents	The document 24590-WTP-PL-MG-01-001, *Interface Management Plan,* identifies baseline requirements for shared WTP, Tank Farm Contractor (TFC), DOE-ORP, and DOE Richland Operations Office (DOE-RL) responsibilities associated with WTP external interfaces.
Nonradiological Safety and Health Plan	The document 24590-WTP-PL-IS-01-001, *Nonradiological Worker Safety and Health Plan,* describes the WTP project industrial safety and health program requirements at the construction site and covers worker safety for all WTP project employees, subcontractors, and visitors at the construction site. (Section 2.4.7.3)
Environmental Permits	The procedure 24590-WTP-GPP-SENV-009, *Environmental Permits,* lists the environmental permits and approvals needed to design, construct, and operate the WTP including design features and operational controls that will be used for environmental protection.

Third-level documents include project procedures that implement requirements into work processes and products. Procedures in this level support the regulatory documents in the second level. Implementing procedures are supported, in turn, by guides, desktop instructions, and user aids provided at the discretion of responsible management for assisting and guiding performance by specific organizations.

2.4.1.1 Document Management Process

Approved project documents and procedures are in place to ensure continued compliance with contractual requirements, the DOE-approved AB, and ISMS principles. The procedure *WTP Document Administration* (24590-WTP-GPP-MGT-007) establishes the minimum requirements for review and approval of new project documents and revisions to existing documents. Some project documents

(e.g., interface control documents [ICDs]) are revised according to a separate management process (*Interface Management Plan,* 24590-WTP-PL-MG-01-001).

AB documents are reviewed, approved, and maintained in accordance with 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance.* This procedure describes the requirements, responsibilities, and administrative controls for the maintenance of the WTP AB. New facility designs or administrative controls (procedures, programs, plans, and management processes) or changes to any of these that could affect the AB documents require an evaluation. This evaluation determines that the facility, as-designed, as-constructed, and as-operated, is consistent with the technical, procedural, and analytical requirements in the AB. Inconsistencies between design and administrative controls and the AB are reconciled. The mechanism used to change the AB is the Safety Evaluation (SE)/Authorization Basis Amendment Request (ABAR).

Procedure 24590-WTP-GPP-SREG-002 implements the process for maintaining the alignment of the WTP facility design and project administrative controls with the AB. Alignment is demonstrated before issuance of drawings and other design media for acquisition and construction activities. Engineering is responsible for design change compliance with the requirements of the AB. E&NS is responsible for monitoring the AB evaluation process and products in support of construction and acquisition activities.

The WTP procedure management process is an administrative program that encompasses the development, review, approval, distribution, use, revision, and retirement of project procedures. A document management hierarchy is followed for the development and maintenance of project procedures. This system identifies and implements processes that support the ISMS, as well as incorporation of AB safety standards, design requirements, and QA requirements.

The project's procedural mechanism for implementing the ISMS objectives, core functions, and guiding principles complies with 24590-WTP-GPP-MGT-007, *WTP Document Administration.* In this procedure, responsibility is assigned to E&NS for reviewing procedures for compliance with the AB. SA is responsible for reviewing procedures for implementation of ISMS principles.

The procedure administration is an essential part of the project ISMS. It specifies the process for maintaining administrative control over procedures, design safety and quality requirements, and operating standards. These procedure management processes are developed in accordance with the core functions and guiding principles of ISMS and specify how WTP standards and requirements are implemented to accomplish work.

2.4.2 Radiological, Nuclear, and Process Safety

DOE regulatory documents for the WTP project place the responsibility of achieving adequate safety and quality compliance with applicable laws and legal requirements, and conformance to the top-level safety standards and principles on the Project Director. This responsibility is described in the following DOE OSR documents cited as applicable directives in the WTP contract, Section J, Attachment E:

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

- DOE/RL-96-0006, *Top Level Radiological, Nuclear, and Process Safety Standards and Principles for the RPP Waste Treatment Plant Contractor*

The WTP uses these regulatory model documents to establish a tailored set of radiological, nuclear, and process safety standards that DOE approves for implementation.

2.4.2.1 Authorization Basis

The WTP project radiological, nuclear, and process safety AB is established by a rigorous, formal process promulgated by several DOE documents and overseen by the DOE OSR within the DOE ORP. The AB is the composite of information provided by the WTP project in response to radiological, nuclear, and process safety requirements that are the basis on which the ORP grants permission to perform regulated activities. A DOE-approved AB is required by the contract, laws, regulations, and top-level safety requirements to conduct nuclear, radiological, and process safety related activities. Lack of compliance or non-compliance with an approved AB can lead to regulatory non-compliances, enforcement actions, and the potential for reduction in personnel safety.

The documents that provide DOE requirements and regulatory positions for the development and maintenance of the WTP project radiological, nuclear, and process safety AB include:

- DOE/RL-96-0003, *DOE Process for Radiological, Nuclear and Process Safety Regulation of the RPP Waste Treatment Plant Contractor*
- DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor*
- DOE/RL-96-0005, *Concept of the DOE Process for Radiological, Nuclear, and Process Safety Regulation of the RPP Waste Treatment Plant Contractor*
- DOE/RL-96-0006, *Top Level Radiological, Nuclear, and Process Safety Standards and Principles for the RPP Waste Treatment Plant Contractor*
- 10 CFR 830, *Nuclear Safety Management*
- 10CFR 835, *Occupational Radiation Protection*
- RL/REG-97-13, *Office of Safety Regulation Position on Contractor-initiated Changes to the Authorization Basis*
- RL/REG-98-05, *Inspection Program Description for the Regulatory Oversight for the RPP-WTP Contractor*
- RL/REG-98-06, *Corrective Action/Enforcement Action Program Description*
- RL/RE-98-14, *Regulatory Unit Position on New Safety Information and Back-fits*

The Radiological, Nuclear, and Process Safety section of the WTP project E&NS organization is the primary group for AB document development and maintenance, and is also the project interface with DOE OSR.

Development of the AB is supported by the ISM process summarized in DOE/RL-96-0004. Appendix A of Volume II of the SRD provides the implementing standard for the WTP project hazard assessment, safety analysis, and standards identification processes that implement DOE/RL-96-0004.

The ISM process is an integrated activity by E&NS, Engineering, Operations, and support organizations to identify control strategies for managing the radiological and chemical hazards associated with the WTP

processes, and to establish the safety standards and requirements applicable to the implementation of these control strategies to be applied during design. Accident scenarios and controls are described in AB documents that have DOE approval, before the project initiates activities authorized by those documents. E&NS, Engineering, Operations, QA, and Construction work in an integrated and iterative manner to ensure that regulatory and safety provisions are appropriately incorporated into the design. They confirm that safety and administrative controls are compliant with the WTP project AB documents.

A multi-discipline Process Management Team (PMT) ensures the proper execution of the ISM process in the design, construction, and commissioning stages of the WTP project. The scope, responsibilities, and process for PMT activities are described in procedure 24590-WTP-GPP-SREG-007, *Process Management Team*. PMT responsibilities include guiding implementation of the ISM process, and ensuring that the ISM teams function to identify standards appropriate for their intended purpose and that are utilized in the design.

2.4.3 Safety Requirements Document

The document 24590-WTP-SRD-ESH-01-001-02 (the SRD) is the WTP project AB document that provides the set of safety criteria and standards that, when implemented, will ensure adequate protection of the public and workers (see Table 2-1). The SRD defines the radiological, nuclear, and process safety objectives. Safety criteria developed from applicable standards are stated as safety management and design requirements. The SRD also identifies a set of implementing standards for the safety criteria ensuring the WTP is designed, constructed, operated, and decommissioned in a manner that protects the safety and health of WTP workers, the public, and the environment. These safety objectives and standards (as specified in SRD safety criteria) are included in the WTP AB (see Section 2.4.2.1) to establish a formal agreement with the regulators on required design features and management processes. Changes to the SRD are controlled by project procedures for AB maintenance. For updates to the SRD, formal DOE review, and approval is required. Incorporation into design is accomplished by passing each requirement to the Design Criteria Database (DCD) through verbatim quotes. The safety criteria and applicable standards are implemented by an approved set of engineering and management procedures that detail the process for complying with the requirements of the AB documents.

2.4.4 Preliminary Safety Analysis Report

The PSAR identifies WTP facility hazards and accident analysis; important-to-safety (ITS) structures, systems, and components (SSCs); and technical safety requirements associated with radiological, nuclear, and process (chemical) safety. The PSAR also identifies project safety management requirements, commitments, and processes by which top-level principles, regulations, and standards applicable to radiological, nuclear, and process safety are satisfied. The SSCs, codes and standards, and management processes described in the PSAR ensure adequate safety of workers and the public from radiological, nuclear, and process hazards. DOE grants authorization to perform regulated activities, such as construction and commissioning, based on the safety basis described in the PSAR.

2.4.5 Radiation Protection

The Radiation Protection Program (RPP) document 24590-WTP-RPP-ESH-01-001, *Radiation Protection Program for Design and Construction,* is a WTP project AB document that implements the requirements of 10 CFR 835, *Occupational Radiation Protection*, which provides the regulatory basis to ensure radiological safety of facility workers, co-located workers, visitors, and the onsite members of the public. For protection against exposure to ionizing radiation, the RPP supports the concept that such exposures

should be as low as reasonably achievable (ALARA). The ALARA program is in 24590-WTP-PL-NS-01-002.

The RPP document and its referenced implementing procedures detail the programmatic radiological standards, requirements, administrative controls, responsibilities, and authorities associated with the occupational radiological control for WTP design and construction activities. This AB document will be updated to reflect commissioning, operations, and deactivation. The process for changing the RPP is described in the RPP.

The RPP requires that personnel be qualified to accomplish work safely in radiological environments. The RPP is implemented by 24590-WTP-PL-NS-01-001, *Radiological Control Program*, 24590-WTP-MN-ESH-01-001, *Waste Treatment Plant Radiological Control Manual*, the project ALARA program, and an approved set of RPP procedures. The RPP covers shielding design, exposure control, management of sealed sources, and solid radioactive waste storage, packaging, and handling. In addition, criticality safety for all proposed normal and off-normal operations and credible accident conditions is analyzed in accordance with 24590-WTP-PL-ENS-03-013, *Criticality Safety Program for the WTP*. The document 24590-WTP-GPP-SRAD-003, *Management of Criticality Control,* defines the overall process for assessing and establishing criticality safety controls.

2.4.6 Risk and Reliability Analysis

The WTP E&NS Risk and Reliability group uses results from a facility-wide probabilistic risk assessment (PRA) to support development of the WTP project radiological, nuclear, and process safety AB. These results demonstrate that WTP design can meet each of the specific risk goals prescribed in DOE/RL-96-0006. Risk and reliability analyses are performed as needed to facilitate maintenance of the PRA. The PRA is updated as the design matures and operational strategies to meet requirements become better defined.

These analyses and updates ensure that the PRA is maintained valid as the design develops. Operational and maintenance requirements, as well as testing and inspection procedures developed during the performance of the preliminary PRA, are documented. These requirements are incorporated into the plant reliability, availability, maintainability, and inspectability (RAMI) program for ITS SSCs. Continued development of plant design is followed by update/enhancement of both the PRA and RAMI.

During WTP design, construction, pre-operational testing, and commissioning, explicit operational requirements for continued validity of the PRA are determined and documented in the RAMI Analysis. These requirements are formalized by inclusion in the final safety analysis report and its associated technical safety requirements as appropriate.

2.4.7 Industrial Safety and Health

The WTP industrial safety and health (IS&H) program is established to provide a safe work environment that prevents employee injury or illness from industrial hazards in the workplace, including the construction site and all the office facilities supporting design efforts. For WTP project activities, IS&H concepts are integrated into various WTP safety management processes as they apply to the identification and analysis of hazards and to determine and implement the appropriate controls for employee protection.

2.4.7.1 Industrial Safety and Health Responsibilities

SA is responsible for defining project-wide (i.e., construction site and office areas) IS&H Program requirements and interpreting these requirements. Implementation of the IS&H requirements is the responsibility of line management, supported by IS&H professionals. The SA organization is involved in the recognition, evaluation, and control of hazards or environmental factors or stresses arising in or from the workplace, which may cause injury, illness, impaired health and well being, or significant discomfort and inefficiency among workers. IS&H specialists/engineers/environmentalists and industrial hygienists work as members of a SA team using ISMS principles in the evaluation of employee work activities and work areas.

2.4.7.2 Industrial Safety and Health Standards

IS&H requirements for design and construction activities are driven by 29 CFR 1910, *Occupational Safety and Health Standards*, and 29 CFR 1926, *Safety and Health Regulations for Construction Safety*, as required by the WTP contract and ORP manual (ORP M) 440.1-2, *Industrial Safety and Health Oversight Plan.* These federal requirements are included in the project design activity through designer-safety interactions. Design documents are reviewed by SA and the ISM teams (i.e., the ISM Process teams) in accordance with 24590-WTP-GPP-MGT-007. The procedure provides checklists for review of design documents, administrative control documents, and ISMS implementation in documents. Final design approval is the responsibility of Engineering. Construction activities are monitored for OSHA compliance at the construction site by permanently assigned SA members involved in work planning and work conduct.

2.4.7.3 Construction Worker Safety and Health

The document 24590-WTP-PL-IS-01-001, *Nonradiological Worker Safety and Health Plan,* describes the WTP project IS&H program requirements at the construction site. Implementing procedures establish the baseline for compliance with applicable industrial safety codes and standards. The *Nonradiological Worker Safety and Health Plan* covers worker safety for all employees, subcontractors, and visitors (of the construction site) from the beginning of limited construction through cold startup. The requirements for worker protection conform to ORP M 440.1-2, which is not in the list of applicable directives provided as Attachment E in Section J of the WTP contract. ORP M 440.1-2 requirements are similar to those in DOE Order (DOE O) 440.1A. However, neither ORP M 440.1-2 nor DOE O 440.1A is in the list of applicable directives in the WTP contract (List B-DEAR 970.5208.78). The *Industrial Hygiene and Safety Regulatory Plan* (RL/REG-2000-04) is cited in the contract and references DOE O 440.1A.

The project management team administers and enforces the (construction) safety and health plan. In addition to normal construction management/supervisory oversight, the multidisciplinary construction site safety and health representatives perform daily observations of construction activities. Both WTP contractor craft and subcontractor employees are included in this daily observation activity that verifies compliance with the safety and health plan and implementing procedures. Unsafe acts or conditions are reported to supervision at the time of the observation. Subcontractor compliance with project safety requirements is monitored per 24590-WTP-GPP-SIND-022, *Assessment and Issue of Noncompliance for Construction Subcontractor's Safety and Health Compliance.* Subcontractors with a previous ineffective safety performance record additionally are monitored by Construction Management and SA per 24590-WTP-GPG-SIND-009, *Mitigation Plan for Assisting Subcontractors Unable to Meet DOE Safety Performance Requirements,* to ensure satisfactory safety performance. The mitigation plan is improved by periodic internal assessments of key plan elements by the SA Manager.

The prevention of incidents, accidents, and injuries for the WTP project is paramount. WTP management is committed to the "zero accident" performance philosophy. All necessary planning and actions are to be taken to establish, maintain, and monitor safe and healthy working conditions and practices, in accordance with contract requirements. These conditions and practices are accomplished by:

- Providing a basic nonradiological worker safety and health plan that assists the project and subcontractors to identify, evaluate, and control hazardous activities and conditions within their areas of responsibility
- Establishing guidelines and assigning specific responsibilities for the implementation and administration of the safety and health plan
- Establishing job site rules that apply to all individuals who enter the site
- Implementing hazard recognition and control methods to ensure that safety is incorporated into all work operations
- Encouraging employee involvement in hazard identification, analysis, and control strategy development
- Promoting employee feedback and continuous improvement
- Recognizing safe performance by workers at all levels

2.4.7.4 People-Based Safety

The IS&H Program applies a behavior-based safety approach to construction activities at the WTP. This approach is called people-based safety (PBS). The implementing mechanism is provided in 24590-WTP-GPG-SIND-004, *Behavior Based Training*. This process is one of many elements that are part of the ISMS and an important mechanism that applies the eighth guiding principle (Worker Involvement). The Manager of Construction establishes observation teams trained by SA to identify and document safe and unsafe behavior in construction activities using craft employees trained to:

- Develop a checklist of unsafe acts/at-risk behaviors likely or observed to occur onsite
- Gather data on unsafe behavior trends by conducting observations of individual workers
- Develop safe alternatives to unsafe behaviors
- Provide immediate positive "coaching and correcting" feedback to their peers to reinforce safe work behaviors

The primary objective of PBS is to observe workplace behavior and provide feedback to identify and eliminate at-risk work behaviors (practices) before an accident/incident occurs. It is a proactive, positive process disassociated from disciplinary action. The project enables employees to appreciate the risk potential involved in work practices and to pursue reduced risk alternatives. Employees' comments and concerns are reviewed by the observation teams to identify process improvements for safety enhancement. Observation data is provided to project management to evaluate and determine positive or negative trends and provide appropriate resources for action.

2.4.7.5 Office Safety

The WTP project office safety program is implemented by 24590-WTP-GPP-SIND-044, *Office Safety*, and 24590-WTP-GPP-SIND-045, *Safety Communication*. These office safety procedures offer employees and management guidance on the prevention of most of the injuries experienced by office

workers. *Safety Communication* describes several techniques used by the project to communicate safety and health issues to employees and from employees to management. These documents, in conjunction with the basic OSHA law, constitute the project's office safety program to protect employees.

2.4.7.6 DOE Oversight

RL/REG-2000-03, *Review Guidance for the River Protection Project Nonradiological Worker Safety and Health Plan*, provides to DOE the acceptance criteria for the review of the WTP project IS&H program. The DOE ORP oversight plan (ORP M 440.1-2) describes how the ORP oversees IS&H for the WTP contractor. It describes routine IS&H verification assessments, periodic IS&H program review, and reactive incident follow-up assessments. The IS&H verification assessments and the responsive IS&H incident follow-up assessments are performed in accordance with the applicable requirements of Appendix A of the Plan.

2.4.8 Quality Assurance Program Overview

The project QA program (defined by the QA manual [QAM] and associated implementing documents) directs the achievement and verification of quality. The project QA manager is responsible for the overall QA program - its development, maintenance, verification, and continuing improvement - and is the approval authority for matters pertaining to its interpretation and implementation. Line organizations are responsible for implementing and meeting the requirements of the QA program. Each individual is responsible for the quality of his or her work. Line management is ultimately responsible to see that quality is achieved.

The project QA program provides an important function in implementing the ISMS. The QA program is an integral part of all the processes by which (a) work is prioritized, (b) clear roles and responsibilities are established, (c) individuals performing work have competence commensurate with their responsibilities, (d) hazards are analyzed, (e) standards and controls are identified and applied, (f) work is performed, and (g) performance is evaluated and improved.

The project QA program establishes controls within its implementing documents that are consistent with the risks associated with the activity, and that take into account the work to be performed and the associated hazards. Effective implementation of the QA program will also provide processes and tools to support principles and functions of the Safety Management System Policy (DOE P 450.4) and related portions of the DOE Acquisition Regulation (DEAR, 48 CFR 970.5204-2).

2.4.8.1 QA Program Drivers

The WTP project QA Program complies with the elements of ASME NQA-1 and DOE/RW-0333P embodying 10 CFR 830 and DOE O 414.1B for managing, performing, and assessing the adequacy of work.

The requirements for the QA Program are derived from the following sources:

- 10 CFR 830, Subpart A, Quality Assurance Requirements
- DOE Order 414.1B, Quality Assurance
- American National Standard, ASME NQA-1-1989 (NQA-1), Quality Assurance Program Requirements for Nuclear Facilities

- Office of Civilian Radioactive Waste Management, DOE/RW-0333P (Rev. 13), Quality Assurance Requirements and Description (QARD)
- ASME NQA-2a-1990, *Quality Assurance Requirements for Nuclear Facility Applications*, Subpart 2.7, *Quality Assurance Requirements of Computer Software for Nuclear Facility Applications*

2.4.8.2 Quality Assurance Manual

The QAM is structured to capture and integrate into a single cohesive QA program, the requirements that apply to the project as stated in the contract (DE-AC27-01RV14136). The QAM policies, as appropriate, contain purpose and applicability statements, implementation strategy, discrete requirements or policy, and responsibilities of management and personnel for effective implementation of requirements.

Requirements of this manual are to be contained/implemented in project procedures. These procedures can be supplemented by other lower-tier instructions and other implementing documents, where applicable, to provide the detail necessary for proper flowdown and implementation of QA requirements. The QA program documentation constitutes a significant portion of the project's ISMS, which ensures that work is performed safely and in compliance with requirements.

The policies in the QAM cover applicable requirements from the referenced sources. The requirements are derived through consensus, as specified in documents, or project-imposed. Consensus requirements serve as baseline requirements for the project. A baseline requirement represents a single requirement interpreted to meet the intent of individual requirements identified from the source. Specific requirements have only a narrow scope of application and are not applied across the project. Project-imposed requirements are those that reflect good management practice.

Requirements of the QAM are implemented by approved procedures. The QA program documentation constitutes a significant portion of the project's ISMS, which ensures that work is performed safely and in compliance with procedures. Implementing documents are found in 24590-WTP-QPD-QA-01-001, *Quality Assurance Provisions Document.*

This compilation of requirements allows the development of one QA program composed of the QAM policies and the necessary implementing procedures. The concept of developing a single QA program simplifies compliance by simultaneously satisfying requirements from multiple requirements sources. This concept allows implementing procedures to be developed from the QA policies rather than referring to the individual source requirements.

2.4.8.3 QA Program Relationship to the Integrated Safety Management System

Effective implementation of the QA requirements provides the processes and tools to support principles and functions of the DOE P 450.4, *Safety Management System Policy,* and related portions of DEAR 48 CFR 970.5223-1. DOE P 450.4 expresses a fundamental expectation that all work be performed safely. Project management's basic QA expectation is that all work meets requirements of approved procedures. In this manner, management ensures compliance with the approved standards set, so that the expectation for safe work within controls is met. This also ensures that workers, the environment, and the public are adequately protected from harm. The project's quality and safety requirements share a management system's approach to achieving objectives. Therefore, compliance to approved procedures satisfies both quality and safety requirements.

Shared attributes of Quality and Safety Management Systems include:

- Expectations for implementation (DEAR 970.5204-2 (c))
- Line management responsibility (ISMS Guiding Principle 1)
- Clear roles and responsibilities (ISMS Guiding Principle 2)
- Competence and qualifications (ISMS Guiding Principle 3)
- Balanced priorities (resources) (ISMS Guiding Principle 4)
- Standards and controls for work (ISMS Guiding Principle 5 and Core Function 4)
- Feedback and improvement (ISMS Core Function 5)
- Graded and tailored controls (ISMS Guiding Principle 6)
- Documentation of the Management System (ISMS Guiding Principle 7)

2.4.9 Configuration Management

Configuration management (CM) is a fundamental principle to achieve safety (Section 4.1.5, DOE/RL-96-0006). The WTP project CM program defined in 24590-WTP-PL-MG-01-002, *WTP Configuration Management Plan* (CM Plan), is based on ISO 10007:1995(E), *Quality Management - Guidelines for Configuration Management*, an international consensus standard identified in the SRD, Appendix C Section 1.0. ISO 1007:1995(E) is tailored for specific application to the project. The CM Plan applies to the design, procurement, construction, and commissioning phases of the project. CM is applied throughout the project's lifetime to ensure that programmatic objectives related to radiological, nuclear, and process safety are fully achieved.

The WTP Project Director has assigned overall responsibility for the CM Program and approval authority for the WTP CM Plan to the Manager of Engineering. Development and implementation of the CM program is achieved through a CM organization including the Engineering Processes Manager, Systems Engineering Manager, and the CM Manager, who implement and follow procedure 24590-WTP-3DP-G04B-00005, *Configuration Management.* Engineering defines (and approves changes to) the document 24590-WTP-RPT-ENG-01-001, *Technical Baseline Description.*

The CM Plan establishes policies, guidelines, and responsibilities to ensure that:

- The engineered configuration of the project is controlled to make sure it meets applicable design, performance, and acceptance requirements
- Approved configuration changes are assessed for their impact on performance and safety
- The configuration status of the technical baseline is maintained

To achieve these objectives, the CM Plan defines a CM process that involves:

- Identification
- Configuration change
- Status tracking and reporting
- Configuration audit (ISMP, Section 1.3.16)

The CM process applies project wide.

Line managers implement CM through approved procedures for their respective areas of responsibility. Configuration management ensures that WTP project SSCs, interfaces, and plant-installed software are designed, constructed, tested, commissioned, operated, and maintained in accordance with the AB, applicable design criteria and regulations, and CM policy. The E&NS Manager and QA Manager review implementing project procedures before approval to ensure adequate safety and quality is maintained. These implementing procedures define individual position responsibilities in a step-by-step process.

Organizations that manage or interface with subcontractors or suppliers of items, activities, or services involving configured items flow-down applicable requirements to ensure that CM is adequately maintained. Subcontractors and suppliers are subject to surveillance and audit to ensure compliance with AB documents and environmental permits.

2.4.10 Personnel Qualification and Training

Personnel qualification and training are essential to ensure quality performance and to protect workers and the environment. The Project Director has responsibility for maintaining a qualified workforce for the project. Line management is responsible for the content and effectiveness of the training and qualification processes. A facility training manager is designated and assigned responsibility for developing and implementing facility training programs that do not create undue risk to employees, the facility, the public, and the environment and that conform to the document 24590-WTP-PL-TR-01-002, *Training and Qualification Plan*.

The project department manager, with Human Resources' assistance, develops a position description for each position supervised. Employees or job candidates being considered for positions are evaluated based on education and experience against the established minimum requirements to verify that they meet or exceed requirements. The Human Resources staffing organization collects candidate resumes, employment applications, and posting forms and provides verified information to the hiring manager for new employees. The hiring manager compares education and experience of the candidates with the position description requirements to verify that the candidate meets the requirements or that exceptions are justified in writing. Once the position is filled, the hiring manager sends the documents to the training organization in accordance with project training procedures.

The training and qualification program describes the process for:

- Identifying training requirements
- Designing and delivering training
- Training responsibility
- Training evaluation, qualification, and records

The training and qualification of personnel is structured to meet the performance needs of the project. This process is assessed to ensure personnel are trained and qualified to perform their jobs in each phase of the project. The project training and qualification program ensures that the ISMS guiding principle, "Competence Commensurate with Responsibility," is maintained for all employees.

2.4.10.1 Developing Employee Training Requirements

Each line organization is responsible for training and qualification of their personnel. The project training and qualification programs are developed and implemented in accordance with procedures 24590-WTP-

GPP-CTRG-002, *Training* and 24590-WTP-GPP-CON-1301, *Construction Training* . Training profiles are created to allow personnel and management to specify and track the completion of required employee-specific training and qualification. The objective of these procedures is to provide process requirements to ensure that employees have competence commensurate with their responsibilities. They specify requirements for identification and completion of personnel indoctrination and training necessary for performing job functions.

Figure 2-4 depicts the structure and development of the employee training profile. The figure denotes the hierarchy of training that achieves job performance by showing the factors (training requirements and background qualification) that assist the managers in identifying training requirements for specific positions/work assignments. The hazards and the risks associated with the activity that an employee performs are important inputs to the employee's training profile. Managers consider these factors to establish training profiles that define what training is required to ensure personnel are appropriately trained and qualified to perform their work activities safely.

Organizational interfaces with the training organization are also addressed in the project procedures. *Training* describes the process to place non-construction employees completing initial training requirements on the List of Qualified Individuals. *Training* applies to most employees, except for Construction employees trained per *Construction Training*. *Construction Training* describes the orientation training for construction (manual craft, non-manual employees including staff augmentation, subcontract personnel, and construction site visitors) and addresses the process to identify, record, and track training needs for construction personnel. Several construction managers also are trained according to the *Training* procedure.

2.4.10.2 Continuing Training

Continuing training is established to maintain and enhance the knowledge and skills of personnel commensurate with specific position needs. Continuing training includes, at a minimum, training in significant applicable procedure changes, applicable industry operating experience and lessons learned, and training as needed to correct identified performance problems.

2.4.11 Design Process

The control of the WTP project design process is described in the PEP, 24590-WTP-PL-TE-01-012. The Manager of Engineering is the WTP project Design Authority. The Design Authority is responsible for design control and ultimate technical adequacy of the design. Engineering also executes Design Agency responsibilities and activities. The engineering activities are governed by the engineering design procedure system, which is based on proven Bechtel corporate engineering principles and processes.

The document 24590-WTP-PL-ENG-01-004, *Design Process Plan and Description,* and implementing procedures describe the WTP project engineering design process and the required interfaces for developing an efficient, effective design within the constraints of the WTP. This includes considerations to ensure the safety of project workers, co-located workers, and the public. The design process ensures the design and construction of the WTP such that it can be operated in a manner that protects the workers, the health and safety of the public, and the environment. The design process plan describes the organization structure and the roles and responsibilities and lines of authority for engineering. These include ensuring that the staff has the required experience, knowledge, skills, and training, and that the design incorporates considerations for safety and environmental protection. The design process is controlled to ensure design requirements are properly implemented. Major design processes and

procedures address work planning and control, design activities, CM, change control, procurement, construction, commissioning support, and integration processes.

2.4.11.1 Engineering Work Control Process

The work control process for planning and control of engineering design activities is described in the procedure 24590-WTP-3DP-G03B-00010, *Engineering Planning and Control*. Each Engineering discipline manager develops a detailed work scope defining required engineering activities, deliverables, and tasks. The Manager of Engineering, together with the discipline managers, prepares the staffing plans and schedules, including interrelationship logic for performance of the engineering work. The engineering schedule is integrated with the construction schedule. The discipline managers are responsible to ensure that the respective discipline produces the required deliverables to specified standards, within budget and on schedule. A more thorough discussion of engineering work planning and control is in Section 4.5.

2.4.11.2 Design Criteria Management

Procedure 24590-WTP-3DP-G04B-00001, *Design Criteria*, defines requirements for identifying, selecting, controlling, and documenting design criteria used as design input. Design engineers obtain process and safety criteria from two databases maintained by the WTP project (24590-WTP-3DP-G04B-00001) to identify applicable design criteria, the DCD, and the Standards Identification Process Database (SIPD).

2.4.11.3 Design Criteria Database

The DCD collects verbatim statements of design criteria from selected source documents into one database. Requirements for identifying, selecting, and documenting design criteria from source documents are identified by procedure (see 24590-WTP-3DP-G04B-00001, *Design Criteria*). Selected documents include the WTP contract; AB documents that describe safety and administrative control requirements for the design, construction, operation, maintenance, and deactivation of the WTP; the BOD; environmental permits; and ICDs.

Changes to source documents are reviewed and approved in accordance with 24590-WTP-GPP-MGT-007 except for AB documents (Section 2.4.2.1) and the WTP contract, which is controlled by contract modifications. The Operations organization reviews both the original and changes to 24590-WTP-PL-G-01-001, *Functional Specification,* and 24590-WTP-RPT-OP-01-001, *Operations Requirements Document*, and Engineering reviews the other source documents to identify design criteria to include in the DCD.

2.4.11.4 Standards Identification Process Database

The SIPD records and tracks information generated by the ISM process that culminates in identification of a set of design standards selected to ensure that the design meets applicable safety criteria. Design engineers identify explicit safety design requirements from the SIPD in accordance with 24590-WTP-GPP-SANA-003, *Standards Identification Process Database*. The information is used as a basis for assessing changes to the design for impact on the safety case, as well as to demonstrate that the design meets safety requirements. Safety engineers review changes to existing safety requirements and modify or update the database.

2.4.11.5 Engineering Design Configuration Management

The engineering CM process involves four essential activities: identification and documentation, change control, status tracking and reporting, and configuration audit. These activities are discussed relative to engineering design in Section 4.5.4.

2.4.11.5.1 Identification and Documentation

Engineering procedure 24590-WTP-3DP-G03B-00044, *Standard Component Numbering,* establishes the engineering standards for component numbering of equipment and bulk materials that make up the design.

- Procedure 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*, defines the documents that comprise the AB.
- Configured interfaces are identified in ICDs (e.g., 24590-WTP-ICD-MG-01-001, *Interface Control Document for Raw Water*).
- Plant installed software, when installed, tested, and approved for use, will be identified in 24590-WTP-RPT-IT-03-001, *Approved Project IT Software Baseline Report.*

Configuration documents for SSCs and plant installed software; the ICDs; and the AB documents are assigned unique document numbers in accordance with 24590-WTP-GPP-PADC-001, *WTP Document Numbering. Technical Baseline* identifies the configuration documents issued for procurement and construction, as well as specific source requirement documents.

2.4.11.5.2 Change Control

Changes to preliminary and final engineering design documents are processed in accordance with 24590-WTP-3DP-G04T-00901, *Design Change Control.* The change identification, evaluation, approval, and implementation process is graded based on whether the document is preliminary or final and on the type of change, i.e., whether the change impacts the AB, safety, environmental, schedule scope, or cost.

2.4.11.5.3 Status Tracking and Reporting

The technical baseline described in engineering documents is prepared to provide a formally declared set of approved and compatible documents that define the characteristics of the WTP project as required by the CM Plan.

This technical baseline is reviewed at least annually and revised when appropriate to reflect the changing status of the project. Changes to the technical baseline documents will be in accordance with the CM Plan and appropriate procedures. CM for the technical baseline is in accordance with the CM Plan, and applies to the physical and functional characteristics described in the documents.

Procedures and AB documents are reviewed, revised, approved, and tracked. The design is reviewed against criteria and requirements in the DCD, and changes are controlled by the change control process (Section 2.4.11.3).

2.4.11.5.4 Configuration Audit

Each revision of the Engineering Design Technical Baseline goes through the document review process, and periodic audits of procedures and programmatic processes are performed according to the QAM.

Configuration audits (which include examination of review, inspection, and test records to determine that a configured item conforms to its configuration documents) are performed as required to verify conformance of the product with its approved configuration baseline documents (see 24590-WTP-PL-MG-01-002, Section 8). The CM Plan includes physical configuration audit(s) based on customer requirements; other configuration audits may be conducted as required by the CM Plan. Project QA will be a part of the audit team.

2.4.12 Construction Process

The control of the WTP project construction management process is described in *Site Organization* (24590-WTP-GPP-CON-1101). Construction management relies on a series of specific construction procedures and guides to define the approach that the construction department employs for conducting the construction activities.

Construction work is performed in accordance with BNI methods and practices developed on similar large, closely regulated nuclear facilities. Project construction practices, procedures, and guides are based on BNI documents to perform "safe work, in accordance with requirements, on time, and within budget." Work is based on identified work scope and packaged with the requirements to perform the work in accordance with the contract, design, and regulatory requirements.

Construction work with clearly identified work scope and moderate technical complexity is completed through an appropriate mix of firm fixed-price, performance-based incentive, and small business subcontracts including small disadvantaged business construction subcontracts. Where work scopes are potentially subject to changes, or the technical complexity challenges the available subcontracting resources, the work is accomplished by BNI force account (direct-hire) craft resources under direct BNI supervision. All subcontracted and force account construction supervision and crafts receive general site orientation and task-specific (including safety) training before performing work.

Construction work control is provided through the CWP process, which implements the ISMS guiding principles and core functions.

2.4.12.1 Construction Work Control Process

The work process flow for construction activities at the construction site includes the following:

- *Define the scope of work* - The construction work scope is defined as part of the planning and scheduling process, generally at a level 5 schedule detail. Project Controls, Field Engineering, and craft supervision define the anticipated work that will be included in the scheduling period. Each CWP clearly defines a concise scope of work. The responsible field engineer (RFE), working with the responsible superintendent (RS), defines this specific scope. Generally, the CWP encompasses a specific work operation (e.g., piping installation, concrete work, electrical work) and necessary support activities (e.g., grouting of a pipe support, rebar placement, cable pull).
- *Identify applicable administrative controls for commodity installation* - The RFE identifies the necessary controlling documents and requirements design documents required to execute the work.

This design documentation includes design drawings, specifications, procedures, vendor data, material requirements, plans, and permits. In performing this review, the RS, in coordination with the RFE, performs a final check of constructability to ensure that what has been designed can be safely and efficiently built. Any discrepancies are fed back to engineering in accordance with the appropriate change notice documentation (e.g., field change request, field change notice).

The RFE ensures that a list of the design documentation required to perform the work scope is assembled. This list may reside in different forms depending upon the specific discipline and the automation tool utilized. It may exist as a CWP index sheet listing all the applicable documents, a TEAMWorks report listing items "ready to work," or the actual installation cards (e.g., TEAMWorks, SetRoute). The format of the list varies and is not a mandatory requirement. During the planning period a "first cut" is taken by the RS, RFE, and SA representative to assess the hazards associated with the specific scope of work. Job hazard analyses (JHAs) are initiated in accordance with procedure 24590-WTP-GPP-SIND-002, *Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT).*

- *Schedule the work* - The RFE and RS provide ongoing input to Project Controls as to the current and forecast status of various work activities. They ensure that the work activity planned is properly identified in the "4 week look-ahead" schedule.
- *Preparation checks to ensure the work will be ready to perform* - Approximately 1 to 2 weeks before the scheduled work activity, the RFE will review the documentation prepared during the "identify stage." The RFE specifically checks on material availability, design changes, changing conditions that would affect safety, and other changes that would impact installation. The RFE generates Material Withdrawal Request forms if the work scope requires permanent plant materials to be issued from the warehouse.
- *Perform the work* - When the CWP is ready to be worked, the material is available, and the work is ready to be performed, the craft supervisor conducts a pre-job (e.g., STARRT) briefing. In this briefing, the work scope for the task to be performed will be discussed and the hazards analyzed, and the controls to mitigate those hazards confirmed to be available and in place. Any applicable JHA that has been developed for the type of work to be performed will also be addressed. Employee issues related to the safety of performing the scope of work will be addressed and recorded on the daily STARRT briefing card and fed back to SA. During performance of the work, the following activities are involved with following and controlling the fieldwork being performed. These activities are performed on a frequent/daily basis.
  - *Supervise work performed* - Craft supervision (CS) supervises the work performed by the crafts. The RFE ensures that the materials, components, and equipment provided to CS are correct and are installed in accordance with the design documentation. CS requests inspections as defined in the inspection documents. CS also ensures that any special training requirements or certifications for workers are current.
  - *Perform Inspections* - The RFE, quality control (QC) engineer, or other authorized inspector (e.g., independent secondary containment inspector) will perform inspections as and when required by the CWP documentation.
  - *Track Quantities Installed* - The RFE tracks installed quantities, which are entered into the applicable quantity tracking database (e.g., SetRoute, TEAMWorks, QRS). Percentages complete and quantity tracking are defined in 24590-WTP-GPG-CON-8401, *Quantity Reporting.*
  - *Resolve Issues* - Any technical issues or discrepancies, such as interferences beyond allowed tolerances, routing problems, or material deficiencies, are reported to the RFE for resolution. The RFE submits the appropriate documentation to resolve issues in accordance with the applicable procedure and advise the RS of the resolution.

- *Work Scope Complete* - Upon completion of the CWP all documentation is processed in accordance with its governing procedures.
- *Review Completed Inspection Records* - The RFE and QC engineer (for "Quality level records") review the completed inspection records, special instructions, permits, and datasheets to ensure the work has been performed correctly and that the required quality records have been completed. Upon determination that the inspection records are complete, the RFE and/or QC engineer submit them to Project Document Control (PDC).

2.4.13 Environmental Protection

The documents 24590-WTP-G63-MGT-002, *WTP Environmental Policy*; 24590-WTP-PL-ENV-01-004, *Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan* (WTP Environmental Plan); and 24590-WTP-PL-ENV-01-005, *WTP Construction Environmental Control Plan* (CECP) identify the WTP project's environmental policy and the programmatic approaches to environmental management. The environmental protection program is implemented through environmental planning, requirements integration, environmental risk assessment, and corrective action programs. Implementation is achieved by using the principles of ISMS in integrating pollution prevention, environmental protection practices, and environmental regulatory requirements into planning and the performance of WTP project work.

The WTP Environmental Plan and the CECP identify the strategies and processes that the WTP project implements to comply with the applicable environmental regulations. These processes include planned environmental permitting and compliance activities and environmental monitoring, record keeping, and reporting.

The construction and commissioning of the WTP facilities require compliance with a number of environmental laws and regulations. The key regulatory drivers include:

- *Resource Conservation and Recovery Act of 1976*
- *Clean Air Act of 1970*
- *Clean Water Act of 1977*
- *Emergency Planning and Community Right-to-Know Act* (EPCRA)
- *Atomic Energy Act of 1954*
- State of Washington *Hazardous Waste Management Act* (HWMA)
- *Toxic Substances Control Act* (TSCA)
- *National Environmental Policy Act* (NEPA)
- *State Environmental Policy Act* (SEPA)

2.4.13.1 Environmental Policy

The WTP project is committed to a high level of environmental care and stewardship. The WTP project's environmental policy emphasizes the significance of environment protection and public health as a primary consideration in WTP project activities. It also identifies how the WTP project strives to minimize impacts on the air, water, land, and cultural resources by meeting the requirements of this policy.

WTP management is responsible for implementing project activities so that they are carried out in a manner that limits risk to the environment and protects public health. WTP management identifies opportunities to improve environmental management by implementing ISMS practices, encourages employee participation in hazard identification and analysis, and promotes employee feedback and continuous improvement.

Employees have the responsibility to integrate environmental considerations into their daily work and perform that work in a manner consistent with the *WTP Environmental Policy* and in compliance with environmental regulatory, permit, and procedural requirements. Employees also promptly report environmental hazards and issues as they are observed. Employees are encouraged to exchange and share environmental best practices to facilitate continuous improvement.

2.4.13.2 Environmental Plan

The document 24590-WTP-PL-ENV-01-004, *Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan*, describes the WTP project's strategy for complying with environmental regulations, including planned environmental permitting and compliance activities, environmental monitoring, recordkeeping, reporting, and a permitting and compliance schedule.

To comply with the RCRA and the HWMA regulations, a Dangerous Waste Permit Application for the storage and treatment of Hanford tank waste was submitted to the Washington State Department of Ecology (Ecology). Since some of the Hanford tank waste contains polychlorinated biphenyls, a TSCA permit application was submitted to the US Environmental Protection Agency (EPA). In addition to the respective permit requirements, procedural requirements for the management of hazardous waste are implemented through the following procedures: 24590-WTP-GPP-SENV-008, *Pollution Prevention/Waste Minimization;* 24590-WTP-GPP-SENV-005, *Waste Designation;* 24590-WTP-GPP-SENV-006, *Packaging Nonradioactive Dangerous Waste and Material for Recycle*; and 24590-WTP-GPP-SENV-007, *Dangerous Waste Accumulation and Handling.*

Compliance with the *Clean Air Act of 1970* (CAA) regulations will be administered through a combination of air permits, approvals, and licenses. A prevention of significant deterioration permit application addressing the criteria pollutants (e.g., particulates) and a toxic air pollutants notice of construction (NOC) permit application were submitted to Ecology. Radioactive air emissions are addressed in a radioactive air emissions license NOC application and a National Emission Standards for Hazardous Air Pollutants (NESHAPs) permit application that were submitted to the Washington State Department of Health and EPA, respectively. The WTP project air requirements are implemented through the DCD, code compliance matrices, and two procedures; 24590-WTP-GPP-SIND-013 and -014 are currently used for compliance with CAA regulations. Additionally, task specific procedures will be developed for further compliance as needed as construction proceeds into commissioning and then to operations.

WTP project construction and commissioning activities have the potential to generate regulated soil column discharges. These discharges will be covered under three existing Hanford Site water discharge permits issued by Ecology. The procedure 24590-WTP-GPP-SENV-001, *Water Quality Program,* has been developed to ensure that the WTP project complies with permit conditions and the site-wide *Pollution Prevention and Best Management Practices Plan for State Discharge Permits ST 4508, ST 4509, and ST-4510* (DOE/RL-97-67).

Compliance with EPCRA is achieved by implementing procurement initiatives minimizing waste generation, managing the chemicals safely, maintaining an up-to-date inventory, and submitting the

required reports in a timely manner. The WTP project is developing an EPCRA program that meets Sections 304, 311, 312, and 313 of EPCRA.

Per the WTP contract, the WTP project is also responsible for providing technical information and support to DOE for NEPA/SEPA compliance on proposed WTP project activities. This obligation is met by reviewing NEPA/SEPA determinations and project baseline changes to identify potential NEPA/SEPA issues related to proposed WTP activities.

2.4.13.3 Construction Environmental Control Plan

The CECP is a tool for implementing a comprehensive environmental compliance program during the construction of the WTP. The CECP defines project environmental compliance requirements and responsibilities; provides guidance for field implementation and environmental controls; and ensures compliance with all federal, state, and local laws, regulations, and permit requirements. This plan fully supports the project commitment to constructing the facility with minimal impact to the environment and to fully comply with all applicable environmental laws and regulations while protecting human health. Refer to Section 5.5.3 for a more detailed discussion on the CECP.

2.4.13.4 Environmental Permit Requirements

The procedure 24590-WTP-GPP-SENV-009, *Environmental Permits*, lists the environmental permits and approvals needed to design, construct, and operate the WTP. The environmental permits identify design features (e.g., containment systems, monitoring equipment, automatic shut-off equipment) and operational controls that will be used for environmental protection. Many of these permits were introduced in the Environmental Plan Section 2.4.13, Environmental Protection. Section 4.5.3 of this document describes how design criteria and requirements are identified and incorporated into design documentation. Additional permits and approvals for construction activities are discussed in Section 5.5.3.

2.4.13.5 Environmental Compliance Performance Measures

Performance measures for environmental compliance are integrated with WTP project safety performance objectives, performance measures, and commitments. Refer to Section 2.4.22 for additional information on WTP project performance measures and the implementation of the measurement process. Examples of environmental performance indicators that can be measured include:

- Releases of radionuclides, hazardous substances, or regulated pollutants that are reportable to the federal, state, or local agencies
- Performance of environmental assessments to ensure work activities are conducted in accordance with project ISMS requirements and to maintain compliance with applicable federal, state, and local statutes and regulations
- Number of environmental deficiencies and regulatory noncompliances
- Trending environmental issues
- Effectiveness of corrective actions taken to ensure objectives are accomplished and remain in place over time
- Timeliness in resolving environmental issues

2.4.14 Fire Protection

The WTP Project Fire Protection Program for construction is implemented by procedure 24590-WTP-GPP-SIND-026, *Housekeeping and Fire Prevention* . The Fire Protection Program focuses on recognizing, evaluating, preventing, and controlling fire hazards in the work place, minimizing fire losses, and ensuring life safety. In accordance with the SRD, the Fire Protection Program complies with:

- NFPA 801, *Standard for Facilities Handling Radioactive Materials*
- *Implementation Guide for Use with DOE Orders 420.1 and 420.1A Facility Safety*
- *DOE-STD-1066-97, Fire Protection Design Criteria*

The E&NS Radiological and Fire Safety Group is responsible for establishing and implementing the WTP Project Fire Protection Program. This group performs the fire hazard analyses to confirm adequate fire protection from a radiological, nuclear, and process safety perspective and to support the accident analyses in the AB documents.

The DOE OSR is the Authority Having Jurisdiction for the WTP project. The Hanford Fire Marshall's office has an agreement to work in parallel with the OSR and the WTP project when the Hanford Fire Marshall has a direct interface with the WTP project design or activities.

2.4.15 Emergency Preparedness

The project implements and maintains the procedure 24590-WTP-GPP-SIND-019, *Emergency Management Program*, to respond promptly, efficiently, and effectively to emergencies involving WTP activities or operations at the construction site. The applicable requirements of federal, state, and local agencies are integrated into a single comprehensive program. The magnitude and scope of the emergency management program will be determined by the results of the final Emergency Planning Hazards Assessment of the potential hazards and consequences associated with the project, when it begins hazardous waste processing operations.

2.4.15.1 Emergency Preparedness for Construction

The document 24590-WTP-GPP-SIND-019, *Emergency Management Program* (EMP), establishes responsibilities for maintaining an emergency preparedness program. This program and the Emergency Action Plan (EAP) ensure that a coordinated emergency response organization is capable of responding to and mitigating emergencies.

An EAP was developed and implemented to support the Limited Construction Authorization Request (LCAR) and subsequent activities during the construction phase of the project. The plan, described in 24590-WTP-GPP-SIND-003, *Emergency Action Plan*, identifies actions necessary to respond to both abnormal construction and site emergency conditions. The EAP provides guidance and instructions for initiating project responses to site emergencies and serves as a basis for training personnel to respond to site physical upsets or emergencies. The EAP, in conjunction with DOE/RL-94-02, complies with the emergency planning requirements established by the Washington Administrative Code 173-303-350, *Contingency Plan and Emergency Procedures*, for implementation during an unplanned spill, release, fire, explosion, or natural phenomenon. Additional emergency management elements (preparedness and planning) applicable to the WTP construction project are maintained in a separate, emergency management program document. The emergency management program document incorporates the elements necessary to ensure a fully compliant program.

2.4.15.2 Emergency Management Program for Operations

A WTP Emergency Response Plan, describing the provisions for responses to operational emergencies, will be developed to document the EMPs used during WTP hot commissioning and hazardous waste processing operations. All aspects of the project EMP as required by DOE and applicable federal, state, and local government requirements will be addressed. The EMP, an element of an integrated and comprehensive DOE Emergency Management System (EMS), will be designed to address emergency planning, preparedness, response, recovery, and readiness assurance activities.

The DOE EMS considers emergency conditions that might place individuals at risk, including radiological and nonradiological hazards. In addition, the relationships of the EMP to existing DOE Headquarters, ORP, and Richland Operations Office, and Hanford Site Contractors programs are to be documented in the EAP. Critical interfaces and the division of responsibility among these agencies will be discussed in the Emergency Response Plan. The elements of the Emergency Response Plan will be designed to ensure that the project, as part of the overall DOE EMS, is prepared to promptly, efficiently, and effectively respond to emergencies in order to protect the public and workers.

Emergency drills and exercises are to be performed to evaluate the adequacy of the Emergency Response Plan and WTP staff response to abnormal/emergency conditions. The drill and exercise program will include coordination with Hanford Site, state, and local emergency response organizations. The project will participate in Hanford Site exercises and drills for other facilities as applicable to the WTP project.

2.4.16 Safeguards and Security

The document 24590-WTP-PL-CN-01-001, *WTP Construction Security Program Plan,* specifies program requirements in the areas of management, protection program operations, and personnel security. The plan addresses security elements, measures, and related functions that apply to the WTP construction site and other designated areas identified on the Hanford Site directly supporting WTP construction activities. It defines the security measures for access controls, property protection, and other security elements including personnel security badge processing for access onto the Hanford Site and the WTP construction site. During the construction phase of the project, no special nuclear material or classified information will be within the boundaries of the WTP project site.

2.4.17 Human Factors

The Human Factors discipline is concerned with the systematic application of what is known about human behavior and capabilities, and using this information during the development of a product, facility, process, or system. Historically, many industries have spent considerable effort in back-fitting good human factors into existing plant designs. For the WTP, human factors considerations are applied as a part of the design process and during the design review process. The primary purpose for applying human factors considerations throughout development of a process plant is to reduce potential for human error. Some areas to be considered in reducing human error can include:

- Eliminating error-likely operations by automating functions.
- Improving human engineering of equipment, tools, instructions, procedures, the work environment, or the organizational structure.
- Improving the monitoring of operations to eliminate some of the consequences of errors, even if errors cannot be reduced.

- Improving the feedback of information about errors and their consequences to increase sensitivity to error generating work habits.
- Providing added incentives for error-free performance.
- Improving personnel selection and classification.
- Increasing and/or improving training.

24590-WTP-PL-G-03-002, *Human Factors Program Implementation Plan for Design and Commissioning*, is a roadmap document that describes the approach for applying the fundamentals of human factors engineering to the WTP design.

2.4.17.1 Human Factors in Design

In the design of the WTP, attention is paid in interface between the operating personnel and the facility to ensure that good human factors and ergonomics practices are followed. This ensures that the facility is user-friendly to minimize errors and that the operator is in the best possible position to respond to those situations in which human response is beneficial or required.

Human factors reviews are conducted for training; operator capabilities; and the design of safety class and safety significant SSCs and functions that are judged critical to facility performance and have a high potential for human error. Human factors engineering is coupled to the design process using the ISM process, as implemented by procedure 24590-WTP-GPP-SANA-002, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*. Human factors are also considered during the review of the design.

In the context of plant design improvement and optimization, the management of human factors engineering activities for the WTP facilities has three objectives:

1 Improve the design of man-machine interfaces
2 Incorporate human factor considerations into the overall WTP facilities design process
3 Apply human factors considerations to the development of procedures and training for commissioning and operations personnel.

2.4.18 Employee Concerns Program

The Employee Concerns Program (ECP) provides a process to ensure appropriate attention and response is available to address concerns raised by employees. These concerns may be related to safety, health, security, quality, environmental protection, and business ethics (including fraud, waste, abuse, or mismanagement), physical working conditions, reprisal, intimidation, or harassment. The ECP, which is available to each employee of the WTP project or its subcontractors, is not used to replace or augment collective bargaining processes for represented employees.

Under the ECP, concerned individuals may report concerns to DOE or any agency regardless of the nature of the issues raised. WTP encourages the concerned individual to first seek resolution with first-line management or use established concern or complaint resolution systems. The ECP is intended to supplement, not replace, existing processes designed to address concerns and resolve disputes. The procedure for this program is 24590-WTP-GPP-MGT-005, *Employee Concerns Program.*

2.4.19 Constructability and Operability Program

The Constructability and Operability program is composed of two main parts: Construction and Operation Coordination, and the Constructability Suggestion Program. The goal of the Constructability and Operability Program is to improve safety and to guide design and procurement activities that result in efficient Construction and Operations activities. This should result in lower total installed and operations costs (TI&OC) for the WTP. This goal is achieved by identification and implementation of such opportunities in a timely manner.

The Constructability Suggestion Program is available to all project personnel and is a subset of the overall TI&OC program. It enables project personnel to submit ideas for safety, cost, and schedule performance enhancement. The program administrators evaluate these ideas and provide feedback to the originator.

2.4.20 Project Administrative Services

The Project Administrative Services (PAS) organization supports the WTP ISMS through a comprehensive program that includes document control, correspondence control, records management, and forms control. PAS support is procedurally integrated into WTP organizations and PAS is a required review organization for project procedures that affect PAS. Most WTP documents are issued through PDC and captured in the project electronic document management system. Document Control/Records Management functions outside of PAS are approved on a case-by-case basis and audited by PDC annually against the project requirements. PAS manages both hardcopy records material and the corresponding electronic information. Project documents and records are made available to project personnel through means including the project electronic document management system (InfoWorks), iDocSearch, the electronic BNI library, and walkup requests. Access to and control of project documentation is an essential part of compliance with both DOE and regulatory requirements.

2.4.21 Occurrence Reporting

The SA organization is responsible for developing and coordinating the WTP Occurrence Reporting program. SA implements its responsibility to identify and report occurrences through this program.

During the construction phase of the project, Occurrence Reporting will be coordinated in SA. As the project progresses to the point where each facility is staffed, the respective facility managers will be responsible for implementation. This turnover will be planned and coordinated between SA, Commissioning and Training (C&T), and Construction.

2.4.22 Lessons Learned

The WTP lessons learned program is managed by the Project Manager. This program ensures that the lessons learned from internal and external incidents applicable to the project are disseminated to the appropriate personnel. This program provides the information to prevent the occurrence of events at the WTP that have similar causes to events that happened at other locations.

The WTP project has prepared a procedure to support the development and implementation of a lessons learned program. Procedure 24590-WTP-GPP-MGT-017, *Lessons Learned,* provides direction for conducting this program.

Development and implementation of a lessons learned program is required per DOE M 231.1-1A, *Environment, Safety and Health Reporting Manual*, as well as by the ISMP and QAM. Lessons-learned supports the ISMS core function of feedback and continuous improvement.

To define the WTP project approach for addressing lessons learned in the engineering design process, an Engineering department lessons-learned system is defined in the Engineering department procedure 24590-WTP-3DP-G01B-00003, *Lessons Learned System.* This system applies to Engineering department personnel, but does not replace the process in 24590-WTP-GPP-MGT-017, *Lessons Learned.*

The objectives of the WTP Engineering lessons-learned system are to:

- Contribute WTP lessons learned to the BSII Engineering department lessons learned database
- Identify best practices by providing feedback on work process improvements and innovative approaches
- Identify recurring or significant problems
- Provide useful information about suppliers

The Engineering department lessons-learned system involves identification, assessment, dissemination, and appropriate incorporation of lessons learned into "Best Practices" and, ultimately, into the Engineering standards, guides, and procedures.

2.4.23 Performance Measures

DEAR 952.223-71 requires the WTP project to annually submit for DOE approval performance objectives, performance measures, and commitments, to measure ISMS effectiveness, to annually identify and allocate resources to meet the safety objectives and performance commitments, and to maintain the integrity of the system. The project ISMS is integrated with the WTP project business processes for work planning, budgeting, authorization, execution, and change control.

The procedure 24590-WTP-GPP-SPEC-001, *WTP Project ISMS Safety Performance Objectives, Measures, and Commitments,* establishes the requirements, responsibilities, and interfaces for the identification, implementation, tracking, trending, analysis, and reporting of safety performance objectives, measures, and commitments. This process is used to measure and continuously improve project safety performance. The procedure provides for the identification of a project-wide ISMS lead. This individual, with input from support staff (personnel from each of the functional groups and performance trending coordinators for the selected performance measurement metrics), maintains the ISMS through an integrated feedback, analysis, and continuous improvement process. This process uses the applicable E&NS, SA, and QA, Engineering, HR, and C&T performance monitoring mechanisms established for the project.

The analyzed safety performance trend results of each previous year are used as input for:

- The required annual ISMS review
- Applicable ISMSD update
- Development of safety performance objectives, measures, and commitments designed to continually sustain and improve safety performance and the project ISMS for the following year.

The WTP has developed a reporting system that reports project performance on the technical work, schedule and cost profile defined in the baseline. In addition, the WTP provides required reports addressing occurrence reporting, accident investigation, and safety reporting. The implementing procedures for the reporting system are defined in 24590-WTP-PL-TE-01-012, the PEP.

2.4.23.1 Performance Monitoring

Performance monitoring (i.e., management assessments and self-assessments) is used at the WTP to verify that safety and other WTP programs, plans, and procedures are in place and are adequate, are functioning as designed, and are in compliance with applicable regulatory or permit requirements. Performance monitoring is conducted by WTP organizations to assess performance in such areas as QA, environmental protection, IS&H, process safety, health physics, nuclear safety, and regulatory compliance.

Performance monitoring includes, but is not limited to, reviewing records, plans, and procedures; visually observing operations/activities; and interviewing key personnel. Findings are provided in written reports with recommendations for improvements as applicable.

2.4.23.2 Metrics for Measuring Performance

DEAR 952.233-71 (contract clause I.105) requires the contractor to measure ISMS effectiveness and annually identify and allocate resources to meet both the safety objectives and performance commitments, and to maintain the integrity of the system. DOE P 450.5 and DOE O 414.1A require a rigorous and credible contractor self-assessment program linked to the ISMS, which includes elements that address performance measures and indicators.

For WTP contractor management of the project, detailed performance metrics for each functional discipline and the overall project are used to objectively track performance and to identify need for corrective action. Continuous improvement objectives are met by measuring and evaluating performance against key performance indicators and factors (metrics). Examples of metrics include repeat problems, timeliness of actions, trending of number of deficiencies, and trends of causal factors of deficiencies. Data are collected from sources such as management and self-assessments, external audits, independent audits, surveillance, deficiency reports, and nonconformance reports. After data analysis is completed, quarterly reports are issued to project management.

Safety performance is measured using a comprehensive set of indicators that shows trends in performance or status relative to established goals. The indicators and goals are determined from WTP project management performance expectations. Performance data are developed by project functional areas and programs.

The performance indicators are reported through BNI progress reports. These reports also analyze performance based on the indicators. The reports are used by responsible managers to initiate corrective or improvement actions as necessary. Senior WTP contractor and DOE ORP management collectively evaluate the information in the reports to identify the most significant problems and initiate responsive actions. This information will be summarized in the ISMS Annual Report and also used to modify assessment and oversight activities as appropriate.

Each year, the WTP contractor develops a set of performance analysis metrics for safety as described in 24590-WTP-GPP-SPEC-001, *WTP Project ISMS Safety Performance Objectives, Measures, and Commitments*. These metrics include the areas of environmental, safety and health, safety program

administration and issues management, as well as those recommended in the ISMS Annual Report. In response to the contract requirements, BNI submits safety performance objectives, performance measures, and a commitment affirmation letter for DOE approval, detailing the required information. The letter contains the appropriate information gathered to conform to the DOE program and budget execution guidance and direction as required by the DEAR clause. The letter affirms the commitments made for the previous year and provides commitments for the following year.

The integrated assessment program consists of independent assessments (audits), QA surveillances, and management assessments. These activities are driven by formal schedules, lessons learned, benchmarking activities, identified trends, and management direction. Requirements are established in QAM Policies Q-18.1, Q-18.2, and Q-18.3. Analyzed results from the integrated assessment program, summarized in the ISMS annual report, provide the input for the next year's safety performance objectives, measures, and commitments. These identified safety performance objectives, measures, and commitments are consistent with the implementation and maintenance of an effective ISMS and are developed in cooperation with DOE. Performance to the safety performance objectives, performance measures and commitments are reported quarterly and are summarized in the ISMS annual report.

2.5 Application of ISMS Core Functions and Guiding Principles for the WTP Project

WTP project implementing mechanisms (Section 2.4) are used to manage and perform work by applying core functions and addressing guiding principles. These implementing mechanisms include the WTP contract, policies, AB documents, plans, procedures, and guides. Figure 2-5 and Figure 2-6 illustrate the WTP ISMS infrastructure of implementing mechanisms that reference implementing procedures and other mechanisms that make up the WTP ISMS. Figure 2-5 shows the project documents that are the primary implementing mechanisms for the ISMS core functions. The documents listed in each column provide elements and attributes to implement the functions. Some documents satisfy more than one function. Figure 2-6 shows the project documents that are the primary implementing mechanisms for the ISMS guiding principles. The documents listed in each column provide elements and attributes to implement the principles. Some documents satisfy more than one guiding principle. For both figures, the lists are not all-inclusive and may include other documents.

The five core functions on the outer ring show the work control process used to implement the core functions that are the foundation for planning and execution of project work. Likewise, the implementation of eight guiding principles that provide expectations for how safety is addressed in the project are shown inside the outer ring. At the heart of the guiding principles are the three principles of Line Management Responsibility for Safety, Clear Roles and Responsibilities, and Competence Commensurate with Responsibility. These three key guiding principles, along with the other five guiding principles, influence how the core functions are applied to the design, construction, and commissioning of a safe facility.

The workflow for the project consists of the following ISM elements:

- Define the scope of work
- Identify and analyze hazards
- Develop and implement hazard controls
- Perform work within the controls
- Feedback and continuous improvement

2.5.1 Guiding Principle 1 - Line Management Responsibility for Safety

The Project Director has overall responsibility for safe execution of the project. This responsibility flows down to line management. Line management is defined as "any management level within the line organization, including contractor management that is responsible and accountable for directing and conducting work." Line management of the individual project organizations (such as R&T and Process Engineering Flowsheet, Engineering, Construction, C&T, and E&NS) has ultimate responsibility for the safety of their personnel. Project management commitment and responsibility for safety is reflected in policies and procedures including 24590-WTP-G63-MGT-001, *Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy*; 24590-WTP-G63-MGT-002, *WTP Environmental Policy*; and the QAM. Project management is committed to ensuring that project activities are performed while protecting the safety of the workers, public, and the environment. This is achieved through the institution and implementation of programs and procedures to control project work, and the qualification and training of personnel appropriate to the safety significance of their work. The WTP organization satisfies the guiding principle that line management is responsible and accountable for integrating safety into the performance of work. Line management responsibilities are identified in Appendix 2A, *Project Key Functions and Responsibilities.*

Project management's "Zero Accident" policy is dedicated to the concept that all accidents are preventable through the application of proper safety practices. Project management is accountable for integrating safety into project work practices. Project management empowers Project personnel, including subcontractors, to identify, report, and resolve project safety issues and continuously improve the project safety program.

2.5.2 Safety Committees

The Project Safety Committee (PSC), described in the PSAR, reviews the management and performance of the WTP project AB regulatory compliance and process safety. The procedure 24590-WTP-GPP-SREG-001, *Project Safety Committee,* establishes the scope and responsibilities for this committee. The PSC provides advice to senior project management on matters related to safety. PSC members are appointed from facility line management and staff. Specialists in specific fields and external subject matter experts may also be specified to support the PSC, as required. The members are specified from several different organizations and backgrounds to ensure that advice on safety matters is representative of an integrated evaluation of the matters under consideration.

The ALARA Subcommittee (ASC), a subcommittee of the PSC, is a multidisciplinary team that advises management on reducing radiation dose and radiological releases to ALARA levels at all stages of WTP design, construction, and commissioning. It provides oversight for implementing the WTP ALARA design process by reviewing and commenting on applicable programs, plans, and procedures. The ASC makes recommendations for improvement, monitors resolution of issues, and ensures the closure of its recommendations and other related issues.

The Accident Prevention Council (APC), governed by 24590-WTP-PL-MG-01-008, *WTP Accident Prevention Council,* provides a forum to involve management and employees from line and support organizations on safety issues. The APC includes appointed and voluntary members representing all project organizations. Regular APC meetings are held to identify, discuss, and propose action to project management to address project-wide, organizational, and employee safety issues.

The procedure 24590-WTP-GPP-MGT-014, *Safety/Quality Council (S/QC)*, provides results that will support management decisions to balance priorities, recommend safety and quality improvement

initiatives, and identify and allocate resources as needed to meet the project's quality and safety objectives and performance commitments. The S/QC also serves as the ISMS Executive Core Team, which includes review and approval of ISMS final documentation, assigning subject matter experts from applicable functions/organizations to support the ISMS program, and directs an annual assessment of the effectiveness of the WTP project ISMS.

The ISMS working core team is made up of management designees from applicable functions and organizations to support the ISMS manager in tasks specific to ISMS. The ISMS working core team reports to the S/QC.

2.5.3 Guiding Principle 2 - Clear Roles and Responsibilities

Clear roles, responsibility, and authorities for WTP managers are communicated as part of their position descriptions and as defined in the PEP and AB documents (e.g., QAM, ISMP, RPP). At the WTP project activity level, clear roles and responsibilities are documented in project procedures for each activity. Roles and responsibilities for Process Engineering Flowsheet Group activities are described in 24590-WTP-PL-TE-01-001, *Process Technology Department Management Assessment Plan*. Roles and responsibilities for R&T activities are described in 24590-WTP-PL-RT-02-006, *Research and Technology Roles and Responsibilities*. Roles and responsibilities for Engineering activities are described in 24590-WTP-PL-ENG-01-004, *Design Process Plan and Description*. Roles and responsibilities for construction activities are described in 24590-WTP-GPP-CON-1101, *Site Organization.*

2.5.4 Guiding Principle 3 - Competence Commensurate with Responsibilities

Project personnel are trained and qualified commensurate with their responsibilities. The procedure 24590-WTP-GPP-HR-020, *Employee Education and Experience Verification,* states that only individuals qualified by both education and experience are employed in specific positions. Management establishes initial and continuing training and qualification requirements and processes for specific job categories. This ensures that personnel achieve the required competency commensurate with their responsibilities in accordance with the guiding principles of the ISMS. The project training and qualification programs are developed and implemented in accordance with 24590-WTP-GPP-CTRG-002, *Training,* and 24590-WTP-GPP-CON-1301, *Construction Training.*

Personnel performing activities affecting safety and quality are qualified on the basis of experience, education, and training, which may include demonstration and testing. Training programs can consist of both classroom and on-the-job training (OJT), and include other training as applicable. Classroom training includes lectures, seminars, computer-based training, and structured self-study activities.

The process to ensure that employees have competence commensurate with responsibilities does not end when employees complete their initial training and qualifications. Exempt and non-exempt employees receive an annual performance appraisal. The results of the appraisal feed into the content of continuing and/or remedial training, as needed. The continuing training and requalification programs include training on tasks that are considered most important and difficult, or infrequently performed.

Managers are responsible for communicating changes in training and qualification requirements to their employees. At the same time, both the manager and employee are accountable for knowing the employee's training and qualification requirements and their status before performing work. An employee has access to her/his training profile through the WTP Project Intranet Training Home Page.

2.5.5 Core Function 1 - Define Scope of Work and Guiding Principle 4 - Balanced Priorities

A well-defined scope of work from Project to activity level is crucial to the success of the ISMS process because:

- It sets the stage for the scope and depth of hazards identification and analysis
- It is the foundation for the budget formulation allocation process
- It is the primary factor in establishing expectations and accountability.

The project business infrastructure (Section 2.3) discusses the key elements for defining scope and balancing priorities at the highest level of the ISMS process. These processes in the PEP and the *Project Control Plan* provide the approach for meeting the WTP contract requirements and for managing the project. A fundamental objective of the WTP business, budgets, and contracts process is to identify the scope, schedule, and costs of activities necessary to construct and commission the WTP in a safe and environmentally sound manner. This process defines the entire contractual scope of work, including engineering, procurement, construction, startup, and commissioning requirements. The WBS establishes a framework within which planning, estimating, budgeting, performance measurement, and actual costs are collected and reported.

2.5.6 Core Function 2 - Identify and Analyze Hazards

As outlined by DOE G 450.4-1A, the objective of hazards analysis is to develop an understanding of the potential for the hazard to affect the worker, the public, and the environment. Hazard controls should be established based on this understanding and other factors related to the work. In accordance with this guidance, the objectives of hazard identification and analysis at the WTP are to identify and eliminate or control hazards and prevent or mitigate negative impact to facilities, programs, workers, the public, and the environment. Control of hazards (degree of care) is based on the magnitude of the hazard and on the associated risk of negative events involving those hazards.

Hazard analyses are performed for design, construction, and commissioning phases of the project. In design, key systems receive comprehensive analysis during the ISM process and during formal safety analysis as required by 24590-WTP-GPP-SANA-002, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards,* and the SRD.

WTP hazards include environmental hazards related to emissions and effluents, wastes, and waste management units. Similarly, activities planned at the project and activity levels can affect environmental resources, including floodplains and streams, and natural, biological, cultural, and historic resources.

In construction, CWPs are prepared and reviewed by the construction management team of construction supervision, field engineering, and safety and health professionals. The work package may include a JHA as required by 24590-WTP-GPP-SIND-002, *Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT),* and 24590-WTP-GPP-CON-1201, *Construction Work Packages.* A job will require a JHA if the job is:

- High-risk activities
- New jobs or tasks or tasks that uses new equipment
- A major job to be repeated frequently

- Historically troublesome activities from a safety perspective
- One involving environmental remediation of hazardous waste
- A job that in the judgment of the safety and health representative requires a JHA

The JHA is prepared by a construction management team of construction supervision, field engineering, and safety and health professionals. The hazards and controls determined by the JHA are then incorporated into the STARRT cards that each craft must review, sign, and post in the work area(s) before work commences on the CWP. SA monitors ongoing work daily at the construction site to ensure compliance with the JHA and applicable safety procedures. (See Section 5.0 for additional details on construction work planning and integration of safety requirements.)

Established and implemented procedures that address WTP hazards for construction activities are:

- *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*
- *Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talks (STARRT)*
- *Construction Work Packages*

During commissioning, formal hazard analysis will be performed on activities per procedures being developed.

2.5.7 Core Function 3 - Develop and Implement Hazard Controls, Guiding Principle 5 - Identification of Safety Standards, and Guiding Principle 6 - Tailor Hazard Controls to Work

After the associated hazards have been identified and before work is performed, hazard analysis should be used to develop appropriate controls and identify applicable safety standards and requirements. Applicable standards are used to determine the minimum level of controls that must be in place. Developing and implementing hazard controls from the Bechtel Corporate to work-activity level include:

- Identifying applicable standards and agreed-upon sets of requirements
- Identifying controls to prevent or mitigate hazards
- Establishing boundaries for safe operations through a defined safety envelope
- Implementing and maintaining configuration of controls

WTP uses the hierarchy of controls (engineering, administrative, and personal protective equipment [PPE] controls) in DOE O 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*. The hierarchy used at the project level is that used at the activity level, which is applied in a risk-based manner. Controls developed, implemented, and maintained at the activity level are integrated with other controls and commitments, particularly project level programs. For instance, radiological protection controls established and implemented at the activity level are integrated with the project Radiological Controls Program. The same hierarchy is applied to IS&H, environmental, and other types of controls. Examples of the barriers and controls considered in the ISM process are listed below:

- **Substitution** - Substitutes a safe or low-hazard material or chemical for a higher-hazard material so the hazard can be eliminated or reduced without relying on the use of a control method.

- **Engineering** - Changes such as tools, equipment, or machines associated with the activity. Examples include a glovebox or ventilation system for containing radioactivity, packaging for containing hazardous waste, or a guard or shield to protect the operator.
- **Work Environment** - Changes control aspects of the job environment in order to avoid injury. The change may affect such things as work areas, equipment layout, illumination, or atmospheric conditions.
- **Environmental** - Identifies applicable environmental regulation and permit requirements such as dangerous waste management, air quality, water quality, hazardous material management, and natural and cultural resources.
- **Procedural** - Written instructions to specify what a person should do to avoid an identified hazard.
- **Work Task Re-evaluation** - Changes the way the entire work activity is performed. The changes result in an improved way of doing the task from safety, time, effort, and cost points of view.
- **Training** - Identifies the need for special training, requalification frequency, dry runs, training mockups, or similar requirements.
- **Frequency** - Reduces the number of times a hazardous task must be performed (such as substituting parts needing less frequent repair or replacement or using an automated process).
- **Rotation** - Reduces the level of individual exposure (such as rotating personnel during an activity).
- **Personal Protective Equipment** - Prescribes appropriate PPE required to eliminate or reduce the hazard.

Some IS&H procedures have been developed to establish controls for selected activities and are incorporated in construction work planning and performance. These include:

- 24590-WTP-GPP-SIND-013, *Hazardous Work Permit*
- 24590-WTP-GPP-SIND-007, *Confined or Enclosed Spaces*
- 24590-WTP-GPP-SIND-009, *Safety Watches*
- 24590-WTP-GPP-SIND-008, *System and Equipment Lockout/Tagout*
- 24590-WTP-GPP-SIND-024, *General Safe Work Practices*

2.5.8 Core Function 4 - Perform Work, Guiding Principle 7 - Operations Authorization, and Guiding Principle 8- Worker Involvement

The conditions and requirements to be satisfied for WTP work activities are clearly established and agreed upon. Applicable state and federal laws and legal requirements are incorporated in the WTP contract. Requirements from regulatory agencies (federal, DOE, state, and local) are met for worker safety and health; radiological, nuclear, and process safety; QA; and environmental protection through approved project procedures.

Once bases for the authorizations are approved, authorization agreements are negotiated between DOE and the project management, and permits are established with state and federal environmental regulatory agencies. Oversight by DOE and the state of Washington ensure that the WTP project activities are in continued compliance with the agreements.

2.5.8.1 Project Work Authorization

The Manager of Engineering is the WTP project technical authority for engineering design work. Engineering work authorization is described in the PEP (24590-WTP-PL-TE-01-012). Design Authority is contained within Engineering and managed by the Manager of Engineering.

The document 24590-WTP-PL-ENG-01-004, *Design Process Plan and Description*, and implementing procedures describe the WTP project engineering design process and the required interfaces for developing an efficient, effective design within the constraints of the WTP AB.

The Manager of Construction is responsible for authorizing all construction work at the WTP site, regardless of the type of work or who is performing it. Once approved, work is authorized by management through the construction plan-of-the-day (POD) meeting and is executed according to established procedures, approved CWPs, or checklists. Facility managers and operational PODs will provide similar authorizations during the Operations phase. Facility shift managers will provide Work authorizations during the Commissioning phase.

The construction management team (construction supervision, field engineering, safety and health) ensures adequate preparation for work performance by using the procedure 24590-WTP-GPP-CON-1201, *Construction Work Packages*, that requires work planning, JHAs, walk-downs of proposed work, dry runs, pre-job briefings, and the use of STARRT tags by supervision and craft before work is performed. (See Section 5.0, Construction, for additional details on work authorization and integration of environmental, safety, and health requirements.)

Line supervision is responsible to ensure that, during work execution, controls remain in place. Line managers are experienced personnel with the necessary training and qualifications to carry out their assigned duties and responsibilities. Employee hazard communication training stresses hazard recognition and acceptance of individual roles and responsibilities for worker safety. Employees are also trained on their rights and responsibilities regarding stop work authority (24590-WTP-GPP-MGT-008, *QA Stop Work/Management Suspension of Work*).

The construction work control process is defined in procedures 24590-WTP-GPP-CON-1201, *Construction Work Packages*, and 24590-WTP-GPP-CON-3105, *Special Instructions*. Construction work control is a single process by which work is performed; it ensures that work is screened consistently to uniform criteria, and that hazards are appropriately identified, analyzed, and controlled. Workers are involved in the identification, analysis, and mitigation of hazards associated with their work. The guide 24590-WTP-GPG-CON-1204, *Dry Run Process*, is used to test and improve significant construction processes related to installation of plant items.

2.5.8.2 Worker Involvement

Safety is a prime consideration in the work practices, including both line management and workers at the construction site and program personnel at all management and working levels in other locations of the WTP.

Managers and workers at all organizational levels are involved in developing, maintaining, and improving the controls applied to work at the task/activity level. Safety is top priority in keeping the workplace as free as possible of recognized hazards, which might endanger workers, the public, or the environment.

When worker safety is managed as a valued part of the ISMS, both managers and workers gain ownership in the process. To be successful, a worker safety system requires commitment from managers and meaningful involvement of workers. Management commitment to worker safety requires managers to:

- Identify occupational safety and health standards
- Train workers on how to work safely and be accountable for safety
- Communicate risk with the worker and ensure compliance with applicable requirements and regulations
- Encourage worker responsibility to demonstrate a strong, questioning attitude
- Implement a process to ensure that all identified hazards and safety issues are addressed
- Solicit worker input in identifying workplace hazards and selection of appropriate controls
- Ensure strict compliance with precautions, limitations, requirements for safely performing work
- Empower workers to exercise their Stop Work authority

In each area of the project, mechanisms are in place to promote employee input and involvement in planning work and affecting how work is accomplished. The goal is to ensure that employees participate and have ownership in the processes for work planning, hazard analysis, work execution, and resolution of safety concerns. In the engineering area, employee involvement is inherent in the engineering design activities with engineers and designers performing the design activities and being involved in providing input to the planning process for engineering activities. The APC is an employee involvement mechanism available to engineering and other project support personnel.

In the construction areas (e.g., the construction site and at the marshalling yard), worker-led teams include representatives of each of the crafts in a safety observation or PBS program. The objective of PBS is to involve the craft in creating and maintaining a safe work involvement. In addition to PBS, specific construction mechanisms for worker involvement include the STARRT/JHA process, the construction site safety committee for Bechtel direct hire and subcontractor participation, and the construction work control process. Other project-wide mechanisms for employee involvement include the Employee Concerns Program and the "stop work" protocol.

2.5.9 Core Function 5 - Feedback and Improvement

The feedback and improvement mechanisms at WTP provide the tools for safety oversight and surveillance. Management commitment to the continuous improvement process is demonstrated by managers accepting ownership and promoting worker involvement. The project's feedback and improvement processes translate worker safety suggestions into safety improvements. The typical process includes worker observance of the work being performed and subsequent review of documentation to identify areas for improvement. The feedback and improvement processes include mechanisms for implementing employee safety suggestions, lessons learned, self-assessments, independent oversight, performance measurement, and trending.

2.5.9.1 Identifying Improvement Opportunities

Several project-wide efficiency mechanisms provide means to identify and act on opportunities for improvement. These mechanisms allow for worker and management involvement in the improvement process. Identified improvement opportunities are also tracked and trended to ensure proper follow through. Improvement mechanisms include:

- Improvements from Lessons Learned. A key element of the feedback and improvement process is the development of lessons learned to describe noteworthy practices, improvements and correction of inadequacies in design or operations methodologies, new techniques, information to protect public safety and health, etc. As part of the feedback and improvement process, a review is conducted to establish appropriate lessons learned for implementation at the WTP project. The procedure 24590-WTP-GPP-MGT-017, *Lessons Learned,* provides requirements for the Lessons Learned. Lessons Learned are generated internally by specific processes or are obtained externally. Each lessons learned is evaluated by subject matter experts and the lessons learned coordinator to determine responsive actions that vary from distribution of information to immediate corrective action through the lessons learned bulletin process.
- Performance Measures (Section 2.4.23) are mechanisms at the WTP process for performance monitoring to determine trends in performance or status relative to established goals.

During the engineering design and construction phase of the project, the following performance indicators are being tracked to measure the effectiveness of ISMS implementation:

- OSHA Recordable Injury Rate - The rate of occupational injuries or illnesses that result in restricted work activity or require medical treatment beyond first aid.
- Reportable Occurrences of Release to the Environment - Release of hazardous substances or regulated pollutants that are reportable to federal, state, or local agencies.

2.5.9.2 Performance Reports

The WTP project uses various report mechanisms to monitor safety performance, including:

- Injury/Illness Summary Report. The DOE ORP is responsible for monitoring the occupational injury and illness performance of the WTP and subcontractors reporting to WTP construction management. The OSHA recordable injury rate is the metric selected to monitor this performance. This injury rate is a performance indicator calculated by taking the sum of the OSHA recordable injuries/illnesses multiplied by 200,000 and dividing by the total hours worked, thus providing a normalized value.

  The OSHA Recordable Injury Rate is updated monthly and distributed within the project and to Bechtel Corporate in a monthly injury and illness summary report. Current performance is regularly reviewed and discussed with management at all levels and at monthly project APC meetings. Members of the council are responsible for relaying pertinent information from such discussions back to the employees they represent. Performance information is also reported to senior project management each month
- Noncompliance Tracking System. The Noncompliance Tracking System was established by the DOE Office of Price Anderson Enforcement (OE) to enable contractor reporting of significant non-compliances associated with Price-Anderson Amendments Act (PAAA)-related nuclear safety regulations. In addition, the OE has indicated that the contractor is expected to identify, evaluate, and track PAAA non-compliances that do not exceed established significance thresholds using an internal tracking system. The procedure 24590-WTP-GPP-QA-101, *Price-Anderson Amendments Act Compliance and Reporting,* invokes the use of the Noncompliance Tracking System for identifying, evaluating, reporting, and correcting potential noncompliances.

2.5.9.3 Assessment Program Expectations

DOE P 450.5, *Line Environment, Safety and Health Oversight*, describes DOE's expectations for a robust, rigorous, and credible contractor self-assessment program linked to the DOE Safety Management System. This self-assessment program includes elements that address:

- Compliance with applicable requirements
- Line and independent assessments
- Data collection, analysis, and corrective action
- Performance measures and performance indicators
- Continuous feedback and improvement

2.5.9.4 Self Assessment

The WTP self-assessment process is implemented through a two-tiered assessment program. The first tier consists of ongoing management assessments, described in 24590-WTP-GPP-MGT-002, *Management Assessment,* and 24590-WTP-GPP-MGT-001, *Readiness Assessments.* These processes are performed by all levels of management to determine the level of program compliance with requirements, promote continuous improvement, and enhance project performance. Because the project includes numerous subcontractors, an additional assessment process is described in 24590-WTP-GPP-SIND-022, *Assessment and Issue of Noncompliance for Construction Subcontractor's Safety and Health Compliance.*

The second tier consists of ongoing independent audits and surveillances performed by the QA organization in accordance with 24590-WTP-GPP-QA-501, *Independent Assessment (Audit),* and 24590-WTP-GPP-QA-601, *Quality Assurance Surveillance.* These two processes are designed to verify compliance with and the adequacy of the QA and safety programs, and determine the effectiveness of the management assessment process.

2.5.9.4.1 Management Assessments

Management assessments help implement the ISMS core function of feedback and improvement, and demonstrate associated guiding principles of management responsibility, continuous improvement, and senior management involvement. WTP management uses management assessment processes to evaluate the adequacy and effectiveness of management control systems for improving processes and eliminating barriers to achieving project goals and objectives. Management participation in these assessment efforts is mandated by the Project Manager. While retaining overall responsibility for the assessment process, senior management requires managers at all levels to foster continuous improvement by assessing the performance of their organizations' activities.

Such assessments are planned and performed as an ongoing activity to verify conformance to applicable requirements and identify opportunities to improve performance and the safety management system. Results and conclusions from these assessments are documented and evaluated at the organizational level to assess the effectiveness of the entire integrated management system on achieving established goals and objectives, and fostering continuous improvement. Conditions adverse to quality identified in management assessments are promptly and effectively resolved as required by 24590-WTP-GPP-QA-201, *Corrective Action.* Provisions include tracking and follow-up on completed and planned corrective actions from the assessments.

2.5.9.4.2 Independent Audits/Assessments

Independent audits/assessments are planned and conducted to measure the adequacy of work performance, and to promote improvement. Independent audits are an important element of the feedback and improvement mechanism of the ISMS. Audits are conducted to evaluate the performance of work processes and to promote improvement with regard to requirements and management expectations. Audits emphasize results, technical adequacy, quality of work processes, and implementation of the ISMS. Audits are performed by trained and qualified QA personnel augmented as necessary by trained technical specialists for the area being audited.

Performance-based audits focus on process improvement, and evaluate and report on the audited organization's achievement of quality. They also evaluate the effectiveness of the organization's management assessment program. During performance-based audits, work is monitored to identify safety, environmental, and quality problems, identify abnormal performance, and promote improvement.

Audit results are documented and provided to the appropriate level of management. Strengths and weaknesses (opportunities for improvement) in safety performance and program implementation are identified so that action can be taken to improve the process or service. Managers responsible for the resolution of identified deficiencies are clearly assigned. Conditions adverse to quality identified during the audit process are addressed and corrected by the responsible organization in accordance with procedure 24590-WTP-GPP-QA-201. The need for follow-up review of areas found deficient during an audit is determined by the QA Manager based on identified adverse trends in quality, safety, or environmental performance.

In addition to audits, surveillance activities are planned and conducted at any time on any activity to measure item and service quality, to measure the adequacy of work performance, and to promote improvement. Surveillances are an important element of the feedback and improvement function of the ISMS. Surveillances are performed by the QA organization. Surveillance activities are separate from, and in addition to, the independent and management assessments. These documented surveillances are routinely conducted to verify conformance of items, services, and processes to established requirements. Flexibility in conducting surveillances allows additional surveillances in questionable areas. The surveillance process includes follow-up by project management to ensure corrective actions are implemented when deficiencies are identified in accordance with 24590-WTP-GPP-QA-201, *Corrective Action*.

Opportunities for improvement are also identified by the surveillance process. Surveillance results are documented and provided to a level of management with authority to implement necessary corrective actions and verify that identified problems have been satisfactorily resolved.

2.5.9.5 Corrective Action

Fundamental to continuous improvement is the corrective action system. The objective of a corrective action system is to identify, control, document, evaluate, and trend conditions adverse to quality, and to develop and implement appropriate actions to correct the adverse condition. For major findings including those identified by external assessments, the corrective action system, as implemented through procedure 24590-WTP-GPP-QA-201 and tracked through procedure 24590-WTP-GPP-QA-204, *Quality Trending*, is vital for implementing the continuous improvement of the environmental, safety, health, and QA programs. For day-to-day (less significant) safety issues found by project personnel, internal and less formal systems such as logs, functional area internal databases, and the project management sponsored

Recommendations and Issues Tracking System (RITS) program is used to identify, track, and close out issues and observations. These issues are tracked in the QA Information System.

Quality and safety improvements support the feedback and improvement core function of the ISMS. Project management has the responsibility to achieve quality and safety in the products produced and services provided. Management's role includes promoting the corrective action system, and supporting and encouraging effective problem identification and correction. The worker's role is to meet the quality and safety requirements and to recommend improvements in these areas. All personnel have the authority and are encouraged to identify services and processes adverse to quality and safety, and to stop work or request that work be stopped, as appropriate, until it is safe to proceed or effective corrective action is completed.

Services and processes that do not meet established requirements are identified, documented, controlled, and corrected according to the importance of the problem and the work affected. Correction includes identifying the causes of problems and taking appropriate action to prevent recurrence.

2.6 Project ISMS Interfaces

2.6.1 DOE, Tank Farm Contractor, and Other WTP Project Interfaces

The WTP contract defines DOE and TFC specific responsibilities and interactions with the WTP contractor. DOE will use a partnering approach to manage interactions between DOE, WTP contractor, TFC, and other Hanford Site contractors. DOE, the TFC, and other Hanford Site contractors provide site services to the WTP contractor as directed by DOE. Partnering encourages a common vision with supporting goals and missions; promotes teamwork, mutual respect, openness, honesty, trust, professionalism, and understanding; and includes joint commitments to:

- Maintain high safety performance
- Complete the WTP on schedule and within cost
- Eliminate barriers to an efficient and more cost-effective project
- Promote innovation
- Improve communication and understanding
- Provide early identification and recovery from performance problems
- Resolve conflicts through a coordinated work effort that avoids adversarial relationships
- Reinforce the partnered relationship through honest feedback and continual improvement

DOE is responsible as the WTP owner and regulator. As the owner, DOE performs functions to:

- Integrate the WTP into the overall River Protection Project
- Approve changes to the system-level flowsheet, ICDs, feed characteristics, and product specifications and future operations baseline
- Perform design, construction and operability oversight, and, where required, engage other contractors to provide design and construction and operability oversight of the WTP
- Review contractor environmental, safety, health, and QA actions for compatibility and integration with site-wide ES&H activities
- Inspect and accept the WTP

- Manage project progression through the critical decision process (DOE O 430.1A, *Life Cycle Asset Management*)
- Provide QA oversight
- Require compatibility of reporting and management systems

As the regulator, DOE regulates radiological, nuclear, and process safety, and nonradiological worker safety and health.

The WTP contractor is responsible to:

- Perform the requirements of the contract, integrating activities with DOE, the TFC, and other Hanford Site contractors as needed
- In cooperation with DOE (as lead), the TFC, and the other Hanford Site contractors, establish an interface management process to ensure effective control of technical, administrative, and regulatory interfaces
- Support DOE in external communications on the WTP project with stakeholders, regulators, Tribal Nations, and other special interest groups
- Transition the commissioned WTP to a future operations contractor
- Provide DOE or its designee(s) access to and the right to conduct assessments, audits, and surveillance of contractor records, premises, activities, and of radioactive materials in possession or use related to the WTP

2.6.2 DOE ORP Responsibilities for Oversight of ISMS Development

DOE-ORP supports ISMS development and verification. The document DOE ORP M411.1-1, *Safety Management Functions, Responsibilities, and Authorities Manual* (FRAM), establishes the responsibilities for managing functions that are fundamental to safety management and that need to be performed consistently throughout DOE-ORP. The FRAM is an organizational-level directive that addresses functions, responsibilities, and authorities for DOE organizations responsible for overall direction of integrated safety for all DOE operations and facilities. The FRAM also describes roles and responsibilities for setting departmental direction, a step that must take place before implementation of the safety management functions, plans, mission statements, budget resource allocation, and the technical competence qualifications required of staff.

The FRAM flows down the full set of requirements from applicable DOE directives, and defines responsibilities of ORP management and support entities. The ORP FRAM further defines and describes the roles and functions of the ORP line organizations and significant internal and external interfaces that directly affect the successful execution of the RPP, including tank waste storage, waste retrieval, interim storage of immobilized waste, waste disposal, and construction and operation of the WTP.

The Manager of the DOE-ORP is the Approval Authority for the ISM verification. The same DOE organization does not provide both oversight of the development and DOE review and approval for ISMS verification. Consistent with "Line Management's responsibility for safety," the DOE-ORP, Assistant Manager for Project Delivery, oversees and monitors the WTP ISMS.

DOE-OSR has the responsibility for preparing and issuing a tailored criteria, review and approach document (CRAD) to the WTP project for assessment of the ISMS. The review and verification process

plans include providing a DOE lead liaison for the program oversight and overall review and verification of ISMS.

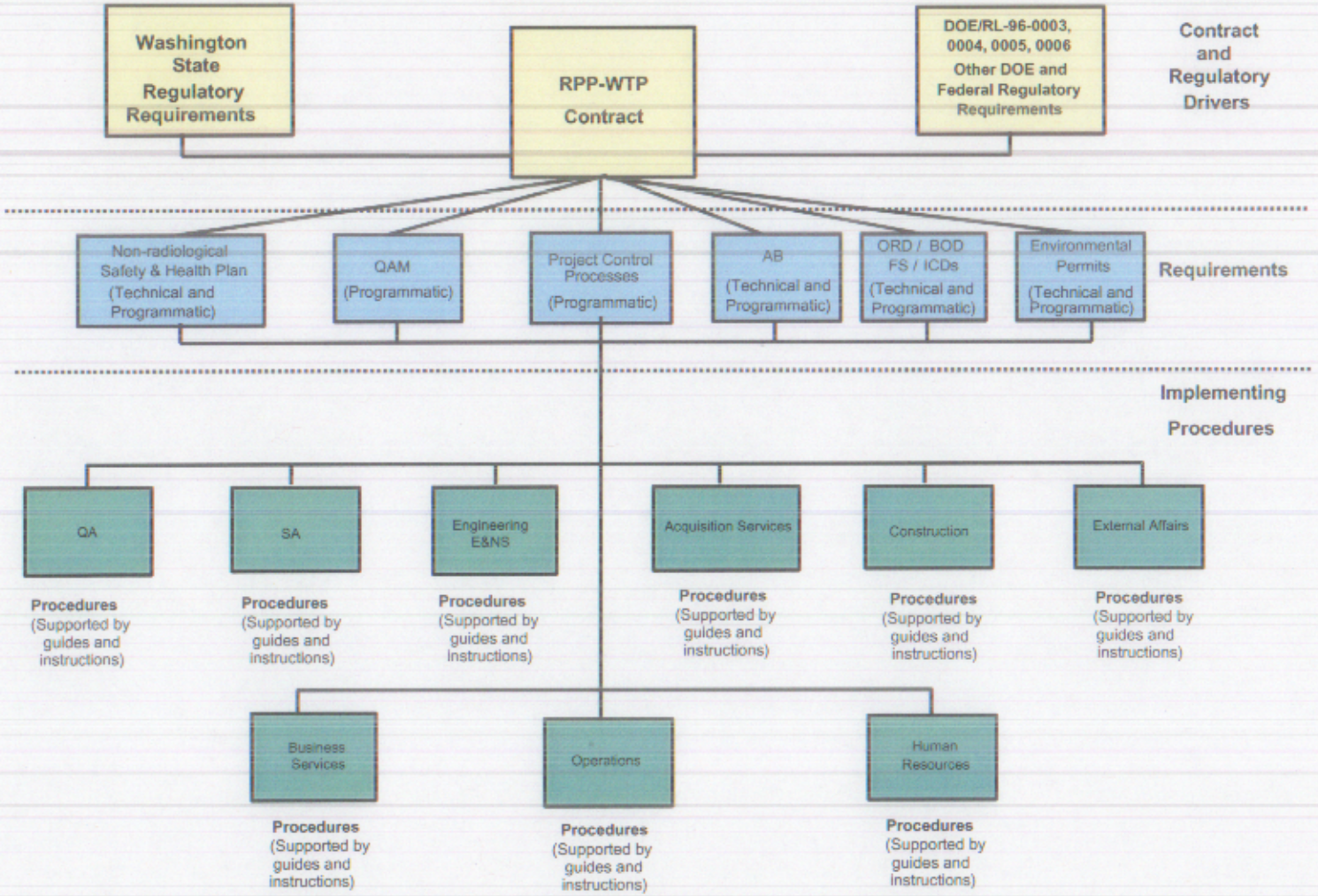
2.6.3 Integration of DOE and Contractor ISMS Roles

Another aspect of integration of ISMS is the complementary nature of DOE and contractor responsibilities in ensuring integration of safety in work processes. WTP contractor responsibilities are defined in the DEAR contract requirements and are incorporated into the WTP contract, corporate policies, and manuals. Application of these requirements is outlined in this ISMSD document. Although the DEAR specifies some DOE-ORP responsibilities, most are described in the FRAM. Each line, support, oversight, and enforcement organization in DOE-ORP is responsible for establishing a lower-tier FRAM document specifying how functions and responsibilities, as assigned in the FRAM, are to be properly discharged. The FRAM also provides an overview of the interfaces between DOE functions and those of the contractor organizations. Such safety management responsibilities include budget management as well as the use of feedback from oversight and review functions.

2.6.4 DOE Review and Approval of the ISMS

DOE must review and approve the project ISMS in accordance with DEAR (48 CFR 970.5223-2(e)) and the FRAM. The process for implementing review and approval is discussed in Chapter III, Section 4.0, and in Appendix E of DOE G 450.4-1B, *Integrated Safety Management System Guide*. Additionally, the Office of the Deputy Assistant Secretary, Oversight (EH- 2), oversees DOE safety management functions. The FRAM is organized in accordance with the Policy and addresses DOE responsibilities and authorities for each of the five ISMS core functions.

Figure 2-1 RPP-WTP Work Control/Procedure Hierarchy



RPP-WTP Work Control/Procedure Hierarchy

Figure 2-2 WTP Project Integrated Safety Management System Structure

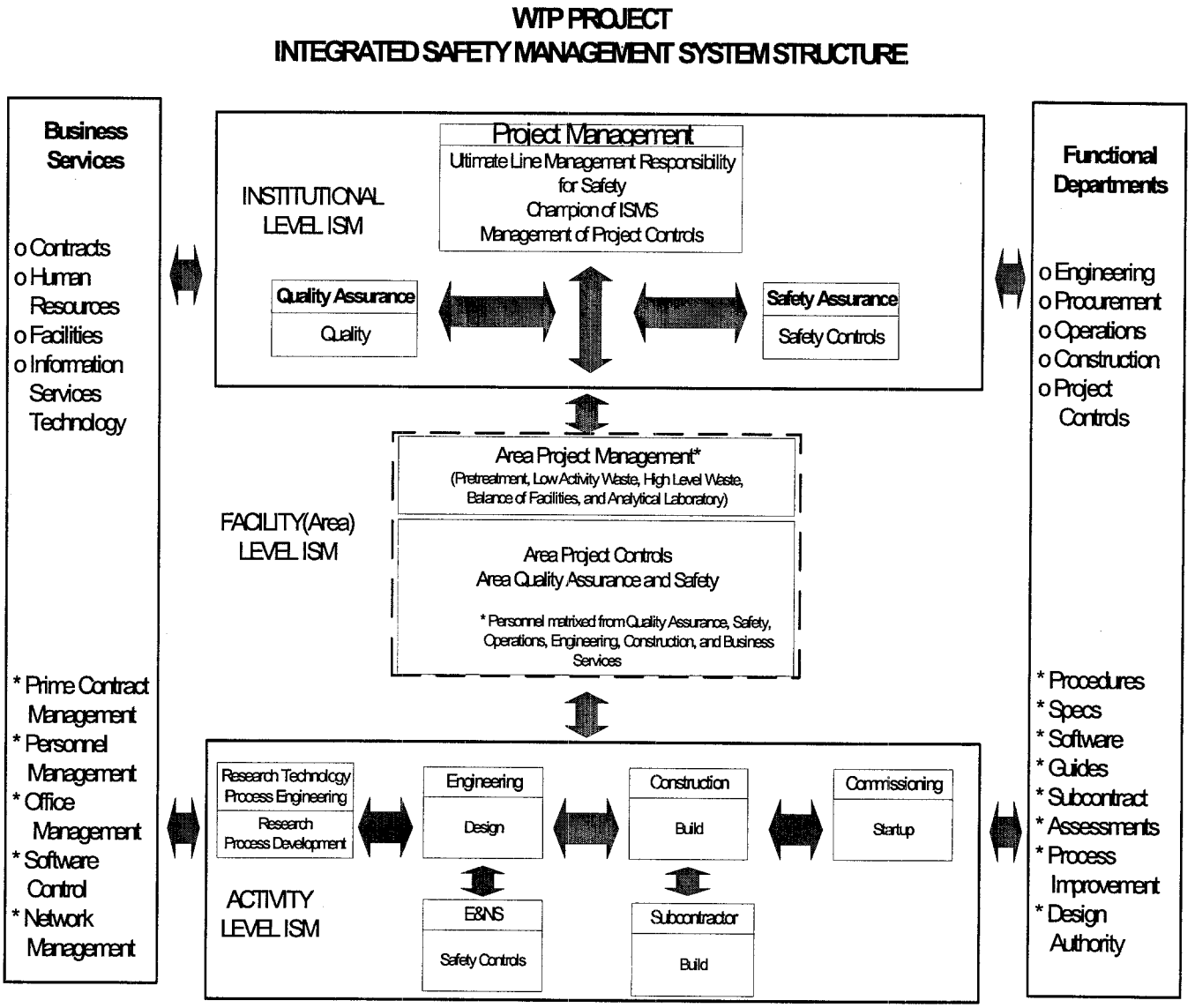


Figure 2-3 Employee Training Profile

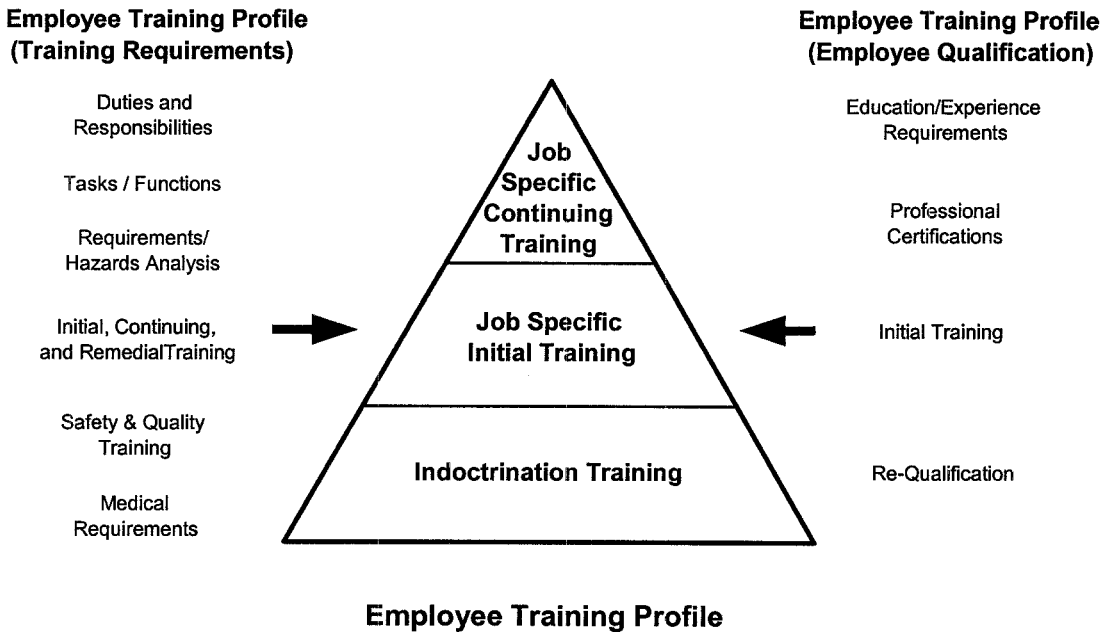


Figure 2-4 WTP ISMS Core Functions Implementation

Define Scope

Waste Treatment Plant Contract
DE-AC27-01RV14136
Project Execution Plan
24590-WTP-PL-TE-01-012
Safety Requirements Document (Vol. II)
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Basis of Design
24590-WTP-DB-ENG-01-001
Research and Technology Roles and Responsibilities
24590-WTP-PL-RT-02-006
Process Operations Business Plan and Strategy Document
24590-WTP-PL-TE-01-010
Design Process Plan and Description
24590-WTP-PL-ENG-01-004
Design Process
24590-WTP-3DP-G03B-00001
Research and Technology Plan
24590-WTP-PL-RT-01-002
RPP-WTP Environmental Requirements and Regulation Guidelines
24590-WTP-GPG-SENV-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Design Criteria
24590-WTP-3DP-G04B-00001
Construction Work Packages
24590-WTP-GPP-CON-1201
Special Instructions
24590-WTP-GPP-CON-3105
WTP Environmental Plan
24590-WTP-PL-ENV-01-004
Nonrad. Worker Safety & Health Plan
24590-WTP-PL-IS-01-001
Work and Org. Breakdown Structures (WBS/OBS)
24590-WTP-GPP-GAB-00101
Contract Management
24590-WTP-GPP-GAV-00100
Operations Requirements Document
24590-WTP-RPT-OP-01-001
Commissioning Plan Part "A"
24590-WTP-PL-G-01-002
WTP Conduct of Operations Plan
24590-WTP-PL-OP-01-002
WTP Maintenance Implementation Plan
24590-WTP-PL-OP-01-004

Analyze Hazards

Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT)
24590-WTP-GPP-SIND-002
Authorization Basis Maintenance
24590-WTP-GPP-SREG-002
Nonrad. Worker Safety & Health Plan
24590-WTP-PL-IS-01-001
Criticality Safety Program for the RPP-WTP
24590-WTP-PL-ENS-03-013
WTP Radiological Control Manual
24590-WTP-MN-ESH-01-001
RPP-WTP Environmental Requirements and Regulation Guidelines
24590-WTP-GPG-SENV-001
Project Risk Management
24590-WTP-GPP-PT-003
Application of ALARA in the Design Process
24590-WTP-GPP-SRAD-002
Management of Criticality Control
24590-WTP-GPP-SRAD-003
Risk Management Plan
24590-WTP-PL-PR-01-003
Research and Technology Plan
24590-WTP-PL-RT-01-002
WTP Accident Prevention Council
24590-WTP-PL-MG-01-008

Develop and Implement Controls

Design Criteria
24590-WTP-3DP-G04B-00001
WTP Configuration Management Plan
24590-WTP-PL-MG-01-002
Project Reviews
24590-WTP-3DP-G04B-00033
Engineering Calculations
24590-WTP-3DP-G04B-00037
Engineering Drawings
24590-WTP-3DP-G04B-00046
Engineering Specifications
24590-WTP-3DP-G04B-00049
Determination of Quality Levels
24590-WTP-3DP-G04T-00905
WTP Radiological Control Manual
24590-WTP-MN-ESH-01-001
Appl. of ALARA in the Design Process
24590-WTP-GPP-SRAD-002
Criticality Safety Evaluation Report
24590-WTP-GPP-SRAD-004
Criticality Safety Program for the WTP
24590-WTP-PL-ENS-03-013
Authorization Basis Maintenance
24590-WTP-GPP-SREG-002
Construction Quality Control Program
24590-WTP-GPP-CON-7101
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT)
24590-WTP-GPP-SIND-002
Hazardous Work Permit
24590-WTP-GPP-SIND-013
Hazard Communication
24590-WTP-GPP-SIND-014
Nonrad. Worker Safety & Health Plan
24590-WTP-PL-IS-01-001
Risk Management Plan
24590-WTP-PL-PR-01-003
Process Operations Business Plan and Strategy Document
24590-WTP-PL-TE-01-010
Research and Technology Plan
24590-WTP-PL-RT-01-002
RPP-WTP Environmental Plan
24590-WTP-PL-ENV-01-004
WTP Construction Environmental Control Plan
24590-WTP-PL-ENV-01-005
Construction Work Packages
24590-WTP-GPP-CON-1201
Special Instructions
24590-WTP-GPP-CON-3105
WTP Conduct of Operations Plan
24590-WTP-PL-OP-01-002
WTP Maintenance Implementation Plan
24590-WTP-PL-OP-01-004
Nonconformance Reporting & Control
24590-WTP-GPP-CON-7104
Construction Deficiency Reporting & Control
24590-WTP-GPP-CON-3106

Perform Work

The EDPI System
24590-WTP-3DP-G01B-00001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Engineering Drawings
24590-WTP-3DP-G04B-00046
Engineering Specifications
24590-WTP-3DP-G04B-00049
Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT)
24590-WTP-GPP-SIND-002
Office Safety
24590-WTP-GPP-SIND-044
Construction Work Packages
24590-WTP-GPP-CON-1201
Special Instructions
24590-WTP-GPP-CON-3105
WTP Document Administration
24590-WTP-GPP-MGT-007
Project Risk Management
24590-WTP-GPP-PT-003
QA Stop Work/Management Suspension of Work
24590-WTP-GPP-MGT-008
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Authorization Basis Maintenance
24590-WTP-GPP-SREG-002
WTP Radiological Control Manual
24590-WTP-MN-ESH-01-001
Packaging Nonradiological Dangerous Waste and Material for Recycle
24590-WTP-GPP-SENV-006
Dangerous Waste Accumulation & Handling
24590-WTP-GPP-SENV-007
Pollution Prevention / Waste Minimization
24590-WTP-GPP-SENV-008
Spill and Release Response
24590-WTP-GPP-SENV-011
Process Operations Business Plan and Strategy Document
24590-WTP-PL-TE-01-010
Research and Technology Plan
24590-WTP-PL-RT-01-002

Feedback and Continuous Improvement

Project Execution Plan
24590-WTP-PL-TE-01-012
Management Assessment
24590-WTP-GPP-MGT-002
Lessons Learned System
24590-WTP-3DP-G01B-00003
Lessons Learned
24590-WTP-GPP-MGT-017
Project Reviews
24590-WTP-3DP-G04B-00033
QA Stop Work/Management Supervision of Work
24590-WTP-GPP-MGT-008
Design Change Control
24590-WTP-3DP-G04T-00901
Construction Subcontract Mgt.
24590-WTP-GPP-CON-4101
Constructability Program
24590-WTP-GPG-CON-1201
PAAA Compliance and Reporting
24590-WTP-GPP-QA-101
Corrective Action
24590-WTP-GPP-QA-201
Nonconformance Reporting & Control
24590-WTP-GPP-CON-7104
Quality Trending
24590-WTP-GPP-QA-204
Root Cause Analysis
24590-WTP-GPP-MGT-015
Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT)
24590-WTP-GPP-SIND-002
Injury/Illness Notification, Investigation, and Reporting
24590-WTP-GPP-SIND-023
Behavior Based Training
24590-WTP-GPG-SIND-004
Ind. Assessment (Audit)
24590-WTP-GPP-QA-501
Assess. and Issue of Noncompliance for Constr. Subcontractor's Safety and Health Compliance
24590-WTP-GPP-SIND-022
DOE, Office of Safety Regulation Action Tracking
24590-WTP-GPG-SREG-004
Quality Assurance Surveillance
24590-WTP-GPP-QA-601
Authorization Basis Maintenance
24590-WTP-GPP-SREG-002
WTP Radiological Control Manual
24590-WTP-MN-ESH-01-001
Dose Assessment Report
24590-WTP-GPP-SRAD-006
Project Safety Committee
24590-WTP-GPP-SREG-001
Research and Technology Plan
24590-WTP-PL-RT-01-002
Employee Concerns Program
24590-WTP-GPP-MGT-005
Performance Measurement
24590-WTP-GPP-GAB-00110
WTP Project ISMS Safety Performance Objectives, Measures, and Commitments
24590-WTP-GPP-SPEC-001

Integrated Safety Management System

Figure 2-5 WTP ISMS Guiding Principles Implementation

Line Management Responsible for Safety

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy
24590-WTP-G63-MGT-001
WTP Environmental Policy
24590-WTP-G63-MGT-002
Hanford Tank Waste Treatment and Immobilization Plant Health and Safety Policy
24590-WTP-G63-SIND-001
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001
Office Safety
24590-WTP-GPP-SIND-044
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Design Process Plan and Description
24590-WTP-PL-ENG-01-004
Site Organization
24590-WTP-GPP-CON-1101
Construction Subcontract Management
24590-WTP-GPP-CON-4101

Clear Roles and Responsibilities

Project Execution Plan
24590-WTP-PL-TE-01-012
Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Design Process Plan and Description
24590-WTP-PL-ENG-01-004
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Application of ALARA in the Design Process
24590-WTP-GPP-SRAD-002
Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan
24590-WTP-PL-ENV-01-004
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001
Criticality Safety Program for the WTP
24590-WTP-PL-ENS-03-013
Process Operations Business Plan and Strategy Document
24590-WTP-PL-TE-01-010
Research and Technology Plan
24590-WTP-PL-RT-01-002
Site Organization
24590-WTP-GPP-CON-1101
Construction Subcontract Management
24590-WTP-GPP-CON-4101

Competence Commensurate with Responsibility

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Indoctrination/Orientation and Training
24590-WTP-3DP-G05B-00034
Employee Education and Experience Verification
24590-WTP-GPP-HR-020
Career Development and Training
24590-WTP-G63-HR-004
Construction Training
24590-WTP-GPP-CON-1301
Training
24590-WTP-GPP-CTRG-002
Process Operations Business Plan and Strategy Document
24590-WTP-PL-TE-01-010
Research and Technology Plan
24590-WTP-PL-RT-01-002

Balanced Priorities

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Pollution Prevention/Waste Minimization
24590-WTP-GPP-SENV-008
Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT)
24590-WTP-GPP-SIND-002
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001
Risk Management for the Waste Treatment Plant
24590-WTP-PL-PR-01-003
Budgeted Cost of Work Scheduled (BCWS)
24590-WTP-GPP-GAB-00105
WTP Construction Environmental Control Plan
24590-WTP-PL-ENV-01-005
Construction Work Packages
24590-WTP-GPP-CON-1201
Construction Subcontract Management
24590-WTP-GPP-CON-4101

Identification of Standards and Requirements

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Design Criteria
24590-WTP-3DP-G04B-00001
RPP-WTP Environmental Requirements and Regulation Guidelines
24590-WTP-GPG-SENV-001
General Safe Work Practices
24590-WTP-GPP-SIND-024
Office Safety
24590-WTP-GPP-SIND-044
Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT)
24590-WTP-GPP-SIND-002
Hazardous Work Permit
24590-WTP-GPP-SIND-013
Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan
24590-WTP-PL-ENV-01-004
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001
WTP Construction Environmental Control Plan
24590-WTP-PL-ENV-01-005
Criticality Safety Program for the WTP
24590-WTP-PL-ENS-03-013
Construction Subcontract Management
24590-WTP-GPP-CON-4101

Hazards Controls Tailored to Work

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Basis of Design
24590-WTP-DB-ENG-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Engineering Calculations
24590-WTP-3DP-G04B-00037
Application of ALARA in the Design Process
24590-WTP-GPP-SRAD-002
Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT)
24590-WTP-GPP-SIND-002
Hazardous Work Permit
24590-WTP-GPP-SIND-013
Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan
24590-WTP-PL-ENV-01-004
WTP Construction Environmental Control Plan
24590-WTP-PL-ENV-01-005
Criticality Safety Program for the WTP
24590-WTP-PL-ENS-03-013

Operations Authorization

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Project Reviews
24590-WTP-3DP-G04B-00033
WTP Document Administration
24590-WTP-GPP-MGT-007
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Hazardous Work Permit
24590-WTP-GPP-SIND-013
Criticality Safety Evaluation Report
24590-WTP-GPP-SRAD-004
Authorization Basis Maintenance
24590-WTP-GPP-SREG-002
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001

Worker Involvement

Accident Prevention Council
24590-WTP-PL-MG-01-008
Safety Communication
24590-WTP-GPP-SIND-045
General Safe Work Practices
24590-WTP-GPP-SIND-024
Office Safety
24590-WTP-GPP-SIND-044
Constructability and Operability Program
24590-WTP-GPP-MGT-004
QA Stop Work/ Management Suspension of Work
24590-WTP-GPP-MGT-008
Employee Concerns Program
24590-WTP-GPP-MGT-005

3.0 Process Engineering Flowsheet Group and Research and Technology

As of the Engineering reorganization effective August 1, the Process Operations group was merged with Process Engineering, except for the Simulator Group which is being transferred to another organization outside of Engineering. Note that the "Flowsheet Group" is now a part of Process Engineering as a subgroup, bringing with it all the scope and functions formerly performed by Process Operations, with exception of the Simulator Group which is being transferred to another organization outside of Engineering. Also effective August 1, Research and Technology (R&T) was moved under Engineering.

Because of the reorganization and merger of functions, there no longer needs to be a distinction in the ISMS description for either Process Operations or what is currently referred to as the "Process Engineering Flowsheet Group" and Research and Technology (R&T). Accordingly, the information that was formerly in this Section (Section 3) that pertained to either Process Engineering Operations or the Process Engineering Flowsheet Group, including the figures, has been folded into Section 4 as applicable. Section 4.6.4 has been updated to reflect R&T's ISMS activities related to design engineering.

The information contained in Section 4 adequately describes the functions now retained by Process Engineering and does not need to specifically call out functions of the flowsheet group or interfaces, since these functions are now integrated and follow the same ISMS principles, work control, etc., as the Engineering organization as a whole.

4.0 Engineering

4.1 Scope

Section 4.0 describes the WTP project production phase activities performed by the Engineering department with support organization interfaces required to produce an engineering design for a WTP that meets applicable standards, codes, and regulations and that will be constructible and operable.

Section 4.0 topics include the following:

- Engineering organization
- Engineering processes and procedures
- Engineering work planning and control
- CM/change control
- Engineering interfaces

4.2 Purpose of Engineering Project Production Phase

The purpose of the project production phase is characterized by dedicated discipline staff concentrating on delivery. The discipline departments will continue to provide support and oversight as well as maintain work process ownership. The engineering project production phase will complete a design in a disciplined manner that will ensure that the WTP is constructed and can be commissioned and operated safely. The engineering design organization major program document 24590-WTP-PL-ENG-01-004, *Design Process Plan and Description,* presents the integrated approach that the engineering department employs to meet contractual requirements. This approach is used to produce a complete design developed in concert with the ISMS core functions and guiding principles.

The success of the production phase is achieved with the following:

- The design output is constructible and operable.
- Engineering requirements are properly identified and communicated.
- The design is compliant with applicable codes, standards, and regulations.
- The design ensures the safety of the workers, the public, and the environment.
- The finished plant will be able to be operated successfully and accomplish the mission set forth by the DOE.
- The waste product meets acceptance criteria and quality requirements.
- Budgets and schedules are met.
- Early procurements are identified.

4.3 Responsibility for Safety

Line management for Engineering is ultimately responsible for ensuring that activities performed under Engineering management purview are conducted safely, in accordance with policies and procedures including 24590-WTP-G63-MGT-001, *Hanford Tank Waste Treatment and Immobilization Plant*

Integrated Safety Management System Policy; 24590-WTP-G63-MGT-002, *WTP Environmental Policy*; and the QAM.

4.4 Engineering Organization

The engineering organization, design processes, and interfaces are described in the document 24590-WTP-PL-ENG-01-004, *Design Process Plan and Description*. This top-level document shows how the WTP contractor is organized to execute the design process. This *Design Process Plan and Description* presents the approach to the design process and the required interfaces for ensuring a cohesive and complete design of the WTP. The plan is in response to the contract deliverable item 3.1 of Table C.5-1.1 referenced in Standard 3 of the WTP contract.

The Engineering organization ensures that the ISMS core functions and guiding principles are being applied to do work safely. Project personnel have been trained on the concepts of ISMS so they understand how work is performed using the ISMS.

4.4.1 Engineering Roles and Responsibilities

The roles and responsibilities for the engineering functions and the implementation of the ISMS core functions and guiding principles in design activities are described in the *Design Process Plan and Description*. The implementing procedures are listed on the Engineering matrix. The Engineering organization also is described in the *Design Process Plan and Description*.

The Manager of Engineering is the WTP project Design Authority. The Design Authority is responsible for design control and ultimate technical adequacy of the design. Design activities are generally performed by engineering teams assigned to each engineering discipline. The Area Project Engineering Managers (APEM) are responsible for schedule and budget related to detailed design activities for their respective area.

4.5 Engineering Design Processes and Procedures

The engineering design process is described in Section 3 of the *Design Process Plan and Description*. Engineering activities and processes, including engineering interfaces with other organizations, are prescribed and controlled by approved engineering procedures and instructions and applicable project documents and procedures. Procedure 24590-WTP-3DP-G03B-00001, *Design Process,* describes the essential engineering activities and overview of the design process.

4.5.1 Engineering and Training

Engineering procedure 24590-WTP-3DP-G05B-00034, *Indoctrination and Training*, describes indoctrination and training activities for Engineering. This training provides employees with a working knowledge of implementation requirements for the quality program; Engineering department policies, procedures, and practices; and relevant procedures such as AB maintenance, environmental, and safety. The Manager of Engineering coordinates general indoctrination and training efforts for the Engineering department.

The general indoctrination is mandatory (Core Training) for all employees. It includes QAM overview; ISMS Policy, and Safety (general safe work practice, safety communication, and office safety). The managers for QA, E&NS, and C&T approve any changes to the core training.

Additional project-specific or position-specific training applies as identified by the Manager of Engineering in accordance with 24590-WTP-GPP-CTRG-002, *Training*. Project and position-specific training is identified by an engineer's manager based on whether the employee will be involved in safety and quality design and by specific position in Engineering (i.e., designer, engineer/architect, or manager). Safety and quality design required training is defined by the Manager of Engineering and includes such training as follows:

- Computer-based training for developing safety standards and requirements, AB maintenance, environmental, CM, and the DCD
- Classroom training for ALARA in design
- Required reading for design change control, determination of quality levels, hazards analysis, development of hazard control strategies, and identification of standards.

Position-specific training may include required reading on such topics as design change control and the SIPD.

4.5.2 Work Planning and Control

The goal of the WTP project design process is to produce a design of high technical quality. This design meets requirements, including technical, operational, contractual, and regulatory requirements in a cost-effective and timely manner, and that protects the safety of the workers, the public, and the environment.

The overall design process and the interactions with other project groups consist of several phases and elements:

- Identification and management of design requirements and criteria
- Conceptual design development
- Preliminary design development
- Prepare analysis and studies as required to provide detail design basis
- Detailed design development
- Specification, material requisition, and subcontract formation and technical administration
- Design integration of packaged equipment supplier design
- Integrated control network configuration
- Regulatory applications support
- Procurement, construction, and startup support activities

The primary characteristics of the WTP project design process that contribute to the high level of quality of the engineering product are:

- Clear definition of the objectives of the project or task (definitive scope and criteria)
- Specific plan for meeting project objectives (design concept and execution plan)
- Early documentation and approval of design criteria and performance requirements or objectives before initiation of detailed design

- Iterations to allow refinement of requirements and assessment of alternate designs to optimize the process and its results
- Integration of pertinent constraints and predecessor design information from other groups/functions
- Identification of process logic and tasks requiring completion before proceeding to the next phase
- Progressive validation and acceptance of the design through a feedback and performance assessment process
- Documentation of the results of intermediate phases to establish and maintain a clear and complete understanding of the design and to serve as a basis for configuration control
- Early and specific definition and implementation of requirements and design baselines

4.5.3 Application of ISMS to Engineering Design Work Control

The ISMS core functions and guiding principles are an integral part of the design process. Through the application of core functions and guiding principles, the design process is executed in a manner that ensures the safety of the workers, the public, and the environment.

Section 2.0 of this document addresses the basic structure of the WTP project ISMS as requirements flow down from the contract. These requirements are implemented by line management through mechanisms prescribed in project-level documents. This section addresses the specific mechanisms and how they are integrated at the project to ensure that Engineering design work is performed safely. WTP project implementing mechanisms are used to manage and perform design work by applying the five core functions and addressing the seven guiding principles. These ISMS implementing mechanisms include the WTP contract, policies, AB documents, plans, procedures, and guides.

Figure 4-1 and Figure 4-2 illustrate the WTP project ISMS infrastructure that references the implementing procedures and other mechanisms that make up the WTP project ISMS to support Engineering design work. Figure 4-1 shows the project documents that are the implementing mechanisms for the ISMS core functions. The documents listed in each column provide elements and attributes to implement the functions. Some documents satisfy more than one function. Figure 4-2 shows the project documents that are the implementing mechanisms for the ISMS guiding principles to support Engineering design work. The documents listed in each column provide elements and attributes to implement the principles. Some documents satisfy more than one guiding principle. For both figures, the lists are not all-inclusive, and may include other documents.

The implementation of the ISMS core functions and guiding principles in the engineering design process are illustrated in Figure 4-3. The five core functions on the outer ring show the work control process together with primary project documents (plans and procedures) that implements the core functions for planning and executing engineering work. Likewise, the implementation of eight guiding principles that provide expectations for how safety is addressed in engineering activities are shown inside the outer ring. At the heart of the guiding principles are the three principles of Line Management Responsibility for Safety, Clear Roles and Responsibilities, and Competence Commensurate with Responsibility. These three key guiding principles, along with the other five, influence how the ISMS core functions are applied to the design that incorporates safety for the worker, public, and environment.

The workflow for the design process consists of the following ISMS elements in the preparation and issuance of design for procurement or construction (Figure 4-3):

- Identification of the design requirements and scope of work (Define Scope)

- Identification and analysis of potential hazards (Analyze Hazards)
- Development of control strategies to prevent or mitigate the hazards (Develop Controls)
- Development of the design incorporating the control strategies (Perform Work)
- Performance of reviews of the design (Feedback)

4.5.3.1 Identification of Design Requirements and Scope of Work

This element initiates the conceptual design development. The scope of work is identified in the WTP contract that establishes the top-level requirements for the project. Other design requirements and constraints are developed from the *Functional Specification*, *Operations Requirements Document*, AB documents, federal and state regulations, BOD, and ICDs. The design is developed to meet all specifications and requirements.

4.5.3.2 Preparation of Design to Meet the Requirements

Conceptual design documents are developed to meet the design requirements and define the scope of work. Conceptual documents describe the evolving design and studies are performed to evaluate alternative concepts. The engineering activities associated with the development and completion of the design of SSCs or subsystems are provided in 24590-WTP-3DP-G03B-00001, *Design Process.*

4.5.3.3 Identification and Analysis of Potential Hazards

ISM reviews for radiological, nuclear, and process safety hazards are conducted per procedure 24590-WTP-GPP-SANA-002, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards.* These reviews ensure that the design is evaluated from the perspectives of identifying potential hazards and for preventing or mitigating these hazardous situations.

This hazard assessment process is conducted to meet the top-level requirements in RL/REG-96-0004 as implemented by the standards in Appendix A of the SRD. ISM teams are used to implement the ISM process. These ISM teams include hazard assessment experts, engineers involved in the work activity, and experienced operations personnel. The teams identify radiological, nuclear, and process safety hazards and hazardous situations from both natural and manmade sources originating from outside and inside the WTP associated with the work.

Hazard control strategies are developed in the form of safety case requirements associated with specific SSCs and are further developed as design requirements and implementing standards. These design requirements are captured in the SIPD (Section 4.5.3.6.2). The specific activities associated with ensuring that environmental hazards are identified and considered during design are discussed in Section 4.6.2.4.

The document 24590-WTP-PL-ENG-01-004, *Design Process Plan and Description,* describes the areas of responsibility for design disciplines. Fire Protection engineers work with E&NS fire hazard experts to identify and mitigate fire hazards associated with the work. They also interface and work with architectural engineers to evaluate project life safety requirements. The architectural engineers determine the occupancy classification of the facilities and ensure that the IS&H requirements are factored into the design. The ISM team may include IS&H experts to assist or confirm the adequacy of design to comply with OSHA requirements.

Human factors and ergonomic practices (Section 2.4.17) are included in the design of interfaces between the operating personnel and the facility. This ensures the facility is user-friendly to minimize operator errors and to ensure that the operator can easily and accurately respond to those situations in which human response is beneficial or required.

An integrated team of engineering personnel familiar with process systems materials and design, radiological safety experts, and experienced operations personnel identify real and potential radiation hazards, and perform ALARA assessments. These hazard assessments are documented in ALARA design reviews. The concept of ALARA is applied to design in accordance with *Application of ALARA in the Design Process* (24590-WTP-GPP-SRAD-002). Criticality hazards and controls are identified during the design phase in accordance with 24590-WTP-GPP-SRAD-003, *Management of Criticality Control,* and 24590-WTP-GPP-SRAD-004, *Criticality Safety Evaluation Report.*

4.5.3.4 Development of Control Strategies to Prevent or Mitigate the Hazards

As described in 24590-WTP-GPP-SANA-002, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards*, the ISM teams identify control strategies that mitigate or prevent hazards and select the preferred strategy. This activity and the requirements from applicable codes and standards are documented. The documented control strategy and requirements become design requirements to be incorporated into design documents by the responsible engineers. Design requirements for IS&H and fire protection are identified by the architectural, fire protection, and IS&H disciplines.

4.5.3.5 Development of the Design Incorporating Control Strategies

The design engineers incorporate the design requirements to meet the control strategies identified for their design area. The requirements as identified are inputs to the design in accordance with procedure 24590-WTP-3DP-G04B-00001, *Design Criteria.* Industrial safety and health and fire protection design requirements are identified and documented by the responsible discipline and included in the design requirement documents.

4.5.3.6 Design Criteria Management

Procedure 24590-WTP-3DP-G04B-00001, *Design Criteria*, defines requirements for identifying, selecting, controlling, and documenting design criteria used as design input.

Design engineers obtain process and safety criteria from two databases maintained by the WTP project, the DCD and SIPD.

4.5.3.6.1 Design Criteria Database

Changes to source documents are reviewed, approved, and controlled in accordance with 24590-WTP-GPP-MGT-007, *WTP Document Administration*, except for AB documents, which have a specific AB change procedure (Section 2.4.1.1) and the WTP contract, which is controlled by contract modifications. Operations reviews the original and changes to the *Functional Specification* and *Operations Requirements Document*, and Engineering reviews the other source documents to identify design criteria to include in the DCD.

4.5.3.6.2 Standards Identification Process Database

The SIPD records and tracks information generated by the ISM process that culminates in identification of a set of design standards selected to ensure that the design meets applicable safety criteria. Design engineers identify explicit safety design requirements from SIPD in accordance with procedure 24590-WTP-GPP-SANA-003, *Standards Identification Process Database*. The information is used as a basis for assessing changes to the design for impact on the safety case as well as to demonstrate that the design meets safety requirements. Safety engineers review changes to existing safety requirements and modify or update the database.

4.5.3.7 Performance of Design Reviews

Design documents are independently checked by an individual qualified to originate the document and reviewed by individuals and organizations that are technically competent for the subject area, other than the originating function, to ensure design adequacy. The Engineering procedure 24590-WTP-3DP-G03B-00001, *Design Process*, describes the checking and review mechanisms.

In addition to checking for technical correctness, completeness, and compliance with procedures, the checking process includes checking for conformance to design criteria, AB compliance and that the identified inputs are implemented in the design. Review of Engineering documents is performed in accordance with 24590-WTP-3DP-G04T-00913, *Review of Engineering Documents.*

- Design drawings are checked and approved in accordance with 24590-WTP-3DP-G04B-00046, *Engineering Drawings*.
- Specifications are checked and approved in accordance with 24590-WTP-3DP-G04B-00049, *Engineering Specifications*.
- Calculations are checked and approved accordance with 24590-WTP-3DP-G04B-00037, *Engineering Calculations*.
- Applicable design documents are reviewed by QA in accordance with 24590-WTP-GPP-QA-207, *Quality Assurance Review of Documents*. This procedure also provides checklists for QA review of design documents and test and operating plans and work packages.
- Design documents identified in 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*, are reviewed by E&NS.

4.5.3.8 Design Verification

Design verification per 24590-WTP-3DP-G04B-00027, *Design Verification,* applies to final design documents involving or containing ITS or immobilized HLW (IHLW) product quality-affecting SSCs to ensure that the SSCs are adequately designed and that the designs are properly integrated. Design verification is also performed whenever a significant change is made to a previously verified design and is accomplished using a single process or a combination of processes. These verification processes are design review, qualification testing, and use of alternative calculation methods.

4.5.3.9 Issuance of Design for Procurement and Construction

Documents are reviewed and verified to ensure that design requirements and control strategies are incorporated and that the design is ready to be implemented. When the design matures sufficiently, documents are approved for procurement and/or construction. Documents are reviewed and approved in

accordance with 24590-WTP-3DP-G04T-00913, *Review of Engineering Documents.* Engineering drawings are reviewed and approved in accordance with 24590-WTP-3DP-G04B-00046, *Engineering Drawings,* and specifications are reviewed and approved in accordance with 24590-WTP-3DP-G04B-00049, *Engineering Specifications.*

Design changes are processed in accordance with 24590-WTP-3DP-G04T-00901, *Design Change Control,* and 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance.* Feedback and lessons learned are incorporated as appropriate in design changes.

4.5.4 Procurement and Construction Support

The format, content, and information exchange methods for purchasing activities are specified in engineering procedures 24590-WTP-3DP-G06B-00001, *Material Requisitions;* 24590-WTP-3DP-G06B-00002, *Subcontracts;* and 24590-WTP-3DP-G06B-00010, *Specifying Supplier Quality Assurance Program Requirements*. Engineering maintains a Master Equipment list that identifies the equipment items to be procured. Commodities are identified in acquisition and engineering drawings.

Design personnel prepare acquisition technical specifications, scopes of work, and Material Requisitions (MRs). Engineering reviews supplier technical submittals, resolves supplier contract deviation requests, and provides technical support for purchasing activities.

The engineering design products are used for acquisition and construction of SSCs. The engineering design products are also used during commissioning to define the baseline and support plant operations. The review and approval of design documents is described in 24590-WTP-3DP-G04T-00913, *Review of Engineering Documents*. This procedure requires that the review include incorporation of the design requirements identified in the requirements documents. The documents are reviewed to be consistent with the AB before approval and issue for construction or purchase. Once issued for construction or purchase, changes are under a higher degree of configuration control.

E&NS requirements are also addressed in the General Conditions of each subcontract or purchase order pro forma for non-commercial supplies and services. The reference is WTP contract Section I, DEAR clause I.105 (952.223-71), *Integration of Environment, Safety and Health into Work Planning and Execution (June 1997).*

Engineering will support the needs of construction and commissioning. Changes to the design from construction are processed in accordance with procedure 24590-WTP-3DP-G04B-00062, *Disposition of Field Change Requests and Field Change Notice.*

4.6 Engineering ISMS Interfaces

The WTP applies a systems engineering, multi-disciplinary approach to ensure that the design meets DOE requirements. Engineering disciplines interface with other project organizations including QA, E&NS, and C&T. QA, E&NS, and Operations interfaces are discussed below. Section 6.6.1 discusses C&T interfaces with Engineering to ensure that operational and commissioning concerns are addressed. C&T provides input to Engineering on operation and maintenance activities by participation in ISM teams and support of engineering design reviews.

4.6.1 Quality Assurance Interface with the Design Process

The application of the QA program for radiological and nuclear process safety is described in the QAM. Engineering controls the classification process for quality-affecting items and activities based on the safety classification from the ISM process and/or IHLW product quality-affecting functions in accordance with 24590-WTP-3DP-G04T-00905, *Determination of Quality Levels*.

4.6.2 Environmental and Nuclear Safety Interface with the Design Process

E&NS has direct involvement and requires close interfaces with engineering design and across all functional departments. E&NS roles and responsibilities are to maintain the health and safety of the worker and the public, protection of the environment, and compliance with applicable laws and regulations. Three major E&NS programmatic elements discussed below are (1) Radiological, Nuclear and Process Safety (ISM Process), (2) Radiation Protection, and (3) Environmental Regulatory and Permit Requirements.

E&NS provides the following project functions related to the design of the WTP:

- Establish and communicate to the design organization the performance requirements for preventive and mitigative ITS SSCs
- Coordinate application of the ISM process for design standard selection
- Establish and communicate to the design organization those risk management and reliability requirements for plant systems needed to meet radiological, nuclear, and process safety requirements
- Determine acceptable design margin and appropriate conservatisms for meeting safety requirements
- Establish and communicate radiation protection requirements including radiation shielding, ALARA, dose assessments, and criticality safety requirements
- Perform hazard and accident analysis for design basis events
- Perform reliability and risk assessments for ITS SSCs
- Develop fire protection requirements
- Develop work process guidance related to safety and environmental protection
- Prepare regulatory compliance documents such as safety analysis reports, dangerous waste and water and air permits
- Participate in safety oversight committees
- Develop AB documentation
- Perform AB document maintenance and provide oversight of the AB maintenance process

4.6.2.1 Radiological, Nuclear, and Process Safety Integration with Design (ISM Process)

The ISM process supports incorporation of safety standards and requirements, as identified and tailored to the WTP hazards and hazardous situations, into the WTP design. This includes identification of scope of work, performance of hazard analysis, identification of control strategies, and development of radiological, nuclear, and process standards to implement preferred control strategies. Thus, the ISM process is an important element of the overall ISMS.

Figure 4-4 illustrates the flow of the ISM process to provide the safety analysis required to support design. This process complies with the methodology in DOE/RL-96-0004, which specifies an approach

for development of an ISM process. The ISM process is described in detail in its implementing standard, Appendix A of the SRD.

The process and responsibilities for implementing the ISM process is in the procedure 24590-WTP-GPP-SANA-002, *Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards.* The identification of scope of work, hazard analysis, and identification of control strategies are performed by ISM teams composed of cognizant design engineers, safety personnel, operations personnel and, as appropriate, subject matter experts (e.g., human factors specialists, fire protection engineers, criticality safety analysts, structural engineers, process engineers, health physicists, occupational safety and industrial hygiene specialists).

The results of the ISM process are incorporated into the design as described in the *Design Process Plan and Description*. The standards and requirements to meet the safety control strategies are identified in the ISM process, documented in the SIPD, and provided as requirements to support engineering design. The design inputs are documented in accordance with 24590-WTP-3DP-G04B-00001, *Design Criteria.*

The WTP controls hazardous situations by providing preventive and mitigative features. Hazardous situations are prevented either by removing the hazard or hazardous situation by design, or by providing administrative and engineered controls such that the consequence of the hazardous situation is acceptably low. Hazardous situations are mitigated by providing reliable and robust protection such that, if the hazardous situation were to occur, its consequences would be acceptably low. This reliability and robustness is achieved, in part, by the preference for passive engineered features with their inherent safety. Administrative controls for accident prevention include training and procedures related to normal operation, facility maintenance, and the commitment to a strong safety culture. Engineered features that enhance accident prevention and mitigation include application of proven engineering practices.

The WTP uses a deterministic approach to control hazardous situations. This is accomplished in tandem with the evolving design. Early recognition of hazardous situations, when the design is most flexible, allows maximum use of this approach. Where hazardous situations cannot be removed by design, protection is identified to prevent or mitigate the hazardous situation. The degree of protection applied is commensurate with the consequence and frequency of the hazardous situation. Defense-in-depth means that multiple layers of protection are applied against the hazardous situation such that no one layer of protection is completely relied on to ensure safe operation of the facility. The number of layers of protection, or barriers, is dependent upon the severity (i.e., consequence) of the hazardous situation to be prevented or mitigated.

The analysis to show compliance with the accident risk goals (SRD Safety Criteria 1.0-3 and 1.0-5) may identify the need for additional barriers to not only satisfy the accident risk goals but also to achieve additional defense-in-depth. One aspect of defense-in-depth is that no single failure of protection will allow a hazardous situation to occur. Protection is either passive or active. Passive protection features are inherent features of the design that provide protection without the need for action (e.g., shielding).

An element of the line of defense against the occurrence of hazardous situations is providing training and procedures that serve to reduce the probability of operator error and facilitate prompt and proper operator response to off-normal conditions. Prompt and reliable operator response serves to reduce the challenges to preventive and mitigative engineered safety features.

Defense-in-depth is applied by specifying that protection against a hazardous situation always combines engineered features and administrative controls providing prevention and mitigation, so that excessive reliance is not placed on any one system.

4.6.2.2 Radiation Protection in the Design Process

The document 24590-WTP-RPP-ESH-01-001, *Radiation Protection Program for Design and Construction* (RPP), documents the standards, requirements, administrative controls, responsibilities, and authorities required for compliance within the scope of WTP radiological activities. It is therefore the regulatory technical basis that ensures the radiological safety of facility workers, co-located workers, visitors, and onsite members of the public. The RPP is a designated source document for design criteria contained in the DCD as described in Section 4.5.3.6, Design Criteria Database, to ensure that radiation protection and ALARA design criteria are captured in the design.

4.6.2.2.1 Radiation Protection Requirements

The document 24590-WTP-PL-NS-01-002, *RPP-WTP Occupational ALARA Program,* provides elements for establishing and operating an occupational ALARA program that complies with DOE requirements specified in 10 CFR 835.

The ALARA Program amplifies the regulatory requirements of 10 CFR 835 by incorporating additional guidance, recommendations, and considerations from DOE G 441.1-2, *Occupational ALARA Program Guide* and *Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations will be As Low As Reasonably Achievable* (NRC Regulatory Guide 8.8). It provides explanations and examples of program elements used in conducting an effective ALARA process for design and construction that will ensure ALARA exposures during WTP operation.

The ALARA Program describes the process and identifies procedures for applying ALARA principles to WTP design. ALARA design criteria and design considerations, consistent with 10 CFR 835, are developed and applied throughout design and construction. ALARA design decisions are documented consistent with 10 CFR 835.704(b) using the ALARA Design Review record, which is implemented by *Application of ALARA in the Design Process* (24590-WTP-GPP-SRAD-002). The ALARA design process is applied in all stages of WTP design, construction, and operation. ALARA process components are described and implemented by approved procedures and design guides. The procedure 24590-WTP-GPP-SRAD-002, *Application of ALARA in the Design Process*, and guide 24590-WTP-GPG-SRAD-001, *Design Guide for ALARA*, are the principal ALARA implementation documents.

4.6.2.2.2 RPP Roles and Responsibilities

The radiation protection and ALARA design criteria are provided by E&NS radiation protection experts. Design engineers are responsible for implementing and documenting ALARA design criteria and ALARA design considerations. Supervisors are responsible for ensuring that individuals are trained in ALARA criteria and considerations and for reviewing designs against those criteria and considerations. Periodic interdisciplinary ALARA reviews are conducted by teams of design engineers, radiation protection experts, and operations personnel to ensure that ALARA concepts are being integrated into all aspects of the design. Formal design reviews are performed by the design engineers to confirm the appropriate incorporation of ALARA features into the design.

4.6.2.2.3 Radiation Protection Design Verification

Radiation protection design verification occurs through the design review process, including the issuance of ALARA design review records.

Final verification of design adequacy is documented through issuance of a dose assessment report for each process facility, in accordance with 24590-WTP-GPP-SRAD-006, *Dose Assessment Report.*

4.6.2.3 Environmental

Environmental requirements and interfaces are provided to Engineering and the engineering design process through Environmental group managed documents, environmental permits, and the Regulatory Integration organization.

4.6.2.3.1 Environmental Regulatory Requirements

A comprehensive list of environmental design requirements and standards applicable to the current project status, level of design, and regulatory guidance are in 24590-WTP-DB-ENG-01-001, BOD. These design criteria and requirements have been identified from the environmental regulations relevant to the WTP. To support the BOD environmental section, the document 24590-WTP-GPG-SENV-001, *RPP-WTP Environmental Requirements and Regulation Guidelines*, has been developed to assist the WTP Environmental group in identifying and assembling environmental requirements that have the potential to be relevant to the WTP project and its design. As decisions are made, the applicable environmental requirements are migrated from 24590-WTP-GPG-SENV-001 to the BOD. Design criteria that are part of the BOD are entered into the DCD as described in 24590-WTP-3DP-G04B-00001, *Design Criteria*. Procedure 24590-WTP-GPP-SENV-016, *Identification and Management of Environmental Permit Requirements*, describes the process for identifying and disseminating WTP permit requirements.

4.6.2.3.2 Environmental Permit Requirements

The procedure 24590-WTP-GPP-SENV-009, *Environmental Permits,* lists the environmental permits and approvals needed to design, construct, and operate the WTP. These permits contain conditions and commitments that reflect the WTP design and construction and commissioning conditions at the time of their approval. Procedure 24590-WTP-GPP-SENV-010, *Dangerous Waste Permit Maintenance,* identifies the process to ensure that the facility design and the environmental permit applications, approved permits, and licensing documents maintain consistency as the project design evolves.

4.6.2.3.3 Regulatory Integration Organization

To support the integration of environmental design requirements, permit conditions, and regulatory guidance into project design, the Regulatory Integration organization has assigned a representative to each major WTP facility: HLW, LAW, PT/balance of facilities (BOF), and analytical laboratory. These individuals interface with Engineering, design groups, and regulatory agencies. They organize and attend concerns meetings, project interface meetings, regulatory meetings, and engineering/design interface meetings to facilitate integration of environmental requirements into design and to address environmental hazards and issues.

4.6.3 Safety Assurance Interface with Engineering

The SA design requirements are mainly in 29 CFR 1910. These requirements are incorporated into project design packages through the actions of the ISM teams and interactions between the teams and SA. Confirmatory SA reviews of selected design packages help verify the adequacy of design.

4.6.4 Research and Technology

R&T supports Engineering design efforts by providing confirmatory testing and analyses, and by developing requested design input information. An overall Technology Roadmap management plan outlines the roles and responsibilities, work control methods, and key issues for design input. The roadmap is developed with input from the Engineering functions. Engineering communicates their needs to R&T through a design requirements document.

In support of the ISMS activities related to design engineering, OR&T does not directly identify hazards or provide hazards mitigation strategies to Engineering. Rather, R&T provides material balances and technical data/reports that furnish input to design related functions.

The R&T mission, organizational structure, roles, and responsibilities are described in the documents 24590-WTP-PL-RT-01-002, *Research and Technology Plan,* 24590-WTP-PL-RT-04-001, *Plan Addendums* and (24590-WTP-PL-RT-01-002), 24590-WTP-PL-RT-02-006, *Research and Technology Roles and Responsibilities.* The role of the R&T organization is to demonstrate the WTP design concept and thereby reduce project risks. R&T provides project services including experimental work to validate hypotheses and provide input data for design, permitting activities, and safety analyses. R&T develops the waste form qualification specifications and performs process verification testing. The research and testing activities fulfill contract requirements of identifying risks and evaluating appropriate mitigating technologies compatible with cost and scheduling for consideration in the WTP. Research and testing is accomplished with subcontractors whose work is coordinated by R&T staff. Subcontracted research work performed at DOE-owned or leased facilities that involve complex or hazardous work follow ISMS principles. Upon completion of the research activity, the subcontractor writes a comprehensive test report. The results are analyzed and, where appropriate, are translated into process and equipment selection, mass and energy balances (flowsheets) through Engineering design activities.

To ensure adequate controls during the development of work scope and data acceptance, a process for specification of work release and clear steps for data review and incorporation into the project has been established. These controls are based on lessons learned from R&D project support activities within the DOE complex and commercial plant startups. The *Research and Technology Plan* includes detailed strategies for closure of open items.

4.6.5 Interface Control

Engineering interface control is managed in accordance with 24590-WTP-3DP-G04B-00025, *Engineering Interface Control.* The interfaces with other Hanford Site organizations are controlled by ICDs and interface teams composed of WTP, DOE, and interfacing organization personnel. The ICD/interface supervisor oversees the activities of the interface teams. Interfaces within the WTP project are coordinated through interaction of the design engineers and discipline managers.

The ICDs are designated source documents for design criteria in the DCD, as described in Section 4.5.3.6, Design Criteria Database, to ensure that multi-contractor interface requirements are met and controlled in the design process.

Figure 4-1 ISMS Core Functions Implementation in Engineering Design

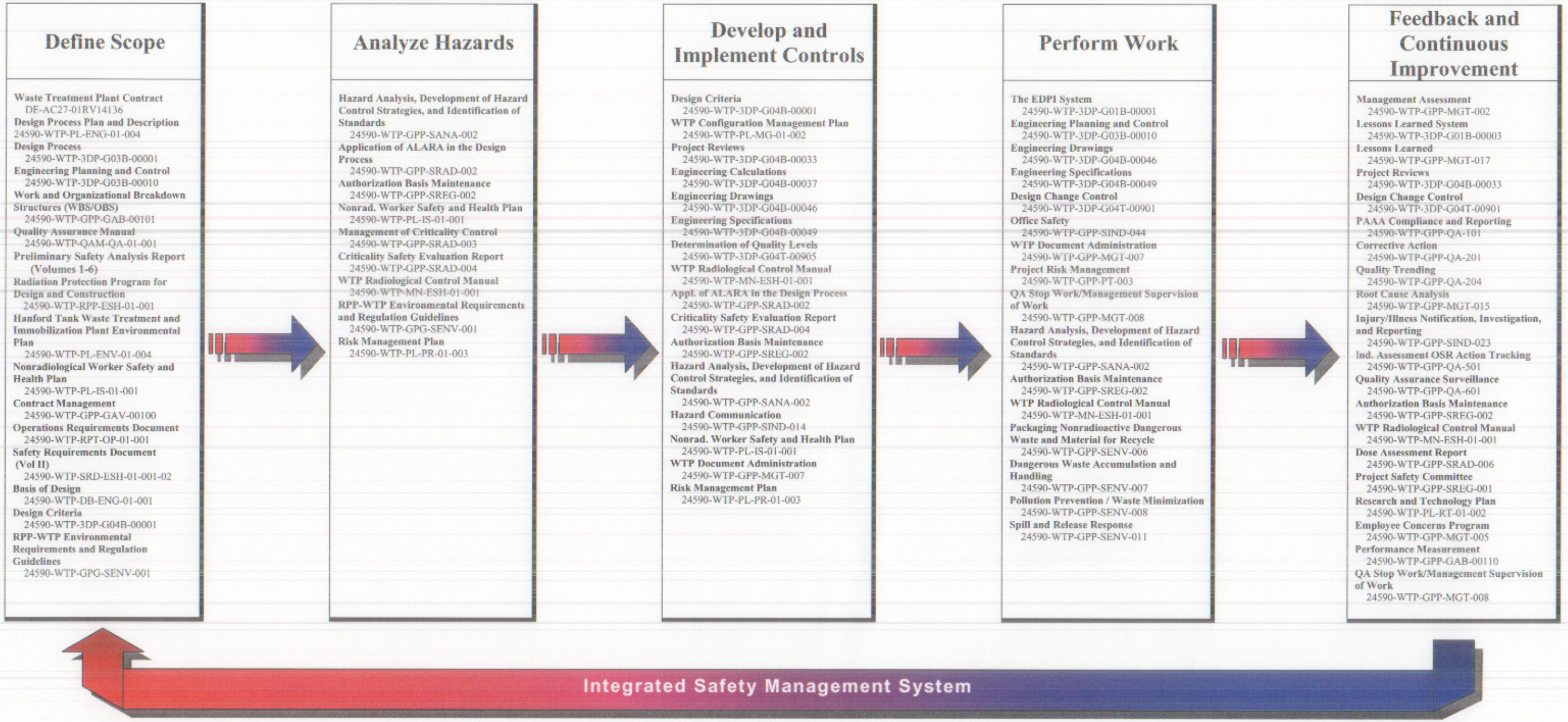


Figure 4-2 ISMS Guiding Principles Implementation in Engineering Design

Line Management Responsible for Safety

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy
24590-WTP-G63-MGT-001
WTP Environmental Policy
24590-WTP-G63-MGT-002
Hanford Tank Waste Treatment and Immobilization Plant Health and Safety Policy
24590-WTP-G63-SIND-001
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001
Office Safety
24590-WTP-GPP-SIND-044
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Design Process Plan and Description
24590-WTP-PL-ENG-01-004
Design Process
24590-WTP-3DP-G03B-00001
The EDPI System
24590-WTP-3DP-G01B-00001

Clear Roles and Responsibilities

Project Execution Plan
24590-WTP-PL-TE-01-012
Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Application of ALARA in the Design Process
24590-WTP-GPP-SRAD-002
Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan
24590-WTP-PL-ENV-01-004
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001
Criticality Safety Program for the WTP
24590-WTP-PL-ENS-03-013
Design Process Plan and Description
24590-WTP-PL-ENG-01-004
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002

Competence Commensurate with Responsibility

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Indoctrination / Orientation and Training
24590-WTP-3DP-G05B-00034
Employee Education and Experience Verification
24590-WTP-GPP-HR-020
Career Development and Training
24590-WTP-G63-HR-004
Training
24590-WTP-GPP-CTRG-002
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002

Balanced Priorities

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Pollution Prevention/Waste Minimization
24590-WTP-GPP-SENV-008
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001
Risk Management for the Waste Treatment Plant
24590-WTP-PL-PR-01-003
Work and Organizational Breakdown Structures (WBS/OBS)
24590-WTP-GPP-GAB-00101
Budgeted Cost of Work Scheduled (BCWS)
24590-WTP-GPP-GAB-00105

Identification of Standards and Requirements

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Design Criteria
24590-WTP-3DP-G04B-00001
RPP-WTP Environmental Requirements and Regulation Guidelines
24590-WTP-GPG-SENV-001
General Safe Work Practices
24590-WTP-GPP-SIND-024
Office Safety
24590-WTP-GPP-SIND-044
Field Implementation of Environmental Notices of Construction
24590-WTP-GPP-SENV-002
Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan
24590-WTP-PL-ENV-01-004
Nonradiological Worker Safety and Health Plan
24590-WTP-PL-IS-01-001

Hazards Controls Tailored to Work

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Basis of Design
24590-WTP-DB-ENG-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Engineering Calculations
24590-WTP-3DP-G04B-00037
Application of ALARA in the Design Process
24590-WTP-GPP-SRAD-002
Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan
24590-WTP-PL-ENV-01-004
Management of Criticality Control
24590-WTP-GPP-SRAD-003
Criticality Safety Evaluation Report
24590-WTP-GPP-SRAD-004

Operations Authorization

Safety Requirements Document
24590-WTP-SRD-ESH-01-001-02
Preliminary Safety Analysis Report (Volumes 1-6)
Quality Assurance Manual
24590-WTP-QAM-QA-01-001
Radiation Protection Program for Design and Construction
24590-WTP-RPP-ESH-01-001
Engineering Planning and Control
24590-WTP-3DP-G03B-00010
Project Reviews
24590-WTP-3DP-G04B-00033
WTP Document Administration
24590-WTP-GPP-MGT-007
Engineering Drawings
24590-WTP-3DP-G04B-00046
Engineering Specifications
24590-WTP-3DP-G04B-00049
Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards
24590-WTP-GPP-SANA-002
Criticality Safety Evaluation Report
24590-WTP-GPP-SRAD-004
Authorization Basis Maintenance
24590-WTP-GPP-SREG-002
Nonrad. Worker Safety and Health Plan
24590-WTP-PL-IS-01-001

Worker Involvement

QA Stop Work/Management Supervision of Work
24590-WTP-GPP-MGT-008
Hanford Tank Waste Treatment and Immobilization Plant Health and Safety Policy
24590-WTP-G63-SIND-001
Employee Concerns Program
24590-WTP-GPP-MGT-005
Management Assessment
24590-WTP-GPP-MGT-002
Lessons Learned System
24590-WTP-3DP-G01B-00003
Project Reviews
24590-WTP-3DP-G04B-00033
Performance Measurement
24590-WTP-GPP-GAB-00110
Root Cause Analysis
24590-WTP-SV-QA-01-007
Total Installed and Operated Cost
24590-WTP-ITC-IT-02-025
Six Sigma Program
WTP Mentoring Network

Figure 4-3 ISMS in Engineering

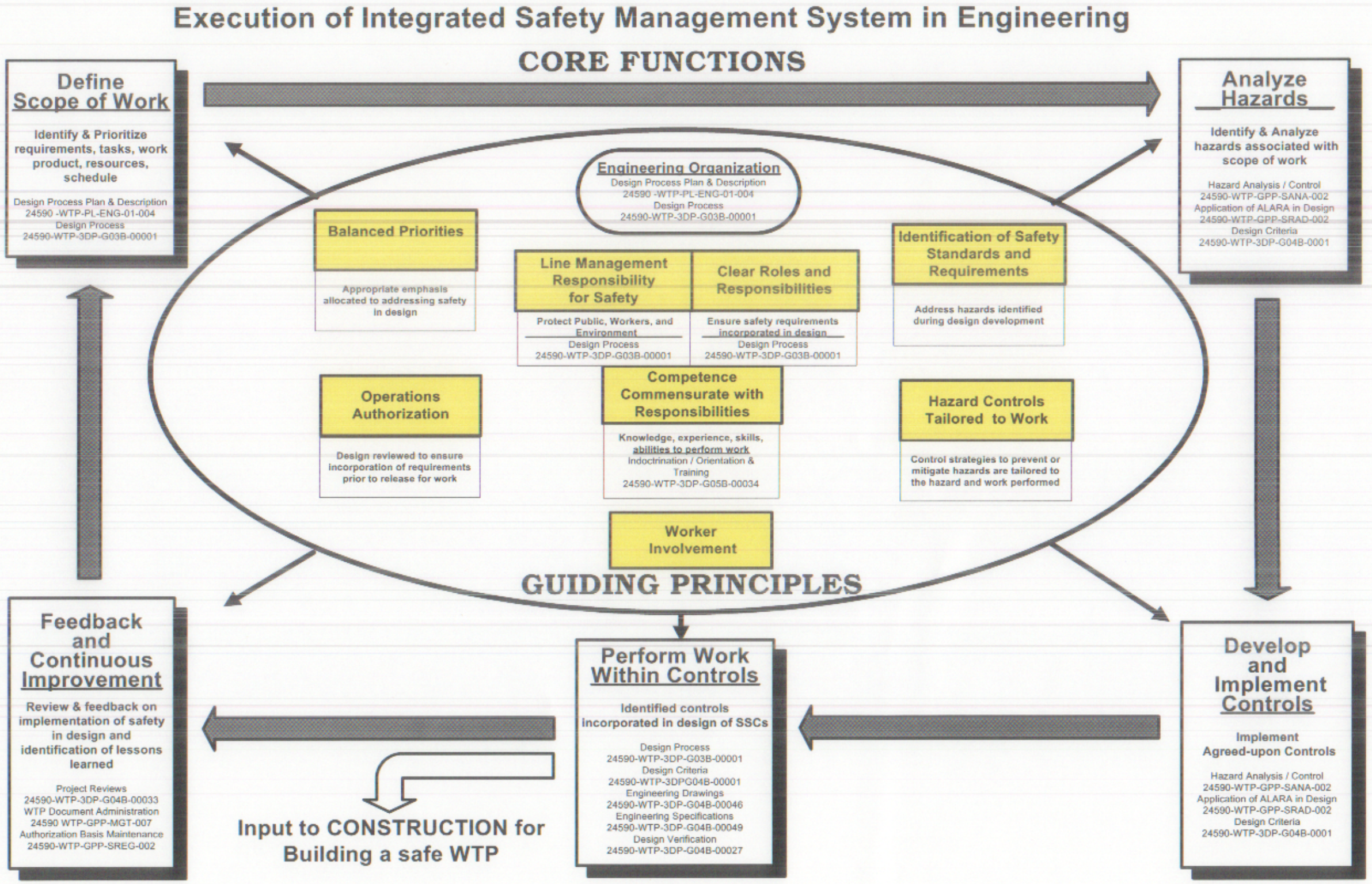
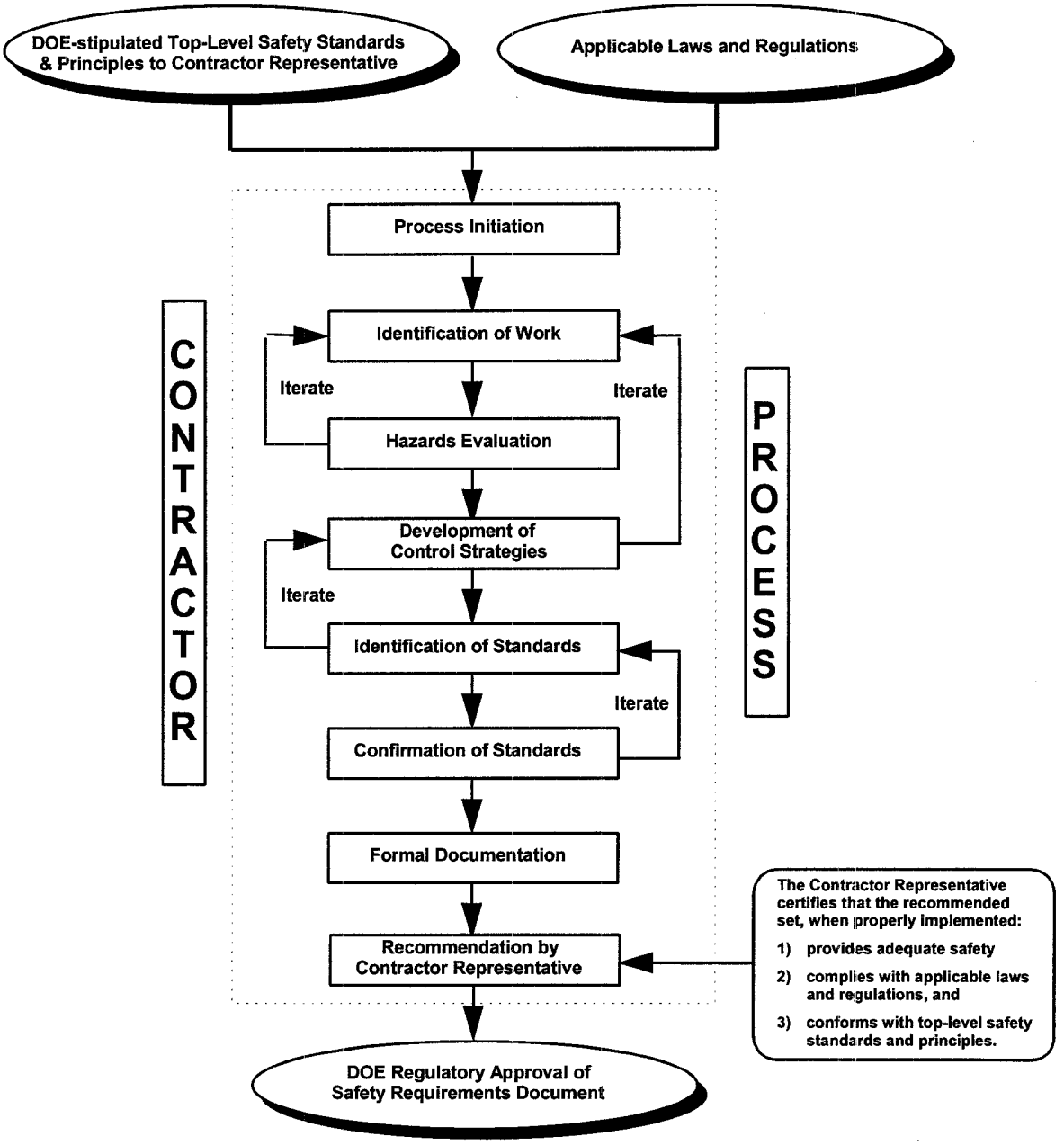


Figure 4-4 ISM Process

Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for the RPP Waste Treatment Plant Contractor (DOE/RL-96-0004)



5.0 Construction

5.1 Scope

Section 5.0 describes the construction management process used to build the WTP to ensure that the facilities are constructed safely in accordance with project requirements.

Section 5.0 topics include the following:

- Construction organization
- Construction processes and procedures
- Construction work planning and controls
- CM/change control
- Construction interfaces

5.2 Purpose of Construction Project Phase

The construction phase includes activities for construction of the WTP. The WTP construction management process provides a disciplined approach for conducting construction activities that ensures that the facilities are constructed safely and in accordance with project requirements. The WTP includes primary process facilities that enclose major process components, namely pretreatment (PT), LAW vitrification, and HLW vitrification. Support systems (BOF) provide required utilities to each of these waste treatment process facilities. An analytical laboratory (Lab) will be constructed to support operations.

The WTP facilities will be constructed consistent with the ISMS core functions and guiding principles. Construction activities will be performed in compliance with applicable codes and standards, and in accordance with the detailed engineering specifications, drawings, and requirement documents developed by Engineering.

The construction planning and implementation activities progress through several construction and environmental permitting phases to obtain authorization for full completion of the planned plant facilities. The DOE authorization to initiate construction activities is accomplished in a phased approach that includes approval of an LCAR, a Partial Construction Authorization Request (PCAR), the Preliminary Safety Analysis Report (PSAR), and the Construction Authorization Request (CAR). Environmental permit applications are submitted to and approved by the appropriate state regulatory agency.

The procedure 24590-WTP-GPP-CON-1101, *Site Organization,* describes the overall construction management system. Specific construction procedures and guides define the approach Construction uses to conduct the construction activities. These documents describe the following key quality features required to ensure safe and efficient construction management:

- Ensuring that ISMS principles are utilized for performing work activities
- Implementing appropriate work process planning and control for direct hire and subcontractor employees
- Clear definition of work scope, objectives, and a listing of primary tasks involved

- Implementing a systematic mechanism for identification and analysis of applicable hazards and tailoring controls to the specific work activities
- Empowering worker input to hazard identification and mitigation
- Identification and application of appropriate implementing documents and administrative controls for addressing prerequisites, special controls, safety requirements, and QC
- Identification of resource and skill requirements for qualified direct hire and subcontract resources
- Assignment of qualified and trained personnel to perform the work safely
- Promoting the concept of accountability and checking of completed work by the installer
- Verification and inspection by others, commensurate with the quality level of the work being performed
- Identification of required records, and the recording of objective evidence of the results of the work performed
- Reporting of performance measures including safety and quality indicators
- Ensuring an effective process for obtaining feedback on opportunities for improved safety or improvements in construction activities
- Management commitment to incorporate applicable and relevant feedback to improve the work processes and work activities

5.3 Responsibility for Safety

Construction line management is responsible for ensuring that all activities performed under the Construction purview are performed according to applicable procedures. The *Site Organization* procedure indicates that workers and management have a responsibility to perform work safely. Management commitment and responsibility for safety is reflected in project policies and procedures including 24590-WTP-G63-MGT-001, *Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy*; 24590-WTP-G63-002, *WTP Environmental Policy*; and the QAM.

5.4 Construction Organization

The Construction organization is led by the Manager of Construction, whose primary responsibility is the safety of site workers including subcontractors and visitors. In concert with the ISMS, the Manager of Construction ensures that project requirements are applied to perform work safely and effectively. The Manager of Construction oversees construction performance including safety, quality, site security, labor relations, and the execution of subcontracts. The Manager of Construction reports to the WTP Project Manager.

The Manager of Construction is responsible for the overall management of the WTP site, site work force, and implementation of the plans and procedures governing construction activities. The Construction Manager implements this direction through the following construction management staff:

- Deputy Manager of Construction
- Field Safety Assurance Manager
- Field QC Manager
- Site Manager

- Field Service Manager
- Labor Relations Manager
- Field Project Controls Manager
- Field Subcontracts Manager
- Field Engineering Manager
- Field Procurement Manager
- General Superintendent
- Area Superintendents

5.4.1 Construction Roles and Responsibilities

Construction roles and responsibilities are described in 24590-WTP-GPP-CON-1101, which provides the division of responsibilities and roles of authority for construction management at the site. The division of responsibility and the established levels of authority provide the means for maintaining a safe work place for the worker and for protection of the public and the environment. The responsibility for safety flows to all levels of construction personnel. All construction employees are responsible to adhere to project requirements to ensure their own safety, the safety of their coworkers, the safety of the public, and the protection of the environment.

5.5 Construction Processes and Procedures

5.5.1 Project Construction Training

Introduction

Personnel training required to support construction includes both core training and training specific to construction activities. The generic core training requirements fall under 24590-WTP-GPP-CTRG-002, *Training,* procedure and are generally common across non-manual positions. The procedure 24590-WTP-GPP-CON-1301, *Construction Training,* provides the minimum training requirements and guidance that ensure construction personnel possess the necessary experience, knowledge, skills, and abilities. This procedure applies to all WTP construction employees, including full time, part time, and contracted. It provides instructions to ensure that personnel have the knowledge, skills, and abilities commensurate with their job assignments. It specifically provides orientation training for construction personnel (manual, non-manual, and subcontract personnel, and construction site visitors). It also describes the process to identify, record, and track project-specific training completed by construction personnel.

The training includes nonradiological worker safety and health plan required training, and courses on general safe work practices.

Qualification of Construction Employees

The process for qualification of construction employees is described in procedure 24590-WTP-GPP-CON-1301, *Construction Training* . Qualification of WTP direct-hire and non-manual personnel (including staff augmentation) consists of evaluating skills and abilities against statements of requirements through interviews and reviews of education, experience, and work history, in accordance with 24590-WTP-GPP-CTRG-002. Qualification of manual (craft) personnel is based on education, OJT, and experience acquired during an apprenticeship program as a member of a labor union ("skill of the

craft"). Qualification of subcontractor employees is stipulated in the subcontract documents. No additional qualification evaluations are required.

The construction training database is used to identify, track, and record training requirements for construction personnel. Line managers and supervisors coordinate with their employees to establish a training agenda for each employee. The training profiles are submitted to the construction training coordinator for inclusion in the construction training database.

Construction Training Requirements

The line manager and supervisors are responsible to determine the specific employee skills required for the construction job functions. Site orientation, training on project procedures, and review of employee qualifications are performed to ensure construction personnel have the experience, knowledge, and skills necessary to safely perform their assigned tasks.

The construction training requirements are based on the employee's specific discipline, work function, skills and experience, and the project tools and work processes that apply to the employee's duties and responsibilities. Construction training will also train construction employees for improving skills in work planning including hazard identification and controls, and for providing feedback on the adequacy of controls. The construction training for construction direct-hire (manual and non manual) is documented and tracked in the construction training database.

Construction training is intended to inform construction personnel of construction conditions and requirements that are unique, project based, or beyond the skill of the craft. Construction training includes such methods as required reading, OJT, classroom or "toolbox briefings," computer based, or accomplished through a vendor. In accordance with 24590-WTP-GPP-CTRG-002, *Training*, the requirements to use qualified trainers and approved lesson plans does not apply to construction craft training. Supervisors or line managers are required to review revisions to construction training requirements (e.g., procedures) and determine whether construction personnel are affected, and determine the appropriate method of training. The construction training requirements are based on the employee's specific discipline or work function.

A PBS program is established for construction activities, to observe safety behavior and provide feedback to identify and eliminate at-risk work practices *before* an incident occurs. The PBS program applies to WTP construction management and direct hire manual employees. The Site Manager as the PBS advocate is key to the implementation of behavior-based safety.

The scope of construction work is defined, hazards are analyzed, administrative controls are developed, and work is planned and performed in a safe manner by construction personnel following approved procedures. All workers are trained to immediately stop work if an unsafe or potentially unsafe condition exists or if it poses a danger to the worker, coworkers, the public, or the environment.

The procedure 24590-WTP-GPP-MGT-008, *QA Stop Work/Management Suspension of Work*, delegates to all personnel the responsibility and authority to stop work immediately, without fear of reprisal, when the work could result in:

- Imminent danger to the safety or health of any individual on the WTP project
- Permanent or severe damage to the environment, facilities or property
- Rework or repair that would adversely impact the project cost or schedule

- A significant condition adverse to quality that requires programmatic redirection before continuing with work
- Any condition warranted by senior management that requires suspension of work

When a concern is identified that potentially warrants a stop work, the applicable line management is notified. The manager performs a review of the concern, notifies the appropriate manager, and initiates a Stop Work Order if warranted. Completion of the corrective action must be verified before the stop work order is lifted. If a formal stop work order is not warranted, the reason for the stop work is addressed and the work is resumed when it is safe to do so. The absence of a formal Stop Work Order does not preclude any employee from stopping work for conditions that present an imminent danger to employee safety and health, the environment, facilities or property. When stop work is invoked, work is stopped immediately, and personnel move to a safe location. The Field SA Manager is advised on all Construction issues involving environmental safety and health issues.

5.5.2 Field Project Controls Group

The primary objectives of the Field Project Controls group are to:

- Provide accurate and timely information for site management decision making
- Develop and monitor a detailed construction schedule, which will enable the project to be completed on or ahead of the schedule at the lowest practical cost
- Establish budgets and control systems, which provide accountability for all responsible functional managers and supervisors
- Integrate field project control tools with the needs of the project
- Provide a basis for identifying, tracking, estimating, and approving scope changes

The Field Project Controls group also supports the construction team by providing the following support:

- Balance priorities and allocate manpower resources
- Integrate facility schedules into a common master project schedule
- Monitor and accurately report field progress
- Monitor and track trends relating to deviations from the approved project baseline schedule

The Field Project Controls group establishes the following traditional cost and scheduling teams:

- The cost is organized by functions. Emphasis will be on daily and weekly program support for the labor cost collection and payroll systems. Dedicated support is recognized for civil, structural, and architectural; mechanical/piping; electrical and instrumentation; and general estimating.
- The scheduling function is established by construction area. The schedule is reviewed weekly and statused monthly to support project needs.

5.5.3 Environment, Safety, and Health Interfaces

Introduction

The Construction organization has important and close interfaces with SA in the areas of worker safety and environmental protection. At the site, the environmental function is matrixed to Site SA. The document 24590-WTP-PL-IS-01-001, *Nonradiological Worker Safety and Health Plan,* applies to worker safety for all employees, subcontractors, and visitors at the construction site from the beginning of limited construction through cold startup. The prevention of incidents, accidents, and injuries during construction is of paramount importance. All necessary planning and actions will be taken to ensure that work hazards are identified, appropriate hazard controls are established and implemented, and a safe and healthy work environment is maintained, in accordance with the WTP contract.

The procedure 24590-WTP-GPP-MGT-017, *WTP Lessons Learned Program,* is implemented by Construction as a mechanism for achieving safety feedback and continuous improvement. The lessons learned program establishes a consistent manner in which information is captured or developed and disseminated to ensure ongoing improvement of site safety and reliability. Construction management manages the construction lessons learned program, which is coordinated with the Project lessons learned program. The overall Project lessons learned program applies to the project work in office environments as well as the construction activities.

Hazard Analysis and Control

The procedure 24590-WTP-GPP-SIND-002, *Job Hazard Analysis (JHA)/Safety Task Analysis Risk Reduction Talk (STARRT),* provides a systematic process for identification of environmental, safety, and health hazards and risks associated with construction activities, and helps to determine controls to deal with these hazards. The construction management team or the SA representative determines the need for a JHA based on the work to be performed. The JHA uses construction workers, supervision, and SA experts to analyze the job tasks. The STARRT system uses a checklist that helps workers and their supervision identify the hazards of a specific task and select appropriate controls.

Construction safety procedures identify controls to be taken under specified situations. The procedures 24590-WTP-GPP-SIND-013, *Hazardous Work Permit,* and 24590-WTP-GPP-SIND-008, *System and Equipment Lockout/Tagout,* provide required worker protection. Construction supervision, construction workers, and the field SA work together to ensure a safe and efficient work process consistent with the ISMS core functions and guiding principles. Appropriate and thorough training of construction site employees to these procedures is a key factor in the successful implementation of hazards identification and control. Employee and management involvement in work planning is essential in developing safe work practices, and for providing and acting on feedback for process improvement. Construction supervisors encourage employee feedback to improve job safety.

The STARRT process is also used to implement jobs or tasks that do not require a formal CWP, such as offloading materials or hazardous material at the site. The project procedure 24590-WTP-GPP-GCB-00100, *Field Materials Management,* provides the requirements and guidance for receiving, handling, and storing material including hazardous materials.

Radiological, Nuclear, and Process Safety Interface

The document 24590-WTP-PSAR-ESH-01-002 (six volumes), *Preliminary Safety Analysis Report,* identifies the primary radiological, nuclear, and process safety activities required to support construction (e.g., incorporation of regulatory requirements and quality commitments into the facility procurement, fabrication, inspection, and testing). In addition, 24590-WTP-RPP-ESH-01-001, *Radiation Protection Program for Design and Construction,* contains procedures and requirements specifically for protection

of workers from radiological hazards that may be encountered during construction (e.g., radiological surveys and proper management of contaminated objects encountered during excavation).

Because legacy radioactive material may be encountered during construction activities, the WTP project implements a radiological monitoring program to ensure site personnel and public radiological safety. If an area of the construction site is determined to be contaminated it will be placed under radiological control in accordance with 24590-WTP-GPP-SRAD-022, *Performance and Documentation of Radiological Surveys*. Subsequent surveys will be performed to confirm that radiological conditions have not changed, with the frequency based on the amount of earth moved.

Environmental Protection Interface

The document 24590-WTP-PL-ENV-01-004, *Hanford Tank Waste Treatment and Immobilization Plant Environmental Plan,* identifies the strategies and timing of activities to comply with applicable environmental laws, regulations, and permit requirements associated with WTP design, construction, and commissioning.

The document 24590-WTP-PL-ENV-01-005, the CECP, serves as the tool for implementing a comprehensive environmental compliance program during WTP construction activities. This CECP is applicable to all WTP employees and subcontractors during construction activities. The CECP fully supports the project's commitment to construct the facility with minimal adverse impact to the environment, fully comply with all applicable environmental laws and regulations, and protect human health. The CECP identifies applicable federal, state, and local laws, regulations, and permit requirements; lists relevant project environmental procedures; and provides guidance for field implementation and environmental controls.

Subcontractors are required to develop and maintain a written environmental compliance plan that complies with the applicable requirements in the CECP. The subcontractor environmental compliance plan is reviewed and approved by the WTP Environmental group.

The CECP describes specific control measures to eliminate or minimize potential construction-related environmental impacts or requirement excursions. The environmental areas covered by the CECP include:

- Air quality
- Water quality
- Natural/cultural resources
- Hazardous materials
- Pollution prevention/waste minimization
- Dangerous and nondangerous waste
- Environmental response and reporting

Most of the environmental areas and requirements for 24590-WTP-PL-ENV-01-005, CECP, are addressed in 24590-WTP-PL-ENV-01-004 (see Section 2.4.13). The following are environmental aspects in addition to those discussed in Section 2.4.13:

The only air emission approval and permit required for WTP project construction is the concrete batch plant NOC application for air pollutant emissions. A radioactive air emissions license for excavation

activities was obtained in case radioactive contamination was detected during excavation activities. The CECP also contains instructions for minimizing the spread of dust during construction activities.

In addition to the water discharge permits (Section 2.4.13), Ecology issued two sand and gravel permits. The permits provide coverage for discharges of storm water and process water associated with concrete batch plant operations on the WTP site, and quarry operations to take place at Pit 30.

The procedures used for implementation of project environmental requirements and permits conditions are listed below. The CECP provides guidance for environmental areas not covered by a specific procedure.

- 24590-WTP-GPP-SENV-001, *Water Quality Program*
- 24590-WTP-GPP-SENV-003, *Spill and Release Reporting*
- 24590-WTP-GPP-SENV-005, *Waste Designation*
- 24590-WTP-GPP-SENV-006, *Packaging Nonradioactive Dangerous Waste and Material for Recycle*
- 24590-WTP-GPP-SENV-007, *Dangerous Waste Accumulation and Handling*
- 24590-WTP-GPP-SENV-008, *Pollution Prevention/Waste Minimization*
- 24590-WTP-GPP-SENV-011, *Spill and Release Response*

The primary control measure to ensure environmental requirements are met during construction is field compliance inspections. The Environmental field points-of-contact will perform routine inspections and surveillance of construction activities related to WTP environmental plans, permits, and regulations. The purpose of these inspections and surveillances is to verify compliance with environmental requirements, assist construction in solving environmental issues, identify noncompliant conditions, and provide for prompt corrective actions to deficiencies. Inspections are primarily intended to be pro-active endeavors to prevent noncompliant conditions.

5.5.4 Application of ISMS to the Construction Process

The ISMS core functions and guiding principles are an integral part of the construction process. Through the application of core functions and guiding principles, the construction process is executed in a manner to ensure the safety of workers, co-located workers, to protect the public, and to ensure protection of the environment.

Section 2.0 of this document addresses the basic structure of the ISMS as requirements flow down from the WTP contract. Line management implements these requirements through mechanisms prescribed in project-level documents. This section addresses the specific mechanisms and how they are integrated at the project to ensure construction work is performed safely. WTP implementing mechanisms are used to manage and perform construction work by applying the five core functions and addressing the eight guiding principles.

The project implementing mechanisms include the WTP contract, policies, AB documents, plans, procedures, and guides. Figures 5-1 and 5-2 illustrate the WTP ISMS infrastructure of implementing mechanisms that reference project documents that make up the WTP ISMS to support construction work. Figure 5-1 shows the project documents implementing the ISMS core functions to support construction work. The documents listed in each column provide elements and attributes to implement the functions. Some documents satisfy more than one function. Figure 5-2 shows the project documents that implement the ISMS guiding principles to support construction work. The documents listed in each column provide

elements and attributes to implement the principles. Some documents satisfy more than one guiding principle. For both figures, the lists are not all-inclusive, and may include other documents.

Within the Construction work control process, the implementation of the ISMS core functions and guiding principles is illustrated in Figure 5-3. The five core functions on the outer ring show the work control process together with primary project documents (plans and procedures) that implement the core functions for planning and execution of construction activities. Likewise, implementation of eight guiding principles that provide expectations for how safety is addressed in Construction are shown inside the outer ring. At the heart of the guiding principles are the three principles of Line Management Responsibility for Safety, Clear Roles and Responsibilities, and Competence Commensurate with Responsibility. These three key guiding principles, along with the other five guiding principles, influence how the core functions are applied to construct the facility safely.

As illustrated in Figure 5-3, the workflow for the construction process consists of the following ISM elements:

- Identification of the construction requirements and scope of work (Define Scope)
- Identification and analysis of potential hazards (Analyze Hazards)
- Development of control strategies to prevent or mitigate the hazards (Develop Controls)
- Performance of the construction incorporating the control strategies (Perform Work)
- Performance of reviews of the construction activities (Feedback)

5.5.4.1 Construction Work Control Process

Introduction

Procedure 24590-WTP-GPP-CON-1201, *Construction Work Packages*, provides the work control process for the execution of bulk construction activities. The documents used in the construction work process (as used in the CWP) are available electronically or in hardcopy. Construction work is typically broken down into discipline-oriented (i.e., electrical, mechanical, piping, and civil) installation packages. Each discipline has specific installation procedures and guidelines to perform and inspect work. Each discipline has a unique automation process to assist in the planning and tracking of work. All disciplines share a common work control process intended to ensure that work is performed in a safe, consistent, and quality manner in full compliance with the ISM process. The work process flow is developed to meet the project work schedule. Field Engineering generates a CWP with a clearly defined scope of work.

Work Planning

Applicable design drawings and specifications are identified in the CWP. The applicable permits, installation cards, special instructions, and inspection records are assembled into a CWP. Field engineers and superintendents review the CWP and if appropriate visit the location of the planned work to verify constructability and that the work can be performed safely and efficiently. The review is the first assessment of the hazards associated with the specific scope of work. Unique hazards associated with the work such as confined space or physical hazards are identified, and the appropriate permits and JHAs are prepared. The document 24590-WTP-GPP-SIND-002, JHA/STARRT procedure, outlines when a JHA is required for inclusion in the CWP or work plan. The craft supervisor, RFE, and safety and health professionals are responsible to ensure that the hazards have been adequately analyzed and the planned hazards controls have been integrated into CWPs and instructions.

Workers are involved in the work planning/improvement process in several ways:

- Completion of STARRT card by each employee before beginning work-the STARRT card lists hazards and controls; each worker signs the card acknowledging this information. The STARRT card is also a worker feedback mechanism to list suggestions or concerns.
- Construction management expects that supervision will provide feedback from the craft to management and from management back to the craft to communicate improvements in construction activities. The dry-run process is used to verify the procedures and techniques to be used for a new construction process, before the process begins. Supervisors and craft representatives walk through the work process (e.g., lay pipe) to identify problems before the process begins (24590-WTP-GPG-CON-1204, *Dry Run Process*).
- The program lets employees influence how work is done and improved through an observation/feedback process (24590-WTP-GPG-SIND-004, *Behavior Based Training*).
- Employees are encouraged (24590-WTP-G63-SIND-001, *Hanford Tank Waste Treatment and Immobilization Plant Health and Safety Policy*) to make suggestions for work improvement through their supervision/management. For safety issues not resolved through normal management channels, the Employee Concerns Program is available (24590-WTP-GPP-MGT-005, *Employee Concerns*).

Worker Safety and Health

The provisions of 24590-WTP-PL-IS-01-001, *Nonradiological Worker Safety and Health Plan*, apply to all employees, visitors, and subcontractors at the construction site from the beginning of limited construction through cold startup. This safety and health plan establishes the program to promote safety and health practices, to maintain a safe working environment for all project employees. It also reaffirms the employees' basic responsibilities for their actions as assigned under the provisions of the *Occupational Safety and Health Act of 1970* and other applicable standards.

The Project Manager or Manager of Construction, with the concurrence of environmental, safety, and health management, reserves the right to modify the plan as required, to incorporate new or revised regulations or standards. The project will administer and enforce the safety and health plan. The project management team will regularly audit the WTP safety and health program for direct hire employees and construction subcontractors for adherence to this plan.

Execution of this safety and health plan will be progressive, proactive, and dynamic. The project will evaluate and implement measures to improve the plan. Project employees and subcontractors are expected to report problems for appropriate assessment and controls, rather than react only after an accident. Subcontractors will be screened before subcontract award to select companies that have a satisfactory safety performance record.

The procedure 24590-WTP-GPP-SIND-024, *General Safe Work Practice,* provides general safe work practices to perform work safely at the WTP construction site. Additional safe work practices are described in or by other health and safety plans, procedures, guides and jobsite work rules. The Field SA Manager, with assistance from the safety and health representatives, is responsible for promoting general safe work practices. Supervisors are responsible for ensuring that the applicable controls and processes are incorporated into the planning and execution of work, and for correcting at-risk behavior and disciplining employees who fail to follow safe work practices.

Subcontractors and their lower-tier subcontractors are held accountable to this plan in terms of the provisions of their contracts. Subcontractors are required to use the safety and health policies and requirements outlined in this plan as the basis for developing and implementing their own safety and health plans.

Construction Quality Control

The procedure 24590-WTP-GPP-CON-7101, *Construction Quality Control Program*, implements QAM requirements applicable to WTP construction activities. It describes the methods used to plan, perform, and document inspections, tests, and reviews to ensure compliance with engineering drawings and specifications. QC activities include monitoring, verification of activities, inspections, identification and resolution of discrepancies, and verification to ensure that construction activities meet quality requirements. Where discrepancies between the as-found condition and the design requirements are identified and corrected by modification, repair, or replacement, reinspection or a repeat test may be required.

5.5.5 Readiness Review for Construction Work Execution

Supervisors confirm availability of craft and support personnel, verify that assigned craft personnel have the required project training and qualifications necessary to safely execute the work as defined in the CWP under the work site conditions. The craft supervisor and workers perform the final review of the CWP. Typically, workers check the work site location to ensure that conditions that affect the identified hazards or established controls have not changed. With input from the workers' inspection of work areas, the craft supervisor confirms that required permits are in place, material and tools are available, and required lighting, signs, barriers, work platforms, and sanitary and other temporary facilities are in place.

5.5.6 Execution of Construction Work

The JHA/STARRT procedure provides the details for developing and maintaining the STARRT card. A STARRT card is implemented for each job task as defined in the JHA/STARRT procedure. Each day, pre-job briefings are conducted to discuss the hazards and associated controls to mitigate those hazards. The STARRT card identifies and resolves environmental, safety, and health hazards associated with a task before it is performed, and incorporates controls resulting from JHAs and review of requirements in construction safety procedures. Workers participate in the pre-job instructions/discussions and are invited to provide feedback on improving job safety and to make suggestions or express concerns.

If the job is not completed in one shift, or when conditions that affect the identified hazards or the established controls have changed, the STARRT card is updated and revised as necessary. Work is performed as described in the CWP. Work is stopped if the activity cannot be safely performed as described in the CWP. When work is stopped, inspection and supervisory personnel are notified as required by the implementing construction procedure. The requirements for documenting the stop work action and the actions necessary to lift the stop work order are specified in 24590-WTP-GPP-MGT-008, *QA Stop Work/Management Suspension of Work.*.

5.5.7 Feedback and Continuous Improvement

Employee and management involvement in work planning and performance is essential to developing safe work practices and feedback for process improvement. Management assessments are performed in accordance with 24590-WTP-GPP-MGT-002, *Management Assessment.* Initial orientation to employees

before they begin working at the construction site stresses the importance of feedback and continuous improvement, and reviews techniques for feedback and improvement.

Pre-job discussions between workers and line supervisors identify the work, associated hazards, and the appropriate controls to mitigate those hazards. Continued communication between workers and supervisor during the work activity provides a pathway for safety and efficiency recommendations to be noted in the STARRT card. Stop work authority for a task or activity in cases of imminent danger to a worker provides immediate feedback for those special cases. Informal post-job discussions concerning safety or the ease/difficulty of construction improve the candor between supervisors and workers and encourage workers to suggest improvements that can be implemented (e.g., improving lighting in the work area or lowering a work platform) to improve safety and efficiency. Formal items that support ongoing work are documented on the STARRT card.

5.5.8 Subcontracts Construction Execution Process

Introduction

The preconstruction phase begins with a subcontract award and concludes when the subcontractor has satisfactorily completed all contractual prerequisites for mobilization and construction. Completion of prerequisites is determined by the subcontractor delivery of administrative, technical, and product submittals required for mobilization specified in the subcontract documents.

The SA Manager has responsibility to develop the safety standards and requirements for all subcontracts. These standards are incorporated into the *Subcontractor Safety and Health Requirements* (Exhibit G), and included in the Request for Proposal and the subcontract. The subcontractor develops and submits a plan, which is reviewed by the SA Manager for conformance to Exhibit G. This plan uses a graded approach to the work performed under the contract.

The selection criteria for subcontractors are also stated in Exhibit G of the contract. This exhibit is maintained by SA, which assists Construction in subcontractor selection. For selected subcontractors who do not meet the safety performance requirements in Exhibit G, 24590-WTP-GPG-SIND-009, *Mitigation Plan for Assisting Subcontractors Unable to Meet DOE Safety Performance Requirements*, followed to assist the subcontractor improve safety performance.

A subcontractor Safety and Health program, QA program, and environmental compliance plan, including procedures and plans necessary to complete the work, must be submitted and approved before mobilization. The subcontractor Safety and Health program is reviewed against subcontract requirements and in the context of the subcontractor's approach to the work and the WTP project experience in safety management, which includes the ISMS Program elements. The subcontractor's QA program is reviewed by the project QA organization for compliance with applicable requirements. The subcontractor's environmental compliance plan is reviewed by the Environmental Group to ensure that applicable requirements in 24590-WTP-PL-ENV-01-005, *WTP Construction Environmental Control Plan*, are adequately addressed.

Award of Construction Subcontracts

The Project Subcontracts Management Group (PSMG) is responsible for the formation, bid evaluation, and award of subcontracts. Prime Contracts, Engineering, Construction, SA, QA and other project organizations support Acquisition Services and participate in the subcontract development, formation, and pre-award process. These organizations help determine information required of bidders (e.g., experience,

equipment available, requested submittals, quality and verification programs). The project organizations provide information on conditions at the site, such as waste disposal, safety, communications provisions, transportation, utilities, training, access, flow-downs from the WTP contract, project milestone dates, and project uniqueness not industry typical.

During the proposal period, prospective bidders demonstrate compliance with and understanding of requirements in the subcontract documents (Exhibit G) and specifically in the subcontractor's Safety and Health Plan. This document includes General Safety and Health Requirements (Section I), Construction Safety and Health Requirements (Section II), and Jobsite Work Rules (Attachment 1). This document assists subcontractors in understanding the WTP environmental, safety, and health requirements and expectations. Exhibit G provides specific instruction to subcontractors in areas where there are requirements or regulations, to ensure uniformity between the subcontractor's program, the WTP activities, and activities of other site subcontractors.

The subcontractor safety and health requirements are applied using a graded approach:

- Section I, "General Safety and Health Requirements," applies to all subcontractors regardless of scope of work.
- Section II, "Construction Safety and Health Requirements," applies to subcontractors whose scope of work includes construction as defined in Section II. Section II requirements are in addition to Section I requirements.
- In addition to the subcontractor safety and health requirements in this document, the subcontractor is required to comply with 29 CFR 1926, *Safety and Health Regulations for Construction Safety*, and 29 CFR 1910, *Occupational Safety and Health Standards*.

The general conditions of each contract require the submittal of an environmental compliance plan by the subcontractor. This plan will include subcontractor established practices that comply with applicable laws, regulations, and requirements in 24590-WTP-PL-ENV-01-005, *WTP Construction Environmental Control Plan.* Each subcontractor has sole responsibility for developing, implementing, and enforcing its environmental compliance plan.

Acceptance of each submittal is by the functional organization or discipline that placed the requirement in the subcontract. Approval of safety submittals is SA's responsibility. Approval of environmental submittals is E&NS' responsibility. Upon completion, review, and acceptance of the submittals, which is a prerequisite to mobilization, the subcontract administrator issues a notice to the selected subcontractor to proceed.

Management of Construction Subcontracts

The document 24590-WTP-GPP-CON-4101, *Construction Subcontract Management*, defines the administrative controls for subcontract management, including monitoring the work process. It is used to ensure adherence to the ISMS principles and core functions to ensure worker health and safety, work quality, productivity, and consistency activities in the work place.

The subcontractor mobilizes sufficient resources at the site and executes the work tasks identified in the subcontract. The subcontractor is responsible for maintaining complete control of the work within the defined scope and is accountable for work being performed. Specific to the performance of the work, tailgate safety sessions, POD meetings, and walk-downs are conducted in accordance with the subcontractor's approved program and in compliance with OSHA and subcontract requirements. The

construction subcontractors are required to have appropriate work control and safety and health processes based on the hazards and level of complexity associated with their scope of work.

The Manager of PSMG has oversight responsibility to ensure that health and safety requirements are implemented and that work is performed safely for the subcontractors as well as the direct hire employees. The Manager of PSMG works directly with the Site Manager and is responsible for overall safety and health coordination activities and will advise the Site Manager on the implementation of safety and health processes. Both will work closely to ensure that the systems and structures provided in the safety and health plan and the subcontractors' safety and health plans consistently meet the needs of the project.

Subcontractor Work Execution

Pre-job briefings are held daily by the subcontractor and attended by personnel involved in the execution of the work. Individual contributors to the pre-job briefing prepare a presentation within their relevant areas of cognizance or expertise. Depending on the complexity or magnitude of the work, a dry run of the pre-job presentation may be held. Commensurate with the scope and complexity of the work, WTP management (level of formality) may attend the briefings.

The work is overseen by a subcontract administrator, subcontract coordinator, and QA/QC for conformance to the subcontractor's approved programs (SA, QA) and subcontract requirements. Nonconformance in safety or quality is dealt with in the same manner as technical requirements of the subcontract. In all cases, employees have the authority to stop work in cases of imminent danger to the worker or environment.

The WTP subcontractor's subcontract coordinator is responsible for monitoring subcontractor performance in accordance with the safety standards in the subcontract. Documented daily subcontract reports are submitted by the subcontract administrator per 24590-WTP-GPP-CON-4101, *Construction Subcontract Management*. In addition, SA conducts and documents periodic assessments of subcontractor compliance with required safety standards per 24590-WTP-GPP-SIND-022, *Assessment and Issue of Noncompliance for Construction Subcontractor's Safety and Health Compliance.*

Written reports document performed work activities with respect to compliance with quality, safety, health, and environmental contract requirements. Regular progress and project coordination meetings are held with the subcontractor(s) to determine work progress and resolve issues concerning safety and contract requirements. Quality, Safety and Health are standing agenda item. During the progress meeting, issues are identified, actions assigned, and meeting minutes are recorded. In the event of adverse safety performance or a violation by the subcontractor, the subcontract administrator will enforce appropriate remedial corrective actions as well as actions to prevent recurrence.

Maintenance and oversight of ISMS requirements are conducted as an integral part of the WTP project design and construction process. All levels of management are committed to continuous improvement in all areas including the minimization of health and safety risks to the workers. Adherence to these principles by the subcontractors is required by the WTP through continuous improvement programs including the following:

- Self-assessments/lessons learned
- Independent assessments/surveillance
- Safety and health program/requirements
- Post-job feedback and evaluation

Figure 5-1 ISMS Core Functions Implementation in Construction

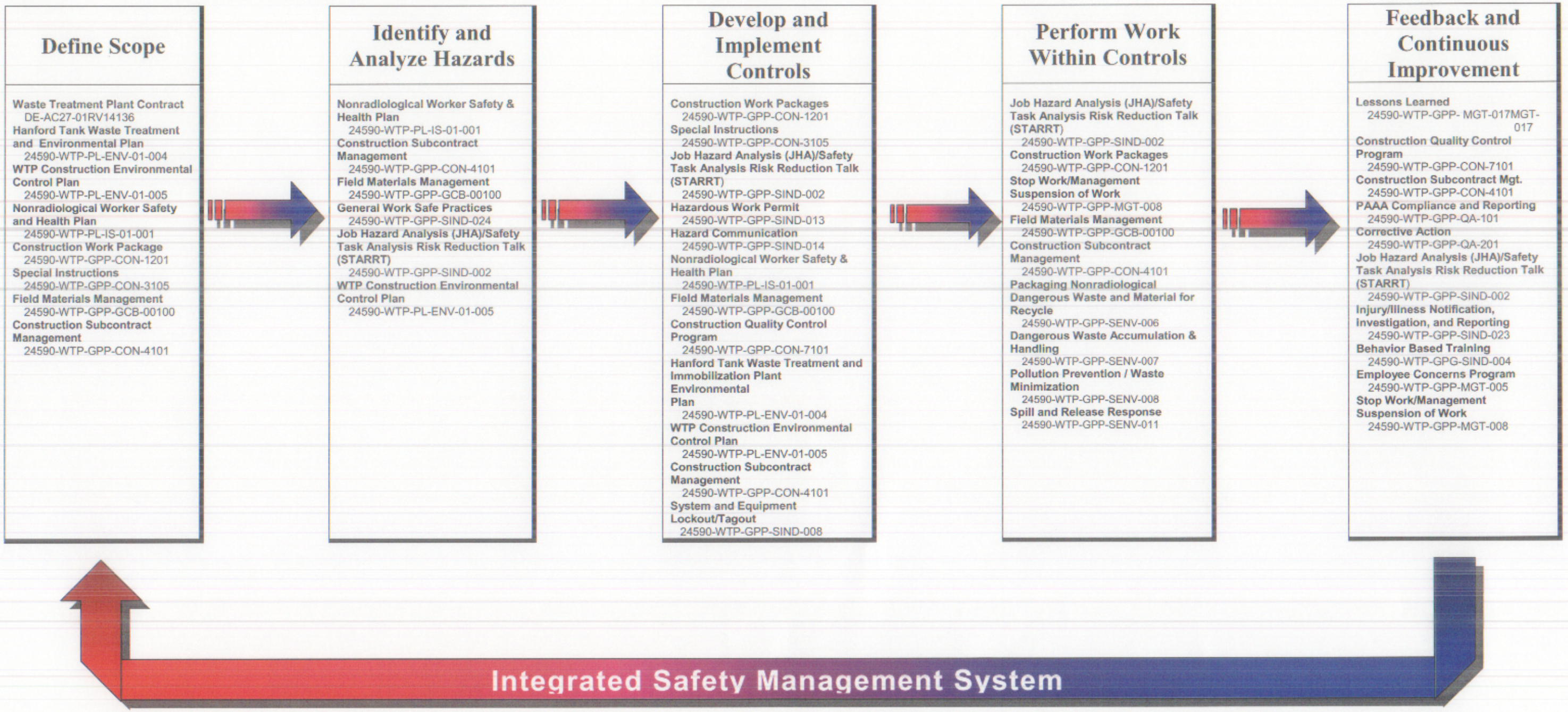


Figure 5-2 ISMS Guiding Principles Implementation in Construction

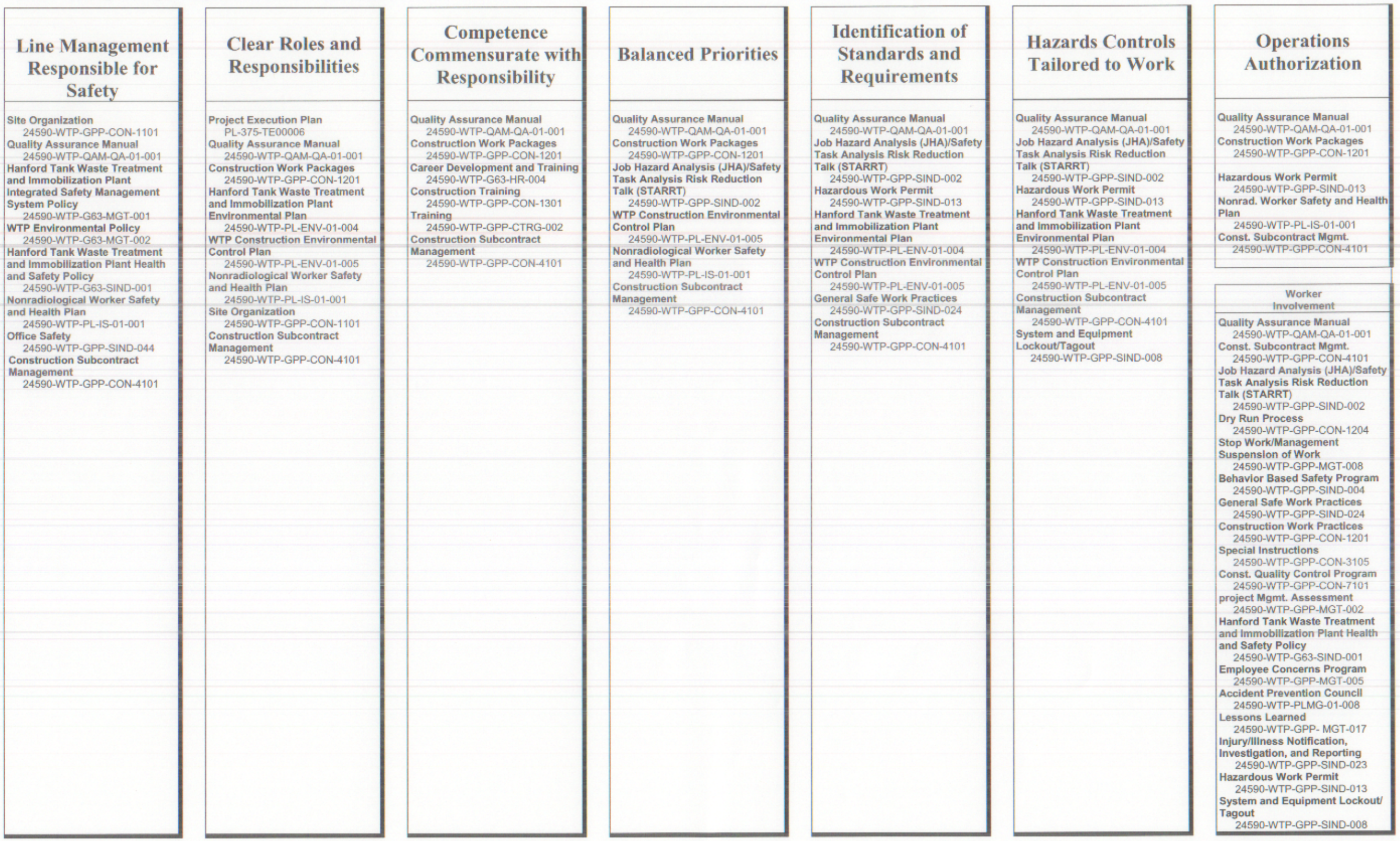
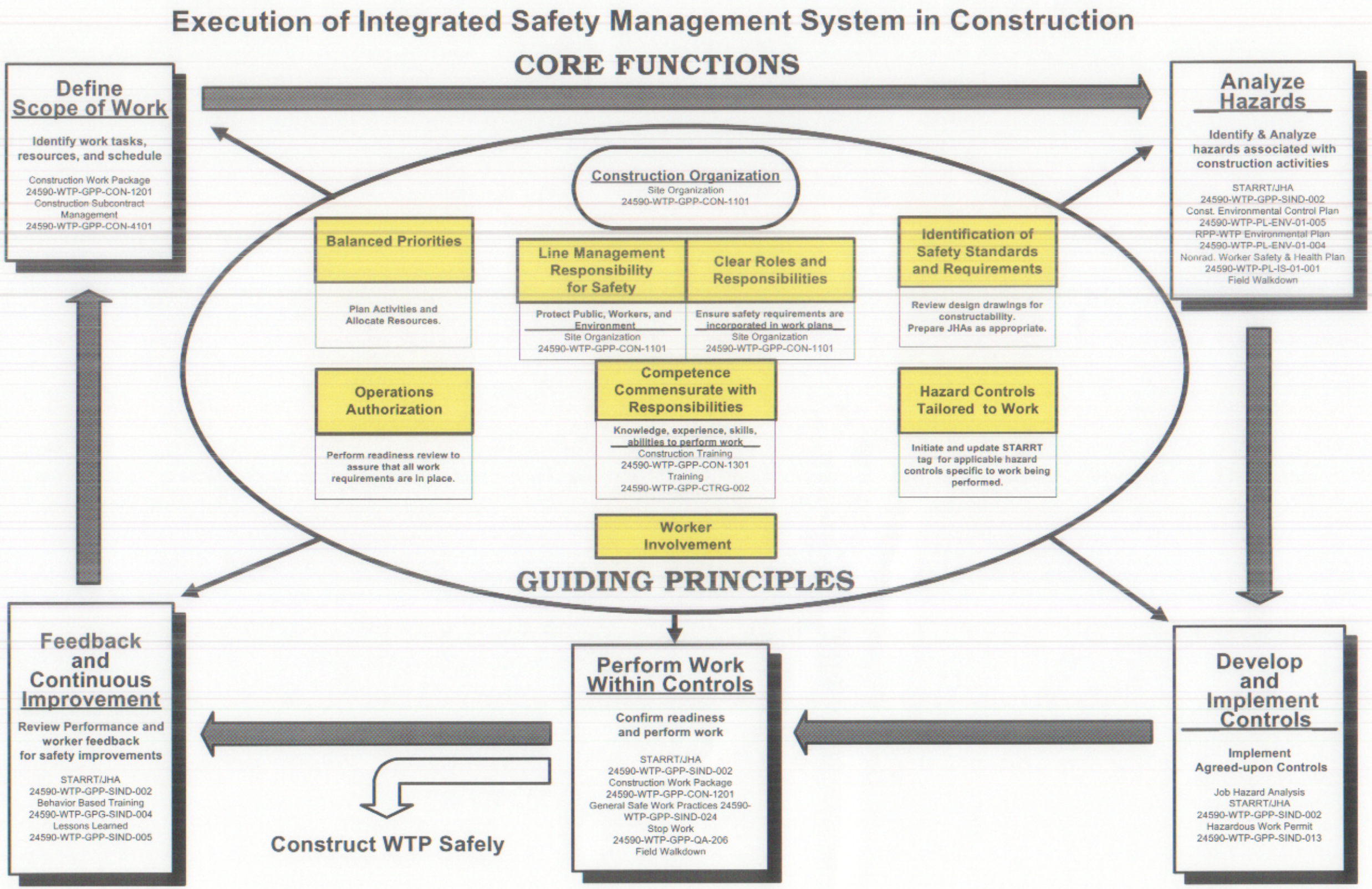


Figure 5-3 ISMS in Construction



6.0 Startup and Commissioning

6.1 Scope

Section 6.0 describes WTP processes for systematic development and execution of start-up and commissioning test activities to verify acceptance of plant systems and components, as well as to prepare the programs and personnel to safely conduct start-up and commissioning activities. Additionally, the training program used during all project phases (design, construction, and commissioning evolution) is described.

6.2 Responsibility for Safety

Line management for Operations is ultimately responsible for ensuring that activities performed under Operations management purview are conducted safely. Management commitment and responsibility for safety is reflected in policies and procedures including 24590-WTP-G63-MGT-001, *Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy*; 24590-WTP-G63-MGT-002, *WTP Environmental Policy*; and the QAM.

6.3 Overview

Start-up testing is the deliberate, systematic testing of individual components and systems to ensure these components and systems meet acceptance criteria specified by Engineering. Commissioning is the systematic development and execution of process, and facility test activities leading to plant turnover to the WTP Operations contractor. Successful commissioning verifies achievement of the following:

- Contractual performance requirements have been satisfied
- A sufficient number of trained and qualified commissioning personnel are available to operate the Plant within a defined performance and safety envelope
- Programs and procedures to support commissioning are approved, issued and in use
- Waste product immobilization using vitrification at the required rate is accomplished

These verification activities are accomplished using approved procedures with specific requirements and acceptance criteria. Test results and system adjustments/modifications required to meet predetermined acceptance criteria are documented and retrievable to support commissioning.

6.4 Operations Organization

The Operations organization includes Startup, and Commissioning & Training (C&T). The Operations Manager reports to the Project Manager who in turn reports to the Deputy Project Director.

Startup is currently a small group, with no further division. C&T is a slightly larger group with the following functions defined: Operations, Commissioning, Maintenance, Procedures, Training and Integration. Each functional area within C&T is managed by a Functional Area Manager (FAM) who reports to the C&T Manager. Specific duties and responsibilities for Startup and each C&T FAM are provided below.

6.4.1 Operations Core Functions

6.4.1.1 Startup

The role of Startup is to perform testing of the facility components and systems, and demonstrate the performance of the WTP facilities. To perform this role, Startup must develop and implement the programs and procedures to safely test the components and systems within WTP facilities. As turnover from Construction to Startup approaches, Startup will recruit and train a startup team, who will engage in development of procedures, and will perform checkout and initial operation functions as well. On completion of system testing, the system shall be released to operate in accordance with administrative procedures.

Startup test procedures apply ISMS principles to identify work, analyze hazards, develop controls, and accomplish the work. The information gained is fed back to the test program for continued improvement.

Startup functions include:

- Acceptance of system turnover from Construction
- Developing start-up program administrative procedures
- Developing start-up test procedures including component and system test procedures
- Establishing a review and approval process for start-up test procedures
- Performing start-up test procedures.

6.4.1.2 C&T Operations

The C&T Operations organization develops, schedules, and implements high-level plans to establish, integrate, and monitor plant activities and demonstrate performance. While Operations addresses overall programmatic considerations; C&T Operations provides concentrated support for plant operations during cold and hot commissioning. This support focuses on two major areas:

- Ensuring an adequate number of trained and qualified personnel are in place to safely and effectively demonstrate operability of the facility during commissioning
- Ensuring adequate conduct of operations programs and procedures are in place to ensure safe and effective plant operations through commissioning

C&T Operations functions include:

- Preparing operations manuals and procedures
- Preparing and maintaining 24590-WTP-PL-OP-01-002, *WTP Conduct of Operations Plan*, that implements a disciplined approach to facility commissioning including communications, procedure use, shift turnover, control room activities, notifications, log keeping, equipment control, system status, and more
- Ensuring operations are conducted by personnel trained and qualified for the task.

6.4.1.3 Commissioning

Commissioning develops and manages facility-wide testing following the completion of the component and system testing performed by Startup. The commissioning program, developed by test engineers, is

designed to verify that overall facility performance criteria established by contract. Commissioning procedures apply ISMS principles to identify work, analyze hazards, develop controls, and accomplish the work. The information gained is fed back for continued improvement. Specific commissioning activities include remotability testing, water runs (expanded system testing using water to simulate operating conditions), cold commissioning (integrated facility testing using simulants) and hot commissioning (integrated facility testing using radioactive waste)>

C&T Commissioning functions include:

- Developing commissioning administrative procedures
- Developing commissioning procedures including water runs, cold, and hot commissioning tests
- Establishing a review and approval process for commissioning procedures
- Performing commissioning procedures

6.4.1.4 Maintenance

C&T Maintenance is responsible for developing a preventive maintenance plan/schedule and for maintaining the facilities in an operational condition following system turnover from Construction. A primary component is the incorporation of ISMS and QA baseline principles into a comprehensive *WTP Maintenance Implementation Plan* (24590-WTP-PL-OP-01-004).

C&T Maintenance applies ISMS principles to identify work, analyze hazards, develop controls, and accomplish the work. When work is accomplished, the completed activity is reviewed and analyzed to determine how to improve the safety and efficiency. The information is fed back to planning and scheduling for continued improvement. Specific functions include the conduct of corrective maintenance, calibration, preventive maintenance, and work control.

C&T Maintenance functions include:

- Developing and implementing the *WTP Maintenance Implementation Plan*
- Preparing manuals and procedures to control maintenance activities
- Ensuring maintenance activities are conducted by trained and qualified personnel
- Maintaining spare parts for each facility

6.4.1.5 Procedures

C&T Procedures will be responsible for establishing and maintaining a structured and disciplined procedure development and management program that provides life-cycle control of C&T's operational, administrative, and technical procedures.

This function identifies and incorporates the requirements that satisfy contractual, regulatory, and business concerns into plans, procedures, and guidance documents. These requirements are presented as processes that implement administrative control over design quality, and operating standards based on ISMS and QA principles.

C&T's procedures provide the primary method for implementing requirements for the commissioning phase of the project.

C&T Procedures functions include:

- Developing technically correct procedures that:
  - Are work focused
  - Are based on established design, operating and administrative controls
  - Implement standards and recognize the operating environment and conditions
  - Apply lessons learned and related work experience
  - Are designed to optimize human performance
- Incorporating procedure program objectives from WTP Contract, Section C, Statement of Work, Standard 5 (Commissioning) such as:
  - Ensuring adequate procedures for commissioning have been implemented and are consistent with system design. Ensuring WTP systems and procedures as affected by any facility modifications, are consistent with the description, procedures, and accident analysis included in the AB.
  - Ensuring facility modifications have been reviewed for potential impacts on procedures, training, and qualifications as required. Procedures have been revised to reflect these modifications and training has been performed, and design documentation is complete.

6.4.1.6 Training

C&T Training is responsible for developing a training program that incorporates QA and ISMS principles. The training program includes processes and procedures to monitor the application of training through the design, construction, and commissioning evolution, including methods to adjust training requirements to accommodate system, equipment, and personnel changes.

The Training organization manages various modules of computer-based training and, where appropriate, executes formal and structured performance-based training in support of the design, construction, and commissioning phases of the project.

C&T Training functions include:

- Developing an overall training program for the WTP project
- Preparing and presenting training as required
- Tracking staff training profiles
- Providing training support as necessary

6.5 Startup and Commissioning Processes

6.5.1 Startup Execution

The primary objective of start-up testing is to ensure that components and systems meet the acceptance criteria specified by Engineering. The WTP shall be proven acceptable to operate through a series of tests performed in distinct phases. Start-up testing shall commence with simple component tests and progress through system-level tests. These phases of testing are part of the overall Operations function to progressively verify the functions of the components and systems within a facility, resulting in a facility ready for testing with simulants during cold commissioning.

The sequence of testing will be based on initially selecting systems that are required to support the major process systems. Such supporting systems include compressed air, electrical power, and cooling water. The testing of these support systems will be performed early in the schedule so that they are operational and available for the testing of more complex process systems that require their support.

Start-up test procedures will be developed to demonstrate that the performance of components and systems meets design criteria. Construction tests shall be developed by Construction as described in the document 24590-WTP-RPT-CN-01-004, *Construction and Acceptance Testing Program.* Test procedures shall be developed in accordance with WTP start-up test program administrative procedures component tests and system tests (functional and acceptance tests).

6.5.2 Commissioning Execution

The primary objective of commissioning is to deliver a vitrification plant that meets all contractual performance requirements. Specific objectives for the commissioning period are outlined in Standard 5 of the WTP contract and are summarized below:

- Demonstration that adequate and correct procedures and safety limits exist for operating the process and utility systems
- Training and qualification programs are established, documented, and implemented
- Safety and environmental compliance documentation is in place
- Programs are in place to confirm and periodically reconfirm the condition and operability of safety systems
- Processes are established to identify, evaluate, and resolve deficiencies and recommendations
- Management programs are established, sufficient numbers of qualified personnel are provided, and adequate facilities and equipment are available to ensure operational support services are adequate for commissioning
- Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsibility for control of safety
- Systems and procedures, as affected by facility modifications, are consistent with the description of the facility, procedures, and accident analysis included in the AB
- Modifications to the facility have been reviewed for potential impacts on procedures, training, and qualification

The WTP shall be proven acceptable to operate through a series of tests performed in distinct phases. Once the first two phases are completed (component and system tests), commissioning progresses through complex demonstrations at the facility level, ultimately resulting in a facility ready for testing with simulants during cold commissioning.

Commissioning procedures will be developed to demonstrate that facility performance design criteria and performance requirements specified in Standard 5 of the WTP Contract.. Commissioning procedures shall be developed in accordance with WTP commissioning program administrative procedures for the following:

- Remotability
- Water runs
- Cold commissioning tests

- Hot commissioning tests

6.5.3 C&T Training Qualification

Personnel are trained and qualified in accordance with 24590-WTP-GPP-CTRG-002. WTP training plans and procedures are used to ensure that personnel are trained and qualified to operate and maintain the plant within the performance and safety envelope established in the AB documents.

The training and qualification program will include:

- Identifying training requirements
- Designing and delivering training
- Training evaluation, qualification, and records

C&T personnel will be trained and qualified to support commissioning program requirements and schedule. This process will be continuously evaluated to ensure personnel are trained and qualified to meet project requirements for each phase of the commissioning program.

A simulator designed to interface with control system hardware and software will be provided to support personnel training, operational procedure validation, and human factors issues during commissioning.

The simulator training program will include:

- Training event logging
- Qualification grading
- Training session results documentation
- Instructor system interface

6.5.4 Commissioning Procedures

Operating, emergency, and maintenance instructions and procedures will be developed for use during commissioning of the facilities. These procedures will be based on design information and will incorporate information collected during the commissioning program. Operating and maintenance instructions and procedures will cover equipment, systems, and the facility as a whole in the following areas:

- Plant/system startup
- Plant/system shutdown
- Plant emergency shutdown and emergency procedures
- Normal operating conditions
- Equipment operating instructions and procedures
- Alarm response procedures
- Laboratory procedures

6.5.5 Maintenance Implementation

A component and system maintenance program will be established and implemented by the Maintenance organization. This program will identify routine maintenance requirements and frequency. The program will be implemented upon turnover from Construction to Startup. It will address manufacturer, system, and equipment supplier requirements and recommendations, as well as available engineering evaluations.

The maintenance program will include preventive maintenance activities, which includes calibration, and corrective maintenance activities.

A work control system will support the completion of tasks in a safe, timely, and efficient manner such that safe and reliable facility commissioning is achieved. This system will provide a real-time status of maintenance activities. Activities are scheduled and completed using a priority system based on ISMS principles, operational need, available personnel, and equipment.

Work to be accomplished will be clearly defined by a work document that identifies or includes applicable procedures and instructions. Troubleshooting activities will be controlled by applicable work documents or instructions.

Work planning and scheduling will consider materials, tools, staff availability, job safety, radiological protection, and QC. Planning of work will be performed and routinely updated for scheduled and unscheduled outages. ALARA concepts will be used in work planning to minimize worker exposure to radiological hazards where appropriate. Hazards will be identified for each task. Instructions will be developed to mitigate the hazards while accomplishing the task. Workers will be involved in the planning process in accordance with ISMS principles.

Maintenance activities will be scheduled to avoid unnecessary removal of equipment and systems from service. Effective use of available staff will be paramount. Post-maintenance testing will be performed when applicable. The work control process will ensure that post-maintenance testing results are documented and reviewed to ensure proper system performance before returning the system to service. Completed work control documents will be reviewed in a timely manner to check proper completion of maintenance work and to verify that any identified deficiencies have been corrected.

Throughout the C&T execution process, progress and results will be monitored. Key processes will be measured and evaluated. Metrics will be used as a basis for decision-making and meeting key milestones in the processes. Current progress will be plotted against this metric to measure overall progress.

6.6 Organization Interfaces

To ensure success for the project, Operations must interface with multiple internal and external customers. This interface begins early in the project, because Operations personnel contribute to design reviews and ISM teams. As the project progresses toward startup testing and commissioning, interface with other project organizations changes to an emphasis on turnover from construction testing and commissioning. The chief interfaces are described below.

6.6.1 Operations Engineering Design Interfaces

Operations provides operational and testing experience input to the project design team. In turn, the design team supplies design basis information and philosophy for incorporation into the testing, commissioning, and training programs developed by Operations. This information exchange ensures Operations operational and testing concerns are considered early in the design process, and design

information and philosophy are incorporated into Operations developed training, testing, and commissioning procedures. Operations also provides input to design on operation and maintenance activities and provisions to improve safety for the facility workers.

Operations interfaces with Engineering in design reviews and provides ongoing input and lessons learned from other projects. Engineering, in turn, provides technical support in areas of defining system, component, and facility test acceptance criteria, facility performance monitoring, surveillance test program, modification control, set point control, and technical reviews to Startup and C&T.

As the project progresses, interfaces and information exchanges that relate to testing and operational issues become more important.

6.6.2 Operations Construction Interfaces

The interface between Construction and Operations allows Construction to take advantage of Operations's experience relating to similar plants and facilities. The Construction organization verifies industry standards; Operations provides input based on lessons learned in hazardous waste management. This melding of industry-specific information ensures commissioning in accordance with AB requirements.

6.6.3 C&T Program Interfaces with Other Project Organizations

Environmental and Nuclear Safety (E&NS)

Operations interfaces with E&NS for development of the TSRs for the WTP safe operating envelope, and environmental compliance. Operations will assist E&NS with defining and developing the safety envelope within which WTP can be operated. Operations will also work with E&NS to determine actions necessary to implement requirements in state and federal environmental permits.

Quality Assurance (QA)

Operations performs work in accordance with established procedures and implements QA requirements. QA performs activities to assess compliance with established QA requirements. QA is involved in such tasks as writing and reviewing procedures, performing independent assessments (audits), surveillances, and inspections; reporting, tracking, and trending identified deficiencies, processing deficiency reports, and providing assistance to Operations in all aspects of quality affecting work.

Project Administrative Services (PAS)

Operations relies on PAS personnel for access to documentation. PAS ensures that documents proving test results are managed in such a way that they are available as required.

6.6.4 Commissioning Review Board

The Commissioning Review Board, supporting the commissioning program, provides independent review of the approach, techniques, methods, and safety aspects of the Operations program. The review board will review the detailed plans, procedures, barriers, and Operations test results. The Commissioning Review Board will review barriers and commissioning progress and results for cold and hot commissioning.

6.6.5 Operations Interfaces with Future Operations Contractor

At this time, Operations interface with the Future Operations Contractor is restricted to transition of programs and documentation as defined in WTP Contract Section C, Standard 5.

7.0 Maintaining an Approved ISMS

7.1 Scope

Section 7.0 describes the WTP project management and DOE-ORP responsibilities and expectations for maintaining the integrity of an approved ISMS.

Section 7.0 topics include the following:

- ISMS maintenance process
- Mechanisms for sustaining, maintaining, and updating ISMS
- Safety performance objectives, performance measures, and commitments
- Feedback and improvement through the assessment program

7.2 Overview

The intent of maintaining the ISMS is to ensure that work continues to be conducted efficiently and in a manner that protects the health and safety of the worker, the public, and the environment. To meet this intent, compliance with requirements (e.g., directives, laws, regulations), maintenance of the radiological, nuclear, and process safety AB; and the environmental and worker protection programs must remain current and effective. The mechanisms in Section 7.4 ensure these aspects of the system receive appropriate review and analysis through effective feedback and assessment to ensure system maintenance, thus providing the opportunity for continuous improvement.

Chapter IV of DOE G 450.4-1B, *Integrated Safety Management System Guide,* provides guidance for maintaining the integrity of an approved ISMS. The WTP contract, Clause I.105 (DEAR 952.223-71(d) and (e)) requires DOE and contractor actions to continuously maintain the integrity of ISMS and to generate revisions as scheduled by the contracting officer.

The authority and responsibility for maintaining ISMS resides with the Project Director. Management responsibilities for implementation flow down through management to individual roles and responsibilities.

7.3 ISMS Maintenance Process

Project management applies key processes inherent to the WTP ISMS infrastructure (Section 2.4.23) to measure, maintain, and improve the effectiveness of the ISMS. Requirements management, continuing training, hazards identification and analysis, and AB updates are ongoing processes that continuously maintain the ISMS. The lessons learned process provides feedback for improving the system. Trending, performance monitoring, and commitment tracking are used for measuring system effectiveness.

These processes are coupled with an assessment program performed as described in 24590-WTP-GPP-MGT-002, *Management Assessment,* and 24590-WTP-GPP-MGT-001, *Readiness Assessments,* and are applied at each level of the organization. Other key processes for improving effectiveness include audits, surveillance, and DOE OSR/ORP inspections. When the results of assessments are analyzed, they provide the comprehensive tool to determine the status of implementation, integration, and effectiveness of the ISMS. The results of these assessment processes (Section 7.5, CCE-9 evaluations) are summarized in the ISMS annual report (Section 7.6).

The annual report is the final product of the maintenance and update process, summarizing the actions taken to evaluate system effectiveness, performance, and changes (if needed) to the ISMSD. The annual report provides an evaluation of progress, strengths, areas needing improvement, and selected topics for continuing ISMS improvement.

The ISMS maintenance process is completed annually in conjunction with the budget cycle (Figure 7-1). With attention focused on improving the system, inputs for measurement criteria are revised and improved for use in the following year.

7.3.1 ISMS Integrity

Essential to maintaining the integrity of an approved ISMS is ensuring that changes to ISMS implementing mechanisms are evaluated before changes are made. Processes for reviewing proposed revisions to project documents will be followed to maintain ISMS integrity. For changes to project documents relied on, as implementing mechanisms of the ISMS, E&NS and SA will coordinate reviews of these proposed changes and assess impacts on the ISMS.

In support of these reviews, E&NS and SA have the responsibility for developing processes for ensuring respectively:

- Review of proposed project document changes for consistency with the AB
- Review of proposed project document changes for impact on implementation of the ISMS

The approach for maintaining the integrity of the ISMS is twofold:

- For the AB documents and documents that implement AB requirements, review is performed by E&NS according to the procedures governing the various documents and *Authorization Basis Maintenance* (24590-WTP-GPP-SREG-002).
- For project documents used to implement the ISMS, reviews are performed by SA in accordance with 24590-WTP-GPP-MGT-007.

The AB documents are key implementing mechanisms of the ISMS. Project Management and DOE-ORP approvals of AB changes are based on results of safety evaluations performed in accordance with the AB maintenance procedure. Contractor approved changes to the AB require DOE notification within 30 days.

Project procedures are developed consistent with ISMS core functions and guiding principles.. SA evaluates procedures during review, to determine if they are implementing mechanisms for the ISMS. All revision 0 procedures are required to have a signature from the appropriate SA Manager, which signifies whether the final document implements ISMS on the project. If the procedure is determined to be an ISMS implementing mechanism, all further changes (including proposed cancellation) to the document must be reviewed by SA to ensure no adverse impacts on the project ISMS.

7.4 Sustaining, Measuring, and Updating Mechanisms

This section describes the mechanisms by which the WTP project meets the intent of the DEAR and the continuing core expectations (CCEs) described in DOE G 450.4-1B, Chapter IV, to maintain an approved and effective ISMS.

Project management will maintain the integrity of ISMS by compiling and assessing sufficient measures of WTP activities to make informed decisions on safety resources for these activities. Information and performance data on ISMS (performance metrics, assessment results, worker suggestions, and other relevant feedback) are essential factors in ISMS feedback, improvement, and change control processes. The following mechanisms are the processes by which project management will sustain, measure, and update the ISM system.

7.4.1 Requirements Management Process

The DEAR (48 CFR 970.5204-78) requires that DOE environmental, safety, and health requirements be established and identified in the WTP contract. These requirements are established and used to develop a tailored set of standards, practices, and controls, which are then incorporated into the AB documents and maintained valid and current as part of the AB. Any changes to federal, state, and local laws and regulations may require changes to both the ISMSD and the ISMS implementation documents. Concurrent with the annual work scope and performance measure negotiations with DOE, the SA function considers actions or changes to the ISMS based on impacts of changes to laws, regulations, and directives compiled throughout the year.

7.4.2 Authorization Bases Maintenance Process

DOE/RL-96-0003, *DOE Process for Radiological, Nuclear, and Process Safety Regulation of the RPP Waste Treatment Plant Contractor,* describes the process that the DOE uses to regulate the radiological, nuclear, and process safety requirements of the WTP AB. The document defines and formalizes the process in which the project obtains authorizations from DOE to perform safety-related activities. Once bases for the authorizations are approved, authorization agreements are negotiated between DOE and the project management, and oversight by DOE ensures that the WTP project activities are in continued compliance with the agreements.

The procedure 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance,* describes the requirements, responsibilities, and administrative controls for the maintenance of the WTP AB. New facility designs or administrative controls (procedures, programs, plans, and management processes) or changes that could affect the AB require an evaluation. This evaluation ensures that the facility, as designed, as constructed, and as operated, is consistent with the technical, procedural, and analytical requirements in the AB. Inconsistencies between design or administrative controls and the AB are reconciled. The mechanism used to change the AB is the SE/ABAR.

The AB Maintenance procedure implements the process for maintaining alignment of the WTP facility and project administrative controls with the AB. Alignment is demonstrated before issuance of drawings and other design media for procurement and construction activities. Design Engineering is responsible for design change compliance with the AB. E&NS is responsible for the AB evaluation process and products in support of construction and procurement activities.

7.4.3 Competence Commensurate with Responsibility

The Competence Commensurate with Responsibility (CCR) process was described in Section 2.5.3. Steps in the CCR process ensure that CCR is maintained for all employees - the process is self-sustaining. The project training and qualification programs are developed and implemented in accordance with 24590-WTP-GPP-CTRG-002, *Training*, and 24590-WTP-GPP-CON-1301, *Construction Training.* The employee's supervisor ensures that each employee maintains CCR.

Continuing training is established to maintain and enhance the knowledge and skills of personnel commensurate with specific position needs. Continuing training includes, at a minimum, training in significant applicable procedure changes, applicable industry operating experience, selected fundamentals with emphasis on knowledge and skills necessary to ensure safety, and other training as needed to correct identified performance problems. Continuing training activities are also documented on the training profiles.

ISMS Focused Training

Project management documents the project ISMS status in the annual ISMS Declaration report; including how well the core functions, guiding principles, and implementing processes are reinforced. Based on the analysis provided by the report and other inputs, ISMS focused training will be either incorporated into topical area lesson plans or developed and conducted as needed.

ISMS focused training is typically partitioned for target audiences: new hires, supervisors and managers, and general employees. Supervisor and manager training and general employee training are offered as needed, based on the recommendations in the ISMS Annual Report.

New employees (non-manual Richland offices) are indoctrinated in several ways on the ISMS process. New employees attend Project New Employee Orientation training that includes an overview of the ISMS core functions and guiding principles and this ISMSD document. In addition, all employees are required to take the ISMS Web Bases module training initially when hired and then annually thereafter.

New employees at the construction site (manual and non-manual) are required to attend the construction orientation, which includes an ISMS overview of the Core Functions. Additionally, non-manual and those manual employees in a supervisory role are required to attend the Construction ISMS Workshop. The workshop focuses on the core functions, guiding principles, Safety leadership and ownership.

7.4.4 Assessment Program

DOE P 450.5 describes DOE line environment, safety, and health oversight. The cornerstone of this oversight is a robust, rigorous, and credible contractor self-assessment program linked to the DOE Safety Management System. The WTP Assessment Program is discussed in Section 2.5.8.

The results of self-assessment identify conditions adverse to quality, safety, health, and the environment, unacceptable performance, and opportunities for improvement. These conditions are tracked and trended. An overall analysis of the results of the self-assessment process is summarized in the ISMS Declaration Report and provides areas to be targeted for focused improvement and assessment the next year.

7.4.5 Corrective Action, Lessons Learned, and Performance Measurement

Corrective Action

One fundamental element of continuous improvement is the corrective action system. The objective of a corrective action system is to identify, control, document, evaluate, and trend conditions adverse to safety and quality, and to develop and implement appropriate actions to correct the adverse condition. The corrective action system implements the continuous improvement element of the environmental, safety, health and QA programs. The WTP Corrective Action Program is discussed in Section 2.5.8.

Lessons Learned

A lessons-learned process is implemented in accordance with 24590-WTP-GPP-MGT-017. Lessons learned are generated internally by specific project processes or obtained externally. Each lesson learned is evaluated by subject matter experts and the lessons-learned coordinator to determine responsive actions that vary from distribution of information to immediate corrective action through the lessons learned bulletin process. The WTP Lessons Learned Program is discussed in Section 2.4.20.

Performance Measurement

Safety performance is measured using a comprehensive set of indicators that show trends in performance or status relative to established goals. The indicators and goals are determined from WTP management and DOE-ORP performance expectations. The assessment and corrective action processes are two sources of data for the performance indicators. WTP performance measurement is discussed in Section 2.4.23.

7.4.6 Safety Performance Objectives, Performance Measures, and Commitments

The WTP contract, Clause I.105 (DEAR 952.223-71, *Integration of Environment, Safety and Health into Work Planning and Execution*) requires the WTP to annually submit for DOE approval safety performance objectives, performance measures, and commitments; and requires the contractor to measure ISMS effectiveness and annually identify and allocate resources to meet the safety objectives and performance commitments, and maintain the integrity of the system. DOE P 450.5 requires a rigorous and credible contractor self-assessment program linked to the ISMS, which includes elements that address performance measures and indicators.

WTP project management annually develops a set of performance analysis metrics for safety that address areas of environmental, safety and health, safety program administration, and corrective action management including recommendations made in the ISMS Annual Report. The WTP project will use the applicable DOE-HQ approved elements as the minimum set of indicators, as documented in DOE G 450.4-1B:

- Total recordable case rate
- Occupational safety cost index
- Hypothetical radiation dose to the public
- Worker radiation dose (not applicable during engineering and construction phases)
- Reportable occurrences of releases to the environment

In response to the contract requirements, WTP project management submits safety performance objectives, performance measures and commitment affirmation letter, for DOE approval, detailing the required information. It conforms as appropriate to the DOE program and budget execution guidance and direction as required by the DEAR clause.

Analyzed results from the assessment program, summarized in the ISMS Annual Report, provide the input for the next year's safety performance objectives, measures, and commitments. The timeline for this process is shown in Figure 7-1. These identified safety performance objectives, measures, and commitments are consistent with the implementation and maintenance of an effective ISMS and are developed in cooperation with DOE-ORP. Performance to the safety performance objectives, performance measures, and commitments are reported in the ISMS Annual Report.

7.4.7 Safety Impact Plan

An Environmental Safety and Health Safety Impact Plan has been integrated into the ISMS process to enhance performance objectives measures and commitments, called out at WTP as metrics, to better evaluate (from a leading indicator perspective) the existing safety processes used within the WTP. The WTP Safety Impact Plan has been included in the ISMSD as a standalone document incorporated into the ISMSD as Section 8.

7.5 Continuing Core Expectations (CCEs)

The following CCEs (from DOE G 450.4-1B, Chapter IV) are addressed to determine the effectiveness of the ISMS and establish how the mechanisms in Section 7.4 are used to meet the DEAR requirements and expectations of the DOE ISMS Guide. They include sufficient detail to confirm that the implementing procedures at the WTP project effectively and adequately maintain the ISMS.

The evaluations performed by line management and QA, as part of the assessment process (Section 7.4.4), are one of the line management tools used to evaluate the effectiveness of the ISMS infrastructure and its implementation down to the activity level. Additionally, the ISMS manager with support from the ISMS working core team will evaluate level 3 and 4 CARs issued during the Fiscal Year as an additional evaluation of performance.

Unannounced surveillances, when deemed necessary by senior management, will be performed where senior management notes weaknesses in ISMS implementation as a result of reported trends.

CCE -1

The annual updates in response to budget execution process are completed. DOE direction is provided as part of the annual program and budget execution guidance including direction regarding major mission changes. The contractor updates the safety performance objectives, performance measures, and commitments so that they reflect and promote continual improvement and address major mission changes, as required. The ISMS Description is updated and submitted for approval as scheduled by the contracting officer.

The primary mechanism used to meet this expectation is the Safety Performance Objectives, Performance Measures and Commitments development process (Section 7.4.6). Additionally, the WTP contract translates customer expectations into performance expectations and defines specific results. The project baseline and WTP contract define success in terms of results that must be accomplished in the next 10 years. The results are then broken down into objectives that are multiple-year initiatives in which significant progress must occur to support the design, construction, and commissioning of the WTP.

Performance Measurement (24590-WTP-GPP-GAB-00110) establishes the Performance Measurement System that supports the WTP contract performance measurement requirements, provides analytical capability to support timely and effective management decisions, and allows benchmarking formal practices and procedures by which budget request proposals are prepared, documented, reviewed, and submitted.

The ISMS Annual Report will conclude and recommend whether an update to the ISMSD is needed. The ISMSD update will be prepared as scheduled by the Contracting Officer. The Project Manager will provide WTP approval for submission to DOE-ORP for final approval. Minor changes that do not affect the intent of the ISMS do not require DOE-ORP approval.

CCE -2

System effectiveness, measured as described in the contractor's ISMS Description, is satisfactory. Safety performance objectives, performance measures, and commitments are met or exceeded, and they are revised as appropriate for the next year.

The mechanism used to meet this expectation is the assessment process (Section 7.4.4). System effectiveness is measured by reviewing and analyzing assessment results, ISM performance metrics, their content and development, and their use. Results of these assessment programs are summarized in the ISMS Annual Report to illustrate ISMS effectiveness and to status the progress of the program to help identify areas for improvement. Using the WTP project reports and the ISMS Annual Report, senior management evaluates the previous year's safety performance and recommends safety performance objectives and measurement criteria for the following year. These criteria are developed in cooperation with DOE-ORP. The Project Manager approves these safety performance objectives, measures, and commitments for submittal to DOE-ORP for final approval.

CCE -3

Work activities reflect effective implementation of the functions of ISMS. Work is defined. Hazards are identified. Controls are developed and implemented. Work is properly authorized. Work is accomplished within controls. Appropriate worker involvement is a priority.

The assessment process ISMS CRADs contains POCs specific to work activities at the activity level. These CRADs address defining the scope of work, identification and mitigation of hazards, and performing work within the established controls.

The POCs focus on the proper use of ISMS core functions and guiding principles concentrating on hazard identification, analysis, and control processes for WTP design, construction, and commissioning. The POCs also evaluate how worker involvement is a priority in those processes. Personnel will be interviewed and CWPs will be reviewed to ensure compliance with the appropriate ISM implementing mechanisms.

In addition, independent assessments conducted by QA using 24590-WTP-GPP-QA-501, *Independent Assessment (Audit),* support the project goals and ISM by providing value-added assessments of the adequacy and effectiveness of project management control systems. Through independent assessments and line-owned management assessments, an integrated assessment approach is established to promote awareness of areas that require improvement and areas where excellence has been achieved. By evaluating assessment results and applying corrective actions where appropriate, senior management ensures work is properly defined, hazards are identified and controlled, and work is authorized and performed within controls.

The WTP APC provides a means for broad management and employee involvement in the WTP safety and health programs. The APC includes employees from key functional areas, and meets regularly to address project safety. Employees are encouraged to volunteer through their supervisors to participate. The council reviews safety suggestions or concerns from any employee, and develops recommendations to address the project-level safety concerns and issues. They make recommendations to project management to address issues, monitor the project-level safety and health trends, and assist in project safety communication and training.

CCE-4

Contractor and DOE implementing mechanisms continue to support the principles of ISMS. Promulgated roles and responsibilities are clear. Line management is responsible for safety. Required competence is commensurate with responsibilities and the technical and safety system knowledge of managers and staff continues to improve.

The mechanisms used to meet this expectation are continuing training and the assessment processes (Sections 7.4.3 and 7.4.4).

A clear understanding of roles, responsibilities, and authorities in relation to the project objectives of the organization creates the foundation for managing project business effectively. The WTP project defines roles, responsibilities, and authorities in project plans, manuals, and procedures to communicate expectations, align work with project objectives and strategy, and facilitate establishment of appropriate accountabilities and authorities with the DOE-ORP. Each department has roles and responsibilities specified in their own procedures. Project implementation is accomplished through rigorous self-assessment programs, performance evaluation, organizational alignment with roles and responsibilities, understanding of customer expectations, ISMS training, and conformance to this ISMS program.

The procedure 24590-WTP-GPP-CON-1101, *Site Organization*, defines the construction site organization and division of responsibilities for construction of the WTP; defines the line management structure that delineates responsibilities and authority for site construction activities; and describes the organizational interfaces and relationships with other project activities. Line management responsibility for safety is inherent for construction activities.

Through use of the self-assessment process, employee performance evaluations, individual training profiles, qualification programs, and employee position descriptions, the CCR process is implemented and focused on improvement for all Project employees. Technical and safety system training for line management are implemented as described in 24590-WTP-GPP-CTRG-002, *Training*. Project work including construction activities are periodically assessed to ensure that line management is responsible for safety, and employees understand their roles and responsibilities and are performing work in accordance with the principles of ISMS.

CCE -5

Contractor and DOE budget processes continue to ensure that priorities are balanced. Budget development and change control processes ensure that safety is balanced with production. Facility procedures ensure that production is balanced with safety.

The assessment process (Section 7.4.4) is the mechanism used to meet this expectation. The periodic assessments of the budget processes provide evidence of proper implementation of risk balancing. The following project procedures describe how priorities are balanced to support the safe design, construction, and commissioning of the WTP by ensuring that safety activities are adequately considered when budgets are established and changed.

- 24590-WTP-GPP-GAB-00108, *Funding Control,* establishes the requirements necessary to monitor and control costs and commitments by budget and reporting classification within the cumulative budget authorization limits provided with the WTP contract.

- The document 24590-WTP-GPP-GAB-00105, *Budgeted Cost of Work Scheduled*, establishes the process for how the budgeted cost of work scheduled is calculated and used in support of the WTP progress reports.

CCE -6

An effective feedback and improvement process is functioning at each level of the organization from the worker and individual activities through the institutional, facility, and activity levels. This process includes the ISMS feedback and improvement process used by and within DOE. The expectations of DOE P 450.5 are in place. Issues management is effective so that issues are identified, evaluated, and closed. Issues identified in ISMS verifications and previous ISMS annual update reviews are effectively addressed.

The assessment process and performance measurement process (Sections 7.4.4 and 7.5.5) are the mechanisms used to meet this expectation.

The process for developing and maintaining the project management assessment plan and schedule is described in 24590-WTP-GPP-MGT-002, *Management Assessment.* The independent assessment plan and schedule is developed and maintained in accordance with 24590-WTP-GPP-QA-501, *Independent Assessment (Audit).* The surveillance process provides the flexibility to conduct surveillances in areas of concern when identified as described in 24590-WTP-GPP-QA-601, *Quality Assurance Surveillance.* Taken together, the project's self-assessment processes address the elements of DOE P450.5.

The WTP APC, through worker involvement in the safety and health processes, monitors the project-level safety and health trending, and serves as the communication pathway between employees and senior management. The employee safety team, through involvement with safety goals and related assessments, keep senior management aware of safety concerns by providing an additional communication link between project work groups and management.

The ISMS Annual Report provides the necessary analysis of ISMS implementation, including issues identified in ISMS verifications and previous ISMS updates, to determine system strengths and weaknesses. The conclusions drawn from the report determine specific areas to focus on for the following year to ensure continuous improvement. Recommendations for corrective actions are developed for approval by the Project Director.

CCE -7

List A/List B is reviewed and updated, as necessary, at least annually and concurrent with the budget cycle. The process of effecting changes to the standards and requirements identified in the Contract per DEAR List A and List B is being utilized and is effective. Authorization Agreements and Authorization Basis documentation is maintained current. Changes in agreed upon standards and requirements are included to reflect mission changes. An effective, dynamic process to keep standards and requirements current is apparent.

The WTP contract, Clause I.117 is DEAR 970.5204-78, *Laws, Regulations, and DOE Directives*. No DEAR 970.5204-78 List A (Applicable Laws and Regulations) is appended to the WTP contract. The DEAR 970.5204-78 List B (List of Applicable Directives) is in Section J (Attachment E) of the WTP contract.

The Requirements Management Process and Authorization Basis Upgrade Process (Sections 7.4.1 and 7.4.2), are the mechanisms used to meet this expectation.

Contract Changes and Pending Item Procedure (24590-WTP-GPP-GAV-00102) is the mechanism used by the WTP to evaluate and implement, as necessary, changes to laws, regulations, and regulatory guidance. The B List in the contract identifies documents applicable to the WTP. Contract changes would be required if any of these documents changed.

The document 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance,* describes the requirements, responsibilities, and administrative controls for maintenance of the WTP AB. New facility designs or administrative controls (procedures, programs, plans, and management processes), or changes to any of these that could affect the AB require an evaluation to ensure that the facility, as designed, as constructed, and as operated, is consistent with the technical, procedural, and analytical requirements in the AB. Inconsistencies identified between design or administrative controls and the AB are reconciled. The mechanism used to change the AB is the SE/ABAR.

CCE -8

Performance objectives and criteria (POC) guidance for contractor and DOE assessments focus the reviews on the adequate implementation of the core functions and the principles of Integrated Safety Management in a manner consistent with the approved ISMS Description. ISMS assessments utilize the POCs.

The assessment processes described in Section 7.4.4 are the mechanisms used to meet this expectation. The self-assessment process for the project is implemented through a two-tiered assessment program. The first tier consists of ongoing management assessments (24590-WTP-GPP-MGT-002) and *Readiness Assessments* (24590-WTP-GPP-MGT-001). These processes are performed by all levels of management to determine the level of program compliance, promote continuous improvement, and enhance project performance. An additional assessment process is described in 24590-WTP-GPP-SIND-022, *Assessment and Issue of Noncompliance for Construction Subcontractor's Safety and Health Compliance.*

The independent assessment process also consists of ongoing independent audits and surveillances performed by QA in accordance with 24590-WTP-GPP-QA-501 and 24590-WTP-GPP-QA-601. These two processes are designed to verify ES&H program implementation, maintenance, and effectiveness of the management assessment process. An overall analysis of the results of the self-assessment process is summarized in the ISMS Annual Report.

CCE -9

Relevant records reflect an improving ISMS. Records include routine DOE and contractor self-assessment reports, independent and focused assessment reports, incident investigations, occurrence reports, PAAA enforcement action reports, and other relevant documentation. These records provide evidence concerning the status of implementation, integration, and effectiveness of the Integrated Safety Management System. Feedback, improvement, and change control of the contractor ISMS Description is in place and effective.

The assessment and performance measurement processes in Sections 7.4.4 and 7.4.5, respectively, provide the data to conduct the analysis necessary to demonstrate this expectation. Improvements to ISMS processes related to CCEs 1 through 8 are summarized in the ISMS Annual Report and incorporated into the annual ISMSD update. These improvements are extracted from feedback processes including the WTP Progress Reports, and provide WTP management with appropriate measures of ISMS improvement.

The following CCEs are applicable to DOE only and are not addressed in this document.

CCE-10

DOE ISMS procedures and mechanisms are in place to ensure that work is formally and appropriately authorized and performed safely. DOE line managers are involved in the review of safety issues and concerns and have an active role in authorizing and approving work and operations.

CCE-11

DOE ISMS procedures and mechanisms are in place to ensure that hazards are analyzed, controls are developed, and that feedback and improvement programs are in place and effective. DOE line managers are using these processes effectively, consistent with the DOE Field Office FRAM and DOE Headquarters FRAM requirements.

7.6 ISMS Declaration of Readiness Report

To measure ISMS effectiveness and readiness for the following Fiscal Year, WTP Project Management compiles an ISMS Declaration Report. Determinations are made as to the success of the past year's ISMS performance measures and commitments as input for the report. Results from assessments, lessons learned, updates to the WTP contract, updates to the AB, and progress on safety performance commitments are analyzed to provide input for generating the safety performance objectives, measures, and commitments and training topics for the next year. This ISMSD is updated if warranted by the conclusions in the ISMS Declaration Report.

Project management, with the support of QA as necessary, annually reviews and evaluates data from internal and external sources, to identify problems that hinder the organization's ability to achieve its mission and performance objectives and to encourage continuous improvement. These management assessments use a management evaluation process to examine project performance, with particular emphasis on areas or activities that could have an adverse impact on worker and public safety or on the environment. The process should include activities for evaluating conditions. Management from each organization has the prime responsibility for planning and conducting such evaluations. Significant issues and deficiencies, as well as opportunities for improvement, are identified and action plans developed and implemented.

7.7 Updating ISMS Description Document Requirements

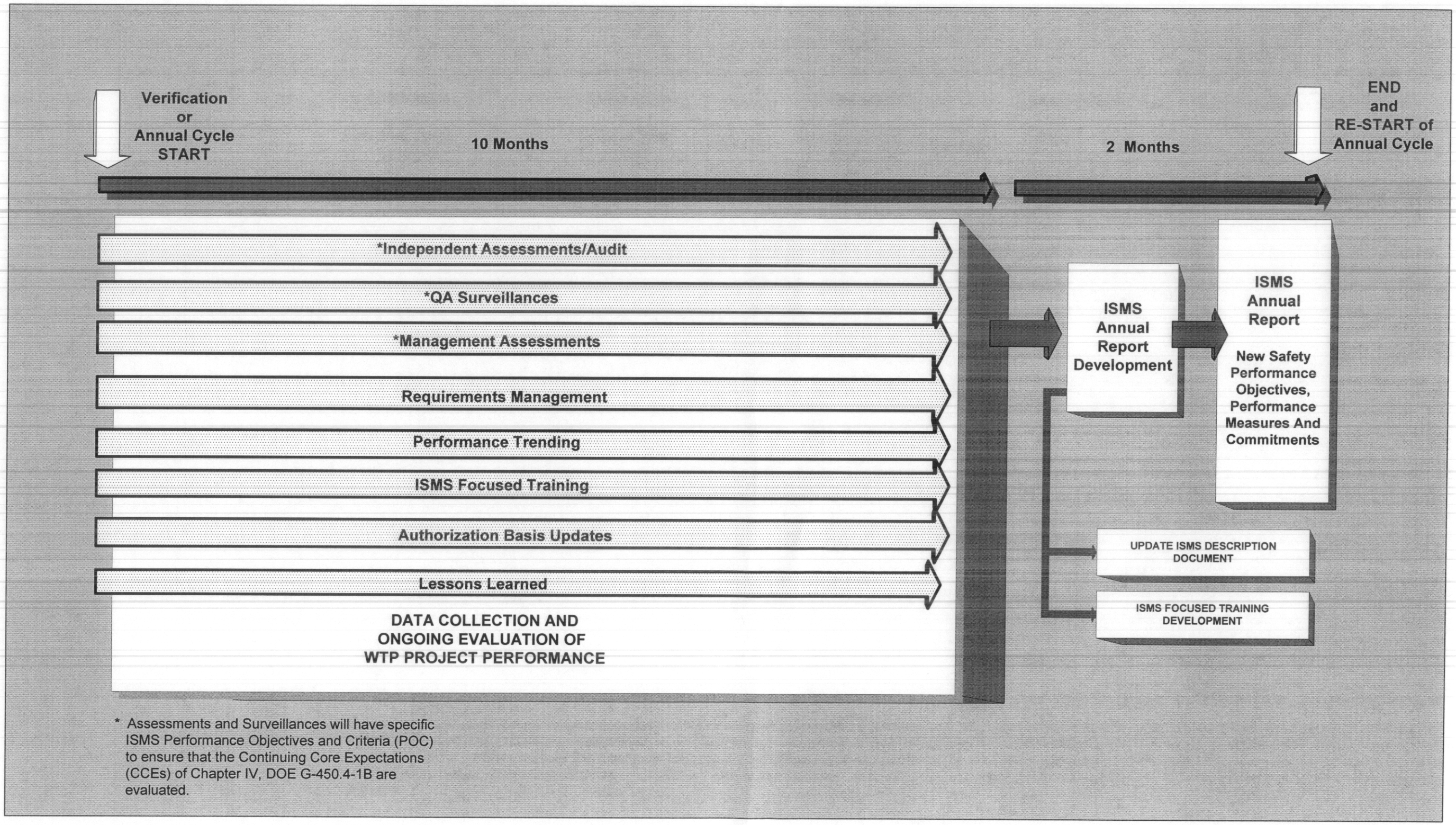
WTP and DOE are responsible for ensuring that the approved ISMSD is controlled by an effective feedback and improvement process, so that the description remains current and reflects changes to the project relative to design, construction, and commissioning. The mechanisms in Section 7.4 enable WTP management to accomplish this through the identification of changes to project schedule, and budget direction from DOE. The ISMS Declaration Report is the tool for analysis of the ISMS mechanisms and indicates whether a revision to the ISMSD is needed.

7.8 Summarizing the Project ISMS

Project management is committed to a safe and technically sound, cost-efficient design, construction, and commissioning of the WTP. Activities at the project are conducted in accordance with the policies, programs, and procedures of the ISMS described in this document, which is invoked by the WTP contract, Clause I.105 (DEAR 952.223-71, *Integration of Environment, Safety, and Health into Work Planning and Execution.*)

Section 7, Maintaining an Approved ISMS, is responsive to Chapter IV of DOE G 450-4-1A. By using ISMS implementing mechanisms as processes to sustain the current safety management culture, measure system effectiveness, and update system processes in response to feedback and assessment results, a path forward has been created for WTP ISMS. The WTP ISMS is mature to the level that the Core Function 5 processes have become the comprehensive tools for maintaining and updating the system.

Figure 7-1 Annual Process for Maintenance and Update of the WTP ISMS



8.0 WTP Safety Impact Plan and Implementation

8.1 Purpose

The purpose of this safety impact plan is to enhance metrics to better evaluate the existing safety processes used within the WTP.

8.2 Scope

The safety impact plan applies to both the construction site and the functional organizations and offices in Richland.

The WTP will adopt this safety impact plan, which includes the metrics provided in this section. The new metrics will be developed, implemented, and maintained to enhance the existing program by focusing on leading indicators, which provide tools to analyze precursor events/occurrences/conditions to serious accidents.

8.3 Objective

The objective of Section 8.0 is to integrate leading indicator metrics into the ISMS, to enhance the effectiveness of ISMS and ultimately to enhance safety in all aspects of work at the WTP.

8.4 Requirements

8.4.1 General Responsibilities

Construction and functional management are responsible to ensure their organizations' compliance with this safety impact plan. Items 1 through 4 are the core elements for leading indicators of the safety impact plan that are to be implemented, maintained, and reported as described. Metrics in Section 8.4.2 further detail the requirements for a fully implemented safety impact plan.

1 ES&H compliance assessments. ES&H compliance assessments will be conducted by supervisors or managers at each construction site area and each Richland office following a SA provided checklist. **Note:** Construction site compliance assessments and office building assessments will be tailored. Responsible organizations are responsible to document the assessments and forward documentation each quarter to the ISMS Manager.

2 Personal ES&H Performance-Based Leadership activities/processes. Supervisors or managers will implement this process to enhance the measurement of performance-based safety to include Performance-Based Leadership activities, to ensure leadership and commitment to safety through active involvement in ES&H activities.

3 Housekeeping assessments/audits will be conducted by supervisors or managers each week, following predefined checklists. These assessments/audits will be conducted by individual supervisors, management teams, or other combinations as appropriate.

4 Personal safety plans (PSPs) are to be developed by each non-manual, supervisor, and manager. The term supervisor in this statement includes manual foreman and general foreman.

8.4.2 Metrics (Leading Indicators)

8.4.2.1 Perform ES&H Compliance Assessments at Each Area

This metric will include measuring the percentage of compliance considering behaviors and conditions. Once these assessments are completed, the observations will be analyzed to ensure continuous improvement.

Construction Site

1 Personal protective equipment
2 Tools and equipment
3 Housekeeping
4 Scaffolds and ladders
5 Fall prevention and protection
6 Walking/working surfaces
7 Rigging and cranes
8 Electrical (temporary)
9 Barricades
10 Fire prevention/protection
11 Environmental
   - Spill prevention
   - Waste management
12 Environmental awareness training
13 Erosion and sediment control

8.4.2.2 Perform ES&H Compliance Assessments at Each Richland Office

This metric will include measuring the percentage of compliance at the office buildings, considering behaviors and conditions. Once these assessments are completed, the observations will be analyzed to ensure continuous improvement.

Richland Offices

1 Housekeeping
   - All places of employment, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition
2 Walking/working surfaces, including stairs
3 Electrical
4 Fire prevention
   - Fire loading
5 Emergency preparedness
   - 1910.38 Emergency action plan
   - Emergency egress paths clear, fire doors functional/not blocked

- Fire extinguishers. The employer shall ensure that portable fire extinguishers are maintained in a fully charged and operable condition and kept in their designated places at all times except during use.

6 Ergonomic evaluations (% of early analysis, % of poor work station)

8.4.2.3 Performance-Based Leadership

The performance-based leadership metric will include construction site managers or supervisors self-measuring their involvement in key safety and planning meetings such as STARRT, pre-task briefings, and JHA meetings. Other areas of measurement will include measuring attendance in leadership training classes and supervision involvement in JHA development for tasks under their responsibility. SA will conduct a general metric review to measure how well and completely this metric is being assessed and evaluated.

- Percentage of supervision attending STARRT meetings
- Percentage of supervision attending JHA meetings
- Supervision completing safety leadership training
- Supervision involvement in the JHA for tasks under their responsibility
- Percentage of completed PBL personal action plans completed (weekly)
- Percentage of supervisors who have completed Supervisor Safety Orientation training

Data Sources

- PBS data (from metrics above)
- Managers/supervisors performance-based leadership action plan reports
- Percent of PSPs completed for personnel (as required) under their responsibility
- Percent of PSPs posted

8.4.2.4 Personal Safety Plan

- Management % complete; % posted
- Non-manual % complete; % posted
- Manual supervision (foreman/general foreman) % complete; % posted

8.4.2.5 Housekeeping, Construction Site

Housekeeping metrics will provide a proactive process for measuring the quality of housekeeping at the construction site as a leading indicator/metric. Each category has 10 points possible (0 to 10) with 10 points being the best. Points awarded are objective per the person conducing the assessment.

	Housekeeping	Points Possible	Points Awarded	%
1	Project work area is clean and free of excess trash, debris	10		
2	Walkways and passageways clear (specific criteria depending on season)	10		
3	Material or equipment properly stored	10		
4	Electrical cords, hoses, welding leads, etc. elevated	10		

	Housekeeping	Points Possible	Points Awarded	%
5	Area free of scrap metal, protruding nails, and other puncture hazards	10		
6	Trash receptacles and water containers are accessible and maintained	10		
7	Trash in appropriate containers (e.g., clean, metal, oily rags)	10		
8	Flammable material stored properly	10		
9	Barricades installed and maintained	10		
10	Gang boxes, toolboxes orderly	10		
	TOTALS	**100**		

8.4.2.6 Housekeeping, Richland Offices

Housekeeping metrics will provide a proactive process for measuring the quality of housekeeping at the Richland offices as a leading indicator/metric.

	Housekeeping	Points Possible	Points Awarded	%
1	Spills cleaned up immediately.	10		
2	Walkways, aisles, stairways, and passageways maintained in a clear and unobstructed condition.	10		
3	Trash containers are placed strategically in the office to promote the proper disposal of scrap materials.	10		
4	Liquids (such as paints, solvents, thinners, oils, greases) and any other material or containers that have contained chemicals are disposed of in accordance with regulatory requirements.	10		
5	Materials are stored in a manner so as not to obstruct access to fire protection equipment, control valves, fire doors, alarm devices, or panels, electrical panels, or aisles and hallways that serve as a means of exit. Minimum clearance of 36 in. (91 cm) is maintained.	10		
6	Storage areas are kept clean, and materials neatly stacked or placed.	10		
7	Freestanding boxes (with no visible damage) are not to be stacked higher than four times the smallest base dimension, nor higher than 5 ft, whichever is less.	10		
	Totals			

8.4.2.7 Key Execution Elements of the WTP People-Based Safety Process

Using the existing PBS metrics, key execution elements will be evaluated and analyzed for trends. The following are the key execution elements for evaluating PBS:

- Employee involvement
- Management/supervisory involvement
- Observation quality

- Implementation team effectiveness
- Percentage of positive behaviors versus negative behaviors

8.4.2.8 Past and Future Safety Targets

Construction and SA will evaluate at least one area or factor from the previous year that contributed to the injury/illness/exposure profile and the major ES&H risk factor for the following year. The metric will evaluate plan of action(s) to control or stop contributors from past and future years.

8.4.2.9 Incident Analysis

Incident reports, audit reports, etc., will be evaluated to ensure negative or potentially negative trends are acted on to stop any further similar incidents. The following indicators are to be evaluated:

- Accident/incident investigations and causal analysis as applicable will be evaluated for negative trends in causes and/or actions. Trends or potential trends will be reported to management for further evaluation and action if necessary.
- Occurrence reports will be reviewed for trends or possible trends from events that fall under the same criteria.

8.4.2.10 Planning Assessments

This metric is in place to ensure planning, including analysis of work hazards and controls, is acceptable and documented as appropriate and then provided to the workers. Data will be obtained by, but will not be limited to, management walk-arounds, area specific walk-arounds, individual functional/organizational assessments, and worker-involved assessments.

Job site observations of hazards, undue risks, etc., versus what the STARRT Card or JHA documented in these areas.

8.4.2.11 Employee Concerns

Evaluation of the employee concerns metric, specifically safety concerns, is intended to provide a leading indicator of potentially unsafe conditions or acts.

- Total number of concerns versus percentage of safety concerns
- Total number of safety concerns versus substantiated safety concerns
- Open actions from safety concerns
- Overdue actions from safety concerns

8.4.3 Training

Each functional and construction manager is responsible for ensuring, at a minimum, that their supervisory/management personnel review the safety impact plan. This section of the ISMSD shall be placed as required reading (training) for identified staff.

8.5 Safety Impact Plan Reporting

The safety impact plan metrics will be evaluated quarterly. Evaluation and analysis will be provided to the SA Manager for incorporation into a corporate report. Additionally, a summary evaluation report will be incorporated into the annual ISMS report provided to DOE.

The intent of reporting is to document the activities/actions taken throughout the reporting period that have enhanced the program and/or to resolve safety issues, and to identify any leading indicators of a potential hazards or risks, gain analysis information from those discoveries, and identify future actions to correct discoveries.

8.6 Program Evaluation

The following questions may be used by corporate auditors and should be considered by WTP managers during internal/functional reviews/assessments:

1 Does the project have a safety impact plan implemented?
2 Are identified staff (those who have responsibilities for implementing portions of this plan) trained to the safety impact plan?
3 Is management carrying out its responsibilities?
4 Is supervision carrying out its responsibilities?
5 Overview assessment of process at the project (are we using the path of risk and problem areas?)

9.0 References

9.1 Project Documents

24590-WTP-3DP-G01B-00001, *The EDPI System.*

24590-WTP-3DP-G01B-00003, *Lessons Learned System.*

24950-WTP-3DP-G03B-00001, *Design Process.*

24590-WTP-3DP-G03B-00010, *Engineering Planning and Control.*

24590-WTP-3DP-G03B-00044, *Standard Component Numbering.*

24590-WTP-3DP-G04B-00001, *Design Criteria.*

24590-WTP-3DP-G04B-00005, *Configuration Management.*

24590-WTP-3DP-G04B-00025, *Engineering Interface Control.*

24590-WTP-3DP-G04B-00027, *Design Verification.*

24590-WTP-3DP-G04B-00033, *Project Reviews.*

24590-WTP-3DP-G04B-00037, *Engineering Calculations.*

24590-WTP-3DP-G04B-00046, *Engineering Drawings.*

24590-WTP-3DP-G04B-00049, *Engineering Specifications.*

24590-WTP-3DP-G04B-00062, *Disposition of Field Change Request/Field Change Notice.*

24590-WTP-3DP-G04T-00901, *Design Change Control.*

24590-WTP-3DP-G04T-00905, *Determination of Quality Levels.*

24590-WTP-3DP-G04T-00913, *Review of Engineering Documents.*

24590-WTP-3DP-G05B-00034, *Indoctrination/Orientation and Training.*

24590-WTP-3DP-G06B-00001, *Material Requisitions.*

24590-WTP-3DP-G06B-00002, *Subcontracts.*

24590-WTP-3DP-G06B-00010, *Specifying Supplier Quality Assurance Program Requirements.*

24590-WTP-DB-ENG-01-001, *Basis of Design.*

24590-WTP-G63-HR-004, *Career Development and Training.*

24590-WTP-G63-MGT-001, *Hanford Tank Waste Treatment and Immobilization Plant Integrated Safety Management System Policy.*

24590-WTP-G63-MGT-002, *WTP Environmental Policy.*

24590-WTP-G63-SIND-001, *Hanford Tank Waste Treatment and Immobilization Plant Health and Safety Policy.*

24590-WTP-GPP-MGT-004, *Constructability and Operability Program.*

24590-WTP-GPG-CON-1204, *Dry Run Process.*

24590-WTP-GPG-CON-8401, *Quantity Reporting.*

24590-WTP-GPG-SENV-001, *RPP-WTP Environmental Requirements and Regulation Guidelines.*

24590-WTP-GPG-SIND-004, *Behavior Based Training.*

24590-WTP-GPG-SIND-009, *Mitigation Plan for Assisting Subcontractors Unable to Meet DOE Safety Performance Requirements.*

24590-WTP-GPG-SRAD-001, *Design Guide for ALARA*

24590-WTP-GPG-SREG-004, *US Department of Energy, Office of Safety Regulation Action Tracking.*

24590-WTP-GPP-CON-1101, *Site Organization.*

24590-WTP-GPP-CON-1201, *Construction Work Packages.*

24590-WTP-GPP-CON-1301, *Construction Training.*

24590-WTP-GPP-CON-3105, *Special Instructions.*

24590-WTP-GPP-CON-3106, *Construction Deficiency Reporting & Control.*

24590-WTP-GPP-CON-4101, *Construction Subcontract Management.*

24590-WTP-GPP-CON-7101, *Construction Quality Control Program.*

24590-WTP-GPP-CON-7104, *Nonconformance Reporting & Control.*

24590-WTP-GPP-CTRG-002, *Training.*

24590-WTP-GPP-GAB-00101, *Work and Organizational Breakdown Structures (WBS/OBS).*

24590-WTP-GPP-GAB-00103, *Trend Program.*

24590-WTP-GPP-GAB-00105, *Budgeted Cost of Work Scheduled (BCWS).*

24590-WTP-GPP-GAB-00106, *Budgeted Cost of Work Performed (BCWP).*

24590-WTP-GPP-GAB-00108, *Funding Control.*

24590-WTP-GPP-GAB-00110, *Performance Measurement.*

24590-WTP-GPP-GAV-00100, *Contract Management.*

24590-WTP-GPP-GAV-00102, *Contract Changes and Pending Item Procedure.*

24590-WTP-GPP-GCB-00100, *Field Materials Management.*

24590-WTP-GPP-HR-020, *Employee Education and Experience Verification.*

24590-WTP-GPP-IT-001, *Use of Quality Affecting Software Applications.*

24590-WTP-GPP-IT-005, *Project IT Change Control Process.*

24590-WTP-GPP-MGT-001, *Readiness Assessments.*

24590-WTP-GPP-MGT-002, *Management Assessment.*

24590-WTP-GPP-MGT-004, *Constructability and Operability Program.*

24590-WTP-GPP-MGT-005, *Employee Concerns Program.*

24590-WTP-GPP-MGT-007, *WTP Document Administration.*

24590-WTP-GPP-MGT-008, *QA Stop Work/Management Supervision of Work.*

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