Department of Energy
Washington, DC 20585

MAR 0 2 2012

The Honorable Peter S. Winokur
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW, Suite 700
Washington, DC 20004

Dear Mr. Chairman:

This letter is to inform you that the Department of Energy (DOE) has completed Action 1-7 of the Department's Implementation Plan (IP) for Defense Nuclear Facilities Safety Board (Board) Recommendation 2011-1, *Safety Culture at the Waste Treatment and Immobilization Plant* (WTP). The deliverable for Action 1-7 is a letter to the Board transmitting a revision to the WTP Project Execution Plan (PEP) to more clearly delineate federal roles, organizational responsibilities and interfaces at WTP and Office of River Protection (ORP) so that the WTP Project reporting relationship is consistent with other Environmental Management (EM) major acquisition projects. The enclosure to this letter is the revised WTP PEP.

Prepared in accordance with DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, this PEP establishes how DOE executes and manages the WTP Project. Additionally, this PEP documents the policies and procedures that are used to manage and control the WTP Project. The PEP describes how the project mission will be accomplished, including resource requirements, technical approach and objectives, management systems and processes, and primary roles and responsibilities.

If you have any questions, please contact me or Mr. James Hutton, Chief Nuclear Safety Advisor, at (202) 586-5151.

Sincerely,

Matthew Moury
Deputy Assistant Secretary for
Safety, Security, and Quality Programs
Environmental Management

Enclosure

Project Execution Plan for the Waste Treatment and Immobilization Plant (WTP) Project

MGT-PM-PL-06
Revision 1
February 2012

Office of River Protection

EM Environmental Management
safety ❖ performance ❖ cleanup ❖ closure

U.S. Department of Energy
Office of River Protection
Hanford Site, Richland, WA

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PROJECT EXECUTION PLAN
for the
Waste Treatment and
Immobilization Plant (WTP) Project

Project Number 01-D-416
Document No. MGT-PM-PL-06
Revision 1

Prepared and Submitted for Approval by:

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2/27/12
Date

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2/29/12
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Secretarial Acquisition Executive Approval:

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U.S. Department of Energy

MAR -2 2012
Date

History Sheet

Document/Rev	Date	Reason for Revision
DOE/ORP-2003-01, Rev. 0	March 2003	Initial release for CD-2
DOE/ORP-2006-02, Rev. 0	June 2007	Revised to conform to December 2006 revised baseline.
DOE ORP-2006-02, Rev. 1	May 2009	Minor revisions to conform to Prime Contract Modification A-143 and incorporation of BNI's internal replan.
MGT-PM-PL-06, Rev. 0	August 2009	Administrative revision to comply with the Office of River Protection Quality Assurance Program. • Assigned new document number, • Added Chief Engineer position to ENS section of roles and responsibilities, • Other minor changes to roles and responsibilities section, • Updated organizational chart, • Consolidated two work breakdown structure elements.
MGT-PM-PL-06, Rev. 1	February 2012	Major Revision - Revisions to reflect HQ-EM/ORP/WTP project organization changes, and other Federal Project Director changes consistent with recommendations in the Sept 2010 Project Management Assessment Report and associated Decision Memoranda approved by the Deputy Secretary on January 13, 2011. References to the project scope of work, the funding profile, the total project cost of $12.263B, and the project completion schedule of November 2019 are being evaluated to determine impacts to performance baseline cost and schedule objectives. PEP references to budget and schedule parameters are noted as under evaluation. The PEP also introduces a proposal for a phased CD-4 approach.

Cover photo: Waste Treatment and Immobilization Plant construction site, October 2011.

FOREWORD

The U.S. Department of Energy (DOE) Waste Treatment and Immobilization Plant (WTP) is the cornerstone of the River Protection Project's (RPP) mission to clean up mixed hazardous and radioactive waste contained in 177 underground storage tanks at the Hanford Site in southeastern Washington State, some of which are over 60 years old. When construction of the WTP is complete, the RPP system – comprised of the WTP and Tank Farms (TF) Projects – will operate as an integrated group of waste transfer and treatment processes and systems.

Integration of the WTP and TF Projects is critical to ensuring the waste processing systems are fully functional to allow treatment, storage, and disposal of Hanford legacy tank waste. The WTP will receive waste from the tank farms and use a vitrification technology to transform the waste into a stable glass form. Immobilized waste glass and secondary waste from the WTP will be transferred to other tank farm facilities for further treatment and/or disposition. While the WTP is being constructed as a set of processing facilities, additional transfer systems and waste-handling infrastructure and facilities are being constructed as part of the TF Project to support the RPP mission.

At the end of November 2011, the WTP Project was 62 percent complete, with 86 percent of engineering, 62 percent of procurement, and 59 percent of construction completed. The project has spent $6.63B of the $12.263B[1] total project cost. WTP facility transition to operations is planned to occur through a sequential startup and commissioning process, ultimately leading to final facility transition to operations by November 2019[1]. This PEP does not change the current performance baseline approved in December 2006.

As of this Project Execution Plan update, additional investments in TF Project infrastructure and facility upgrades are required to align with the current WTP operational readiness review and 2019[1] final facility transition. With the WTP Project over 60 percent complete, increased emphasis is being applied to the active management of the complex interfaces between the WTP and TF Projects to ensure the successful startup, commissioning, and facility transition of the WTP. WTP radioactive operations will be integrated with existing tank farm activities.

The WTP is a project of unprecedented scale and complexity in the DOE Office of Environmental Management program. Its success requires a disciplined and documented approach to project management in accordance with DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, and suggested approaches contained within the DOE G 413.3 series guides, as well as the Deputy Secretary of Energy's *Project Management Principles* memorandum dated March 4, 2010, which mandates increased emphasis on design maturity, project staffing, funding stability, transparency of project management information, and implementation of peer reviews.

[1] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

This plan describes the execution strategy, objectives, and processes used to manage all aspects of the WTP Project. The project management processes described in this plan focus on successful completion of WTP Project work and describe the project execution and government oversight responsibilities required to achieve design, construction, and startup of the WTP. WTP Project closeout will occur after commissioning and facility transition to operations has been completed.

CONTENTS

ATTACHMENTS

FIGURES

TABLES

TERMS

BCP	baseline change proposal
BNI	Bechtel National, Inc.
BOF	Balance of Facilities
CD	Critical Decision
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CO	Contracting Officer
COR	Contracting Officer's Representative
DOE	U.S. Department of Energy
DOE-EM	U.S. Department of Energy, Office of Environmental Management
DOE-HQ	U.S. Department of Energy, Headquarters
DOE-ORP	U.S. Department of Energy, Office of River Protection
DOE-RL	U.S. Department of Energy, Richland Operations Office
DOE-WTP	U.S. Department of Energy, Waste Treatment and Immobilization Plant Project Office
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
EPC	engineering, procurement, and construction
ESAAB	Energy Systems Acquisition Advisory Board
ESH&Q	Environmental Safety, Health and Quality
EVMS	Earned Value Management System
FPD	Federal Project Director
FPM	Federal Project Manager
FY	fiscal year
HCA	Head of Contracting Activity
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
HLW	high-level waste
ICD	interface control document
IDF	Integrated Disposal Facility
IHLW	immobilized high-level waste
ILAW	immobilized low-activity waste
IMP	Interface Management Plan
IPT	Integrated Project Team
ISMS	Integrated Safety Management System
JRMT	Joint Risk Management Team
KPP	key performance parameters
Lab	Analytical Laboratory
LAW	low-activity waste
LBL	Low-Activity Waste Facility, Balance of Facilities, and Analytical Laboratory
LEED	Leadership in Energy and Environmental Design
MR	management reserve

MT	metric ton (where 1 MT = 1,000 kg or 2,204 pounds)
NEPA	*National Environmental Policy Act of 1969*
OARS	DOE-ORP's Action Reporting System
OECM	DOE Office of Engineering and Construction Management
OPC	other project costs
ORR	operational readiness review
PARS	Project Assessment and Reporting System
PBS	Project Baseline Summary
PEP	Project Execution Plan
PMB	performance measurement baseline
PT	Pretreatment (Facility)
QA	quality assurance
QAPD	Quality Assurance Program Description
R&T	research and technology
RCRA	*Resource Conservation and Recovery Act of 1976*
RCW	*Revised Code of Washington*
REA	request for equitable adjustment
RPP	River Protection Project
SAE	Secretarial Acquisition Executive
SAS	Safeguards and Security
SCIM	Startup and Commissioning Integration Manager
SEPA	*Washington State Environmental Policy Act*
SSC	structure, system, and component
TC&WM	Tank Closure and Waste Management
TF	Tank Farms (Project)
TOC	Tank Operations Contract
TPC	total project cost
TWRS	Tank Waste Remediation System
WAC	*Washington Administrative Code*
WBS	work breakdown structure
WCD	WTP Construction Oversight and Assurance Division
WDOH	Washington State Department of Health
WED	WTP Engineering Division
WTP	Waste Treatment and Immobilization Plant

1.0 INTRODUCTION

The 586-square-mile Hanford Site is located along the Columbia River in southeastern Washington State. Beginning in the 1940s with the Manhattan Project, the Hanford Site played a pivotal role in the nation's defense with the construction and operations of nine nuclear reactors and five large plutonium processing complexes. Today, the Hanford Site includes numerous former nuclear material production areas, active and closed research facilities, waste storage and disposal sites, and large areas of natural habitat and buffer zones. Under the direction of the U.S. Department of Energy (DOE), the Hanford Site workforce is engaged in the cleanup of contaminated facilities, groundwater, and soils resulting from this period of national defense activities.

Hanford Site cleanup is overseen at DOE Headquarters (DOE-HQ) by the Office of Environmental Management (DOE-EM) and is directed and implemented locally by two DOE field offices: the Richland Operations Office (DOE-RL) and the Office of River Protection (DOE-ORP). DOE-RL manages the projects associated with cleaning up the reactors, the soil, the groundwater, and the solid waste burial sites. Additionally, DOE-RL manages the demolition of facilities, the disposition of the remaining plutonium left on the Hanford Site, and the physical infrastructure necessary to perform the cleanup missions. DOE-RL also provides human resource, administration, and legal services for both field offices.

DOE-ORP was established in response to Section 3139 of the *Strom Thurmond National Defense Authorization Act for Fiscal Year 1999* to manage the River Protection Project (RPP). This Act was extended through 2019 in a defense authorization bill passed in December 2011. The RPP includes the safe storage, retrieval, and treatment of tank wastes currently stored in the 200 Area tank farms; construction of a Waste Treatment and Immobilization Plant (WTP) to process and immobilize the tank waste; and associated operations, maintenance, engineering, and construction activities.

The WTP Project is pivotal to the cleanup mission at Hanford, providing the majority of hazardous and radioactive tank waste treatment and immobilization functions. The WTP is comprised of the following primary facilities:

- Pretreatment (PT) Facility
- Low-Activity Waste (LAW) Vitrification Facility
- High-Level Waste (HLW) Vitrification Facility
- Analytical Laboratory (Lab).

The remaining WTP structures and facilities make up a facility grouping referred to as the Balance of Facilities (BOF).

The WTP Project has an authorized total project cost (TPC) of $12.263B[2] and is scheduled to be complete by November 2019[2]. Key schedule objectives supporting these commitments include substantial completion of engineering activities in 2013[2], substantial completion of physical construction in 2016[2], and final project completion in 2019[2]. Figure 1-1 depicts major elements

[2] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

of the RPP and the relative location of the WTP in relation to tank farm infrastructure and facilities.

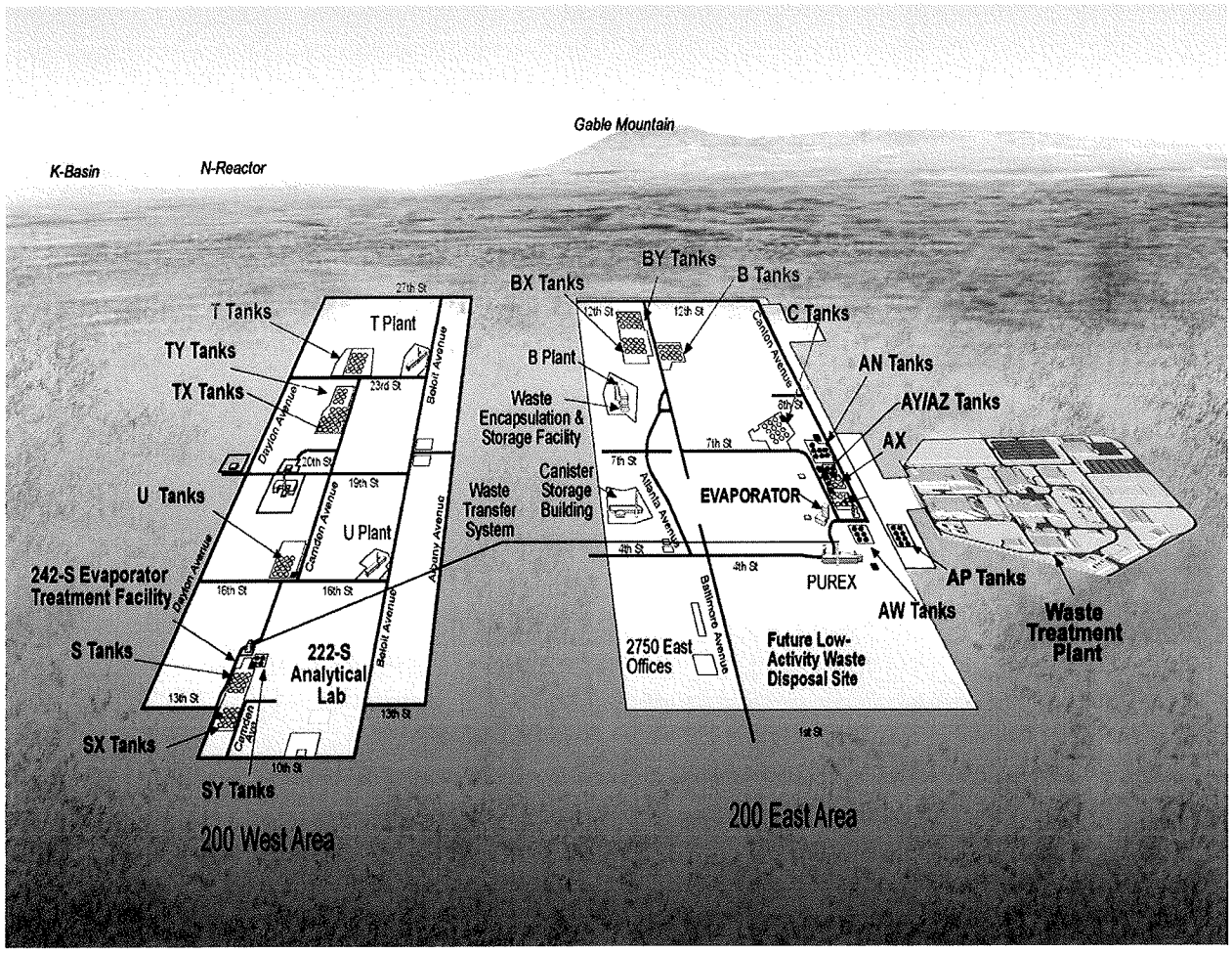

Figure 1-1. Tank Farms in Hanford 200 West and 200 East Areas and the Site of the Waste Treatment and Immobilization Plant. (Not to scale.)

At the end of Fiscal Year (FY) 2010 with plant design more than 80 percent complete and construction more than 50 percent complete, the project emphasis shifted from design/construct to construct/commission to facilitate transition to an operating facility. DOE's integration of the WTP and TF Projects is critical to ensuring successful startup, commissioning, and facility transition of the WTP. Primary goals of this integration are to create a single WTP and TF Project waste treatment system and to ensure efficient and consistent waste feed during operations.

Prepared in accordance with DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, this Project Execution Plan (PEP) establishes how DOE executes and manages the WTP Project. Additionally, this PEP documents the policies and procedures that are used to manage and control the WTP Project. The PEP describes how the project mission will be accomplished, including resource requirements, technical approach and objectives, management systems and processes, and primary roles and responsibilities.

2.0 PROJECT MISSION AND STRATEGY

The mission of the WTP Project is to design, construct, and commission a chemical processing plant to treat approximately 56 million gallons[3] of highly hazardous chemical and radiological waste stored in 177 underground tanks at the Hanford Site. The wastes will be separated into HLW and LAW streams, and both are planned to be immobilized by a vitrification process for disposal. The WTP Project performance baseline includes operating the plant using waste simulants during cold commissioning to demonstrate the ability to achieve waste processing throughput and immobilized waste product acceptance criteria prior to the introduction of radioactive tank waste. Once WTP operating capability is demonstrated during cold commissioning, the WTP Project will complete operational readiness reviews (ORR) consistent with DOE O 425.1D, *Verification of Readiness to Startup or Restart Nuclear Facilities.* Project closeout will be initiated after the final Critical Decision (CD)-4, "Approve Start of Operations" for the WTP is received. Following CD-4, the WTP contractor will demonstrate integrated operations of the WTP using radioactive materials and will transition the facility to a WTP post commissioning contractor who will maintain radioactive WTP operations.

The primary objective of the RPP is to reduce environmental risk from Hanford tank wastes. The WTP Project contributes to that mission by:

- Constructing a facility that can safely separate and treat the radioactive hazardous tank waste into LAW and HLW waste streams
- Constructing a facility that can safely immobilize the HLW fraction for eventual shipment to a national high-level nuclear waste repository
- Constructing a facility that can safely immobilize the LAW fraction for on-site disposal.

This PEP revision reflects on-going consideration of a shift in priorities and implementation of a phased approach to facility construction, startup, commissioning, and turnover. There are three factors influencing the phased approach to facility startup and commissioning. First, a pause in the construction of the PT and HLW Facilities to resolve a technical design issue in the 2005-2006 timeframe resulted in construction of the LAW Facility, BOF, and Lab (collectively the LBL) being substantially ahead of the PT and HLW Facilities. Consequently, LBL construction and startup testing may be completed several years ahead of the remaining facilities.

Second, the Project has maintained its focus on resolving the technical issues for the PT Facility, while continuing construction activities on those areas not affected by technical concerns. Thus, the Project would maintain the planned progress on the LBL Facilities, and technical issues for the PT Facility would be prioritized for resolution first, where appropriate.

Third, the staggered completion of construction may present an opportunity for the WTP Project to conduct cold commissioning and an ORR for the lower hazard category LBL facilities earlier than the 2006 project baseline had established. This could allow plant, equipment, personnel, and program challenges to be recognized sooner, while not on the project critical path. By overcoming these challenges early and off the critical path, the project could reduce the risk to

[3] ORP-11242 Revision 6, 2011, *River Protection Project System Plan*

the later critical path commissioning programs supporting the PT and HLW Facilities. This approach would involve uncoupling the commissioning, ORR, and turnover of each facility; implementing a phased CD-4 process with WTP facility final performance goals achieved sequentially rather than starting all facilities at a single point in time; and beginning operation of the LBL before overall WTP Project completion, as early as 2017[4]. A critical element in beginning to treat LAW as early as 2017[4] is securing alignment within DOE-EM on the resources required by the TF Project to provide interim pretreatment and feed-delivery systems that will directly supply the LAW Facility with a suitable waste feed stream, as well as ensuring needed infrastructure services provided by other Hanford contractors.

This potential shift in priorities and implementation of a phased approach to facility construction, startup, commissioning, and turnover translates into a change in the project management and contract execution strategy for completion of the WTP Project. The project performance baseline documented in the previous revision of the PEP was based on an approach that included an assumption for "deferred operations" for facilities that were completed early, a single ORR for the entire WTP, and a single CD-4 approval to turnover facilities and transition to operations.

Approval to proceed with consideration of an approach based on an "active transition" of WTP facilities as they are completed and implementation of a phased CD-4 approach, as well as endorsement of waste feed introduction prior to 2019 (subject to an independent review of TF Project and identification of funding) was received from the Acquisition Executive in Decision Memorandum EXEC-2010-017788, "Approval of Actions to Move Forward with Implementing Waste Treatment and Immobilization Plant project Low Activity Waste Hot Operations in 2016."

Any final implementation of the changes in section 2.0, Project Mission and Strategy, will be accomplished in accordance with DOE O 413.3B requirements and the *Federal Acquisition Regulation*. The remainder of this PEP describes the details of the plans for implementing a phased approach for WTP facility construction, startup, commissioning, and turnover.

[4] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

3.0 ACQUISITION STRATEGY

The DOE-ORP is responsible for the successful accomplishment of the RPP mission and is implementing cleanup work under two prime contracts:

- The Tank Operations Contract (TOC) includes management of the TF Project, with the primary responsibility to safely store, retrieve, and treat tank waste, store and dispose of immobilized waste, and perform tank farm closure activities.[5] This responsibility includes designing, constructing, and operating the processes, systems, and facilities needed to batch, characterize, blend and mix as needed, and transfer waste to the WTP. The TOC is a critical interface to the WTP Project and must be aligned with the WTP Contract to support integrated WTP commissioning and facility transition.
- The WTP Contract includes the design, construction, and commissioning of a processing plant that separates and treats high-level radioactive slurry waste and low-activity radioactive liquid waste and immobilizes it by glass vitrification for final disposal.[6] Included in the WTP Contract is a period of time following successful completion of an ORR for the contractor to demonstrate integrated operations of the WTP using radioactive materials. The WTP contractor also supports transitioning the successfully commissioned WTP as a condition of contract completion. The WTP Contract originally was awarded as a cost plus incentive fee contract. However, in January 2009 it was converted to a cost plus award fee contract that consists of a traditional award fee, a schedule incentive fee, an operational incentive fee, and an enhancement fee.

The WTP Contract and TOC are managed and incentivized independently for their respective work scope. Each contract contains requirements for coordination with the other to ensure successful transition to a post commissioning contractor. Current contract requirements will be revised to improve the interface definition between the WTP Contract and TOC to incentivize performance.

The waste-processing objectives of the WTP Contract and TOC will remain aligned throughout the WTP Project duration. The proposed sequential WTP facility startup and transition strategy described in Section 8 of this PEP would require integration between the WTP and TOC contracts to align commissioning and facility turnover times. Initiating cold and hot (radioactive) commissioning of the LBL facilities earlier than the remainder of the WTP will require activation of a TOC contract line item for interim pretreatment and LAW feed delivery as early as 2017[7]. An independent review to evaluate the viability of the TF Project to support options for the sequential initiation of WTP facility transition and radioactive waste processing was completed in FY 2011.

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[5] The TOC (DE-AC27-08RV14800) was awarded to Washington River Protection Solutions, LLC in October 2008.

[6] The WTP Contract (DE-AC27-01RV14136) was awarded to Bechtel National, Inc., in December 2000.

[7] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

DOE-ORP will establish a contracting strategy for post WTP Project activities based on current budget and operational planning for the TF and WTP facilities. WTP hot commissioning must be contractually covered in time to support facility transition prior to completion of the current WTP Contract in November 2019[7] – preferably prior to WTP operational readiness activities – to ensure continuity throughout the multi-year commissioning and transition period.

A substantial contracting effort will be required by field and DOE-HQ staff to expedite an acquisition strategy for WTP operations that integrates with the current WTP Contract and TOC in a manner that achieves stability in commissioning and facility transition. This strategy must coordinate multiple environmental contracts to support mission objectives into the next decade.

Contracting authority in the DOE flows from the Secretary of Energy to the WTP Project, as follows:

- **DOE-HQ, Senior Procurement Executive, Director, Office of Procurement and Assistance Management (MA-60):** The Senior Procurement Executive has authority and responsibility to provide overall management direction for the DOE procurement system and to oversee development of procurement goals, guidelines, and objectives.
- **Head of Contracting Activity (HCA) – Deputy Assistant Secretary for Acquisition and Project Management (EM-50)**: The HCA has the authority and responsibility to make formal Contracting Officer (CO) appointments within the DOE-ORP and perform other HCA functions as described in the *Federal Acquisition Regulation* and *Department of Energy Acquisition Regulation* and other duties delegated by the DOE Senior Procurement Executive.
- **Contracting Officer**: Within warrant limits, the CO has the authority and responsibility to enter into, administer, and/or terminate contracts, financial assistance actions, leases, and/or sales contracts, and make related determinations and findings.
- **Contracting Officer Representative (COR)**: The COR has the authority and responsibility to act as an authorized representative of the CO. The WTP Federal Project Director (FPD) serves as the primary COR and provides technical direction regarding statement of work technical matters that are within the scope of work in the WTP Project contract.

4.0 PROJECT DESCRIPTION

4.1 PLANT OVERVIEW

The WTP, shown in Figure 4-1, is the largest construction project within DOE-EM. Occupying 65 acres of the Hanford Site, each of the WTP Project's five facility groupings fulfills a key function in treating and immobilizing the radioactive and chemical waste stored in Hanford's single-and double-shell tanks. In addition to being radioactive, the tank waste is highly caustic. Conditions vary from tank to tank, as do the techniques to retrieve the waste, pretreat it, and blend glass forming constituents that are dependent on waste chemical characteristics prior to immobilizing the waste. Figure 4-2 shows the separation of waste into LAW and HLW streams for vitrification.

Figure 4-1. Waste Treatment and Immobilization Plant Construction Site, October 2011.

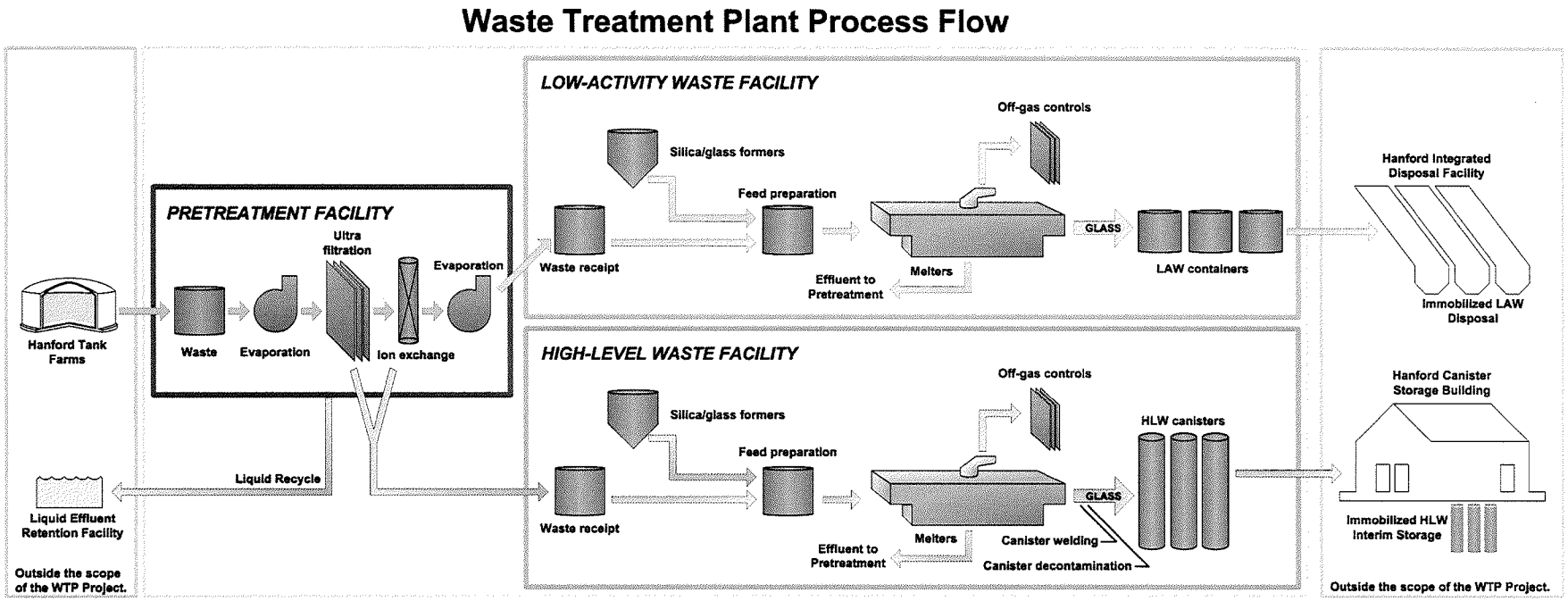

Figure 4-2. Simplified Schematic Showing the Separation of Waste into Low-Activity and High-Level Waste Streams for Vitrification.

(Components shown in light gray are outside the scope of the WTP Project.)

The LAW feed will be immobilized through a vitrification process for on-site disposal at the Integrated Disposal Facility (IDF). The immobilized low-activity waste (ILAW) containerized product will be prepared in accordance with WTP Contract specifications, as well as state land disposal requirements.

The insoluble portion of tank waste feed material, together with the radionuclides separated from the soluble fraction, becomes the HLW feed that will be immobilized by vitrification for eventual disposal at a national high-level nuclear waste repository. The immobilized high-level waste (IHLW) products will be transported to an interim on-site storage facility until a final repository is established. The TF Project constructs facilities to store these canisters onsite while awaiting final disposition.

The IHLW canister and ILAW container are shown in Figure 4-3.

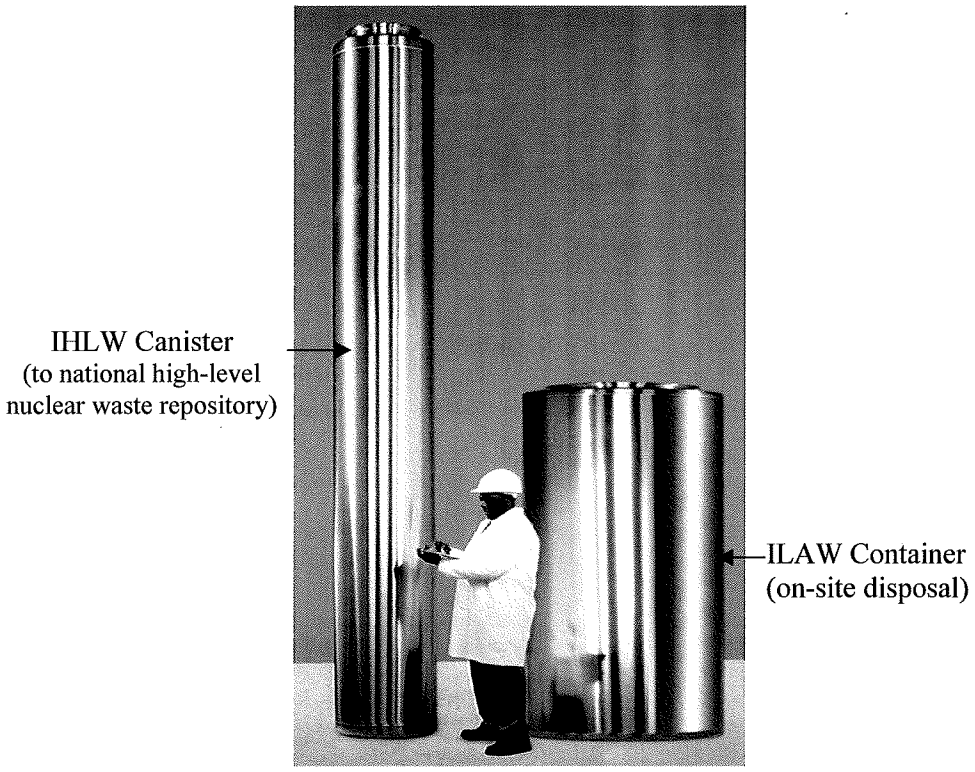

Figure 4-3. Immobilized High-Level Waste Canister and Immobilized Low-Activity Waste Container.

4.2 FACILITY DESCRIPTIONS

The physical dimensions of the WTP's four primary facilities are shown in Table 4-1, along with estimated quantities of materials and craft hours to build them. Key treatment and immobilization functions of each WTP facility are described in the following sections.

Table 4-1. Properties of the Four Primary Facilities of the Waste Treatment and Immobilization Plant.

Material Quantities / Craft Hours (estimated)	Facility Name			
	Pretreatment	Low-Activity Waste	High-Level Waste	Analytical Laboratory
Length (ft)	540	330	440	320
Width (ft)	215	240	275	180
Height (ft)	120	90	95	45
Volume (ft^3)	13,900,000	6,500,00	8,600,000	2,592,000
Concrete (yd^3)	114,000	29,000	87,000	12,000
Structural steel (tons)	20,000	6,200	11,800	1,800
Heating, ventilation, and air-conditioning ducts (lb)	1,872,000	953,000	1,142,000	342,000
Piping (ft)	556,000	110,000	166,000	36,000
Electrical cable (ft)	1,835,000	930,000	1,519,000	259,000
Craft hours to build	9,280,000	4,132,000	6,227,000	841,000

* Estimated quantities and craft hours included in contractor monthly status report.

4.2.1 Pretreatment Facility

The largest of the WTP facilities, the PT Facility is the world's largest radioactive chemical treatment and separations facility. The PT Facility contains processes that separate the radioactive tank waste into HLW and LAW fractions and transfer the segregated waste to the HLW and LAW Facilities for vitrification.

The PT Facility receives waste from underground storage tanks. LAW is transferred as a solution that contains some undissolved solids (precipitated salts); HLW is transferred as undissolved solids in slurry form. Figure 4-4 provides a simplified process flow diagram of the PT Facility.

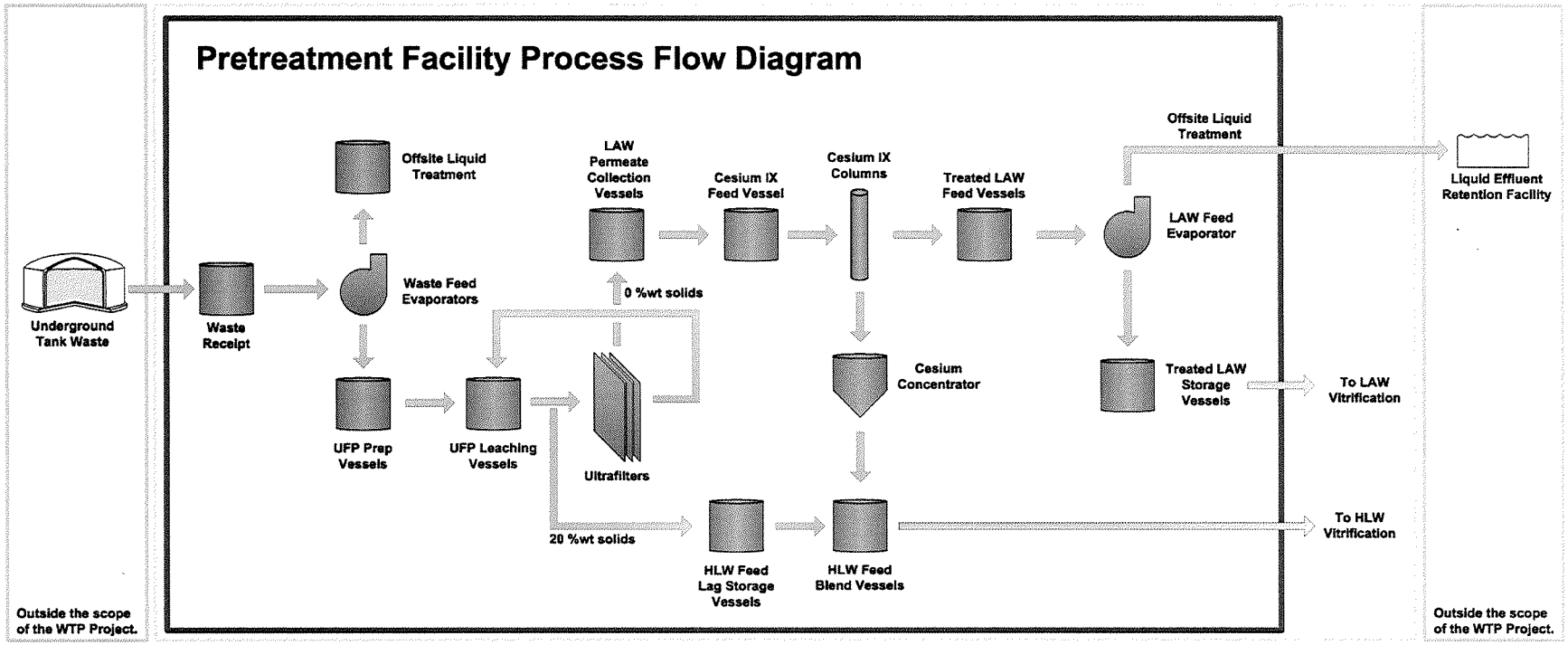

Figure 4-4. Simplified Pretreatment Facility Process Flow Diagram.

(The tank icon at the left represents the Tank Farms Project.)

The main pretreatment processes include filtration to separate the high-curie solids from the low-activity liquids, evaporation to remove excess water, and an ion exchange system to remove highly radioactive soluble cesium from the liquid fraction of the tank waste to meet LAW Facility limits. The waste is processed in vessels located in "black cells" (isolated from entry) and in equipment located in an adjacent hot cell (remotely accessible) that are located in concrete structures in the center of the building. A hardened control room building, which is the master control room for the WTP, and an annex building also are part of the PT Facility and are located adjacent to it.

The PT Facility also contains a process vessel ventilation system, an off-gas treatment system, and a stack. Liquid effluents are either recycled back into the facility or sent to facilities in other parts of the Hanford Site – the Liquid Effluent Retention Facility for treatment at the Effluent Treatment Facility.

4.2.2 Low-Activity Waste Facility

The LAW Facility receives feed from the PT Facility that has been filtered to remove the solids and has had actinides and cesium removed to meet the facility's waste acceptance criteria. To support an independent LAW vitrification process as early as 2017[8] and until the PT Facility is operational, feed may be transferred directly from the TF Project to the LAW Facility using interim pretreatment and feed delivery systems. In the LAW Facility, the LAW feed is mixed with glass formers and vitrified in joule-heated melters to produce an immobilized waste glass product that can be disposed of onsite at the IDF. LAW Facility container and waste performance capacities are shown in Table 4-2.

Table 4-2. Low-Activity Waste Facility Container and Waste Performance Capacities.

Low-Activity Waste Facility	
Container size	7.5 feet (2.686 m) high / 4 feet (1.22 m) in diameter
Container weight (when filled)	Less than 10,000 kg
Expected annual container production	1,277 containers
Design capacity	30 MT glass per day
Treatment capacity [1]	24 MT glass per day

[1] Treatment capacity assumed to be greater than or equal to 70 percent of design capacity based on facility operating assumptions.
MT = metric ton.

The LAW Facility also contains primary and secondary off-gas treatment systems for melters, exhaust stacks, and support systems to add glass formers. The facility is designed for contact maintenance, as the melters are self-shielded. An annex adjacent to the LAW Facility provides control rooms, entries, and operations and maintenance support areas.

[8] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

4.2.3 High-Level Waste Facility

The HLW Facility receives HLW slurry from the PT Facility, including highly radioactive cesium that has been removed from LAW feed stream. The HLW feed is mixed with glass formers and vitrified in joule-heated melters to produce an immobilized waste glass product that can be disposed of at a national high-level nuclear waste repository.

HLW Facility canister and waste performance capacities are shown in Table 4-3.

Table 4-3. High-Level Waste Facility Canister and Waste Performance Capacities.

High-Level Waste Facility	
Canister size	15 feet (4.5 m) high / 2 feet (0.61 m) in diameter
Canister weight (when filled)	3.2 MT
Expected annual canister production	620 canisters
Design capacity	6.0 MT glass per day
Treatment capacity [1]	4.2 MT glass per day

[1] Treatment capacity assumed to be greater than or equal to 70% of design capacity based on facility operating assumptions.
MT = metric ton.

The HLW Facility also contains primary and secondary off-gas treatment systems for melters, and other support systems for operations and processing of secondary waste streams. Because of high levels of radioactivity, the facility is designed for remote operations. Molten HLW glass is poured into stainless steel canisters. After cooling and lid-sealing, the canister surface is cleaned, a number of certification checks are completed, and the canister is loaded into a shipping cask for transportation to an interim storage facility where they are stored until shipment for disposal at a national high-level nuclear waste repository. The HLW Facility is designed to support possible future increases in the melter design capacity from 6 MT per day for the original melters up to 7.5 MT per day with replacement melters.

4.2.4 Analytical Laboratory

The Lab provides an around-the-clock ability to analyze waste samples from the PT Facility, the LAW Facility, and the HLW Facility. Its key objective is to ensure the final glass product meets all regulatory requirements and standards. The Lab is designed to support the potential expanded melter capacity of the HLW Facility. Thousands of waste samples per year will be analyzed in the Lab.

The Lab incorporates features and capabilities necessary to ensure efficient operations, including receipt/handling of samples for waste feed acceptance, process control, waste form qualification testing, environmental and authorization basis compliance, and limited technology testing.

Samples are taken from the PT, HLW, and LAW Facilities. Several samples also are taken from the BOF. PT and HLW Facility samples are pneumatically transferred to a series of shielded hot receipt cells and handled remotely using mechanical manipulators because of their high levels of radioactivity. LAW samples are pneumatically transferred to the Lab receipt cells and, due to their lower level of radioactivity, are handled and analyzed in a series of fume hoods.

4.2.5 Balance of Facilities

The BOF makes up the overall support services infrastructure essential for WTP operations. It comprises multiple support buildings (approximately 150,000 square feet) and approximately 100 systems across the 65-acre WTP site, and provides interconnecting utilities and support to the PT, HLW, LAW, and Lab facilities. The BOF infrastructure consists of the following groupings of facilities and types of support buildings.

- The power group includes switchgear buildings and emergency generator facilities.
- The steam group includes a steam plant and a fuel oil facility.
- The water group consists of cooling towers, water treatment facility, chiller/compressor facility, and a firewater facility.
- The air group has compressors.
- The process support group consists of the glass former storage facility, wet chemical storage facility, and the anhydrous ammonia storage facility.
- The waste facilities group consists of the spent melter staging pad and the non-dangerous, non-radioactive effluent facility.
- The miscellaneous support buildings group includes the administration building, simulator facility, warehouse, and site infrastructure (e.g., roads, grading, lights, sanitary waste, storm drains).

4.2.6 Site Development/Temporary Facility and Services Plan

The site is developed and the temporary construction facilities will be removed during project closeout after the completion of facility commissioning.

5.0 TAILORING STRATEGY

The WTP Project meets DOE O 413.3B requirements through a tailored application of project management processes to satisfy essential capital asset acquisition requirements. Tailoring does not imply the omission of essential project management elements, but instead relies on an innovative approach to manage the unique project management challenges of the WTP Project.

The key areas requiring tailoring for the WTP Project are as follows.

5.1 PHASED START OF OPERATIONS APPROVAL - CRITICAL DECISION-4

Due to the suspension in construction on the PT and HLW Facilities to resolve Defense Nuclear Facilities Safety Board questions related to seismic design requirements, construction of the LAW, Lab, and BOF facilities is substantially ahead of the other facilities. The staggered completion of construction presents an opportunity to conduct cold commissioning and an ORR for the lower hazard category LAW Facility earlier than the 2006 project baseline plan had established.

Based on a sequential startup and commissioning strategy for WTP facilities, two CD-4 approval decisions are being planned for consideration (see Section 7.3).

1. The WTP Project would define CD-4a, "Approve Start of Initial Operations," as the successful completion of an ORR and approval to start up the LAW Facility consistent with DOE O 425.1D. Approval to start up the LAW Facility would signify project completion for LAW and associated support facilities and approval to commence LAW hot commissioning, which would be outside the scope of the WTP Project.[9]
2. The WTP Project would define a second CD-4 approval milestone, "CD-4b - Approve Start of Full Operations," as successfully achieving operational key performance parameters as defined in Table 7-1, completion of ORRs for the PT and HLW Facilities, and approval to start up the PT and HLW Facilities consistent with DOE O 425.1D. Approval to start up the PT and HLW Facilities would signify WTP Project completion and approval to commence hot commissioning for the balance of the WTP. Consistent with DOE O 413.3B, approval of CD-4b would constitute WTP Project completion.

5.2 INTEGRATED PROJECT TEAM

The FPD is responsible for organizing and leading the WTP Integrated Project Team (IPT), as described in DOE O 413.3B. The FPD has delegated authority to facility and area-specific IPTs led by a Federal Project Manager (FPM) who organizationally reports to the FPD. FPMs are accountable for reporting project management performance, issues, and other significant project

[9] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered

information to the FPD. A common IPT charter ensures consistency across the four individual IPTs. This charter is approved as part of the PEP and included as Attachment 1.

5.3 SUSTAINABLE BUILDING PRINCIPLES

The DOE O 413.3B Contractor Requirements Document (CRD) requires that "all new construction and major building renovations must meet U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) gold certification." Based on DOE O 430.2B, *Departmental Energy, Renewable Energy and Transportation Management*, only new buildings at CD-1 or lower must implement the Guiding Principles of Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and attain LEED gold certification. However, the contractor's corporate policy documents a commitment to sustainable development principles in 24590-WTP-PL-COMM-08-0001, *WTP Sustainable Development Plan*, that are substantially aligned with the sustainable environmental stewardship considerations identified in DOE O 450.1A, *Environmental Protection Program;* therefore, the WTP Project will continue to implement the following sustainable building principles:

- Effectively protecting the environment by designing and building the WTP in a manner that ensures radioactive and chemical wastes are treated and disposed in accordance with regulatory guidelines.
- Plan, design, and build the WTP, while balancing economic, environmental, and community values.
- Protecting the environment, minimizing and mitigating unavoidable impacts, restoring environmental resources as appropriate, and using resources efficiently.

Since CD-1 for the WTP Project occurred prior to the implementation of LEED, the specific requirements to obtain gold LEED certification, or to document achievement of facility sustainment goals do not apply. The WTP Project will continue to implement high-performance and sustainable building principles, as appropriate, for the balance of the project lifecycle.

5.4 COMMISSIONING PLAN

DOE O 413.3B requires a checkout, testing, and commissioning plan be developed following approval of CD-1 to define the processes that will be established for acceptance and turnover of the structures, systems, and components (SSC) at CD-4. In accordance with the WTP Contract, the required commissioning plan will be submitted a minimum of 12 months prior to the start of cold commissioning and introduction of waste feed simulant into WTP facilities.

A draft of the commissioning plan has been submitted by the WTP contractor. However, based on ongoing engineering, construction, and integration activities with the tank farms contractor, refinement of the commissioning plan will continue as an outcome of the contractor Startup and Transition Integration Working Group.

5.5 QUALITY ASSURANCE

DOE O 413.3B requires that the contractor's Quality Assurance (QA) Program be developed in accordance with DOE O 414.1C, *Quality Assurance*; NQA-1-2008; and NQA-1A-2009 (addenda). The existing WTP Project contract awarded in August 2000 and modified in 2005 meets the contractual QA requirements specified in the following sources:

1. 10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements."
2. ANSI/ASME NQA-1-2000, *Quality Assurance Requirements for Nuclear Facility Applications,* Part I, "Requirements for Quality Assurance Programs for Nuclear Facilities," and Subpart 2.7, "Quality Assurance Requirements for Computer Software for Nuclear Facility Applications."
3. DOE/RW-0333P, *Quality Assurance Requirements and Description*, Rev. 20.
4. 24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document*, Vol. II, requires the contractor to apply ASME NQA-1-2004 to perform commercial grade dedication activities.

The WTP Project Code of Record and QA requirements will continue to be based upon these requirements. The WTP Project Code of Record is defined in Section 9.4.2.

5.6 ENVIRONMENTAL MANAGEMENT SYSTEM

DOE O 413.3B requires the Environmental Management System (EMS) be revised prior to approval of CD-4 in accordance with DOE O 450.1A to support the management and operations of DOE facilities. Specifically, the order identifies additional EMS requirements that apply to "new construction" or "major renovation projects," including environmentally preferable purchasing and recycling of construction materials.

The WTP Project policy and programmatic approach to environmental management are codified in 24590-WTP-G63-MGT-002, *WTP Environmental Policy*; 24590-WTP-PL-ENV-01-004, *WTP Environmental Plan*; and 24590-WTP-PL-ENV-01-005, *WTP Construction Environmental Control Plan.* The WTP Project EMS is integrated into 24590-WTP-ISMSD-ESH-001, *WTP Project Integrated Safety Management (ISM) System Description*, to provide for the systematic planning, integrated execution, and evaluation for public health and environmental protection; pollution prevention; and compliance with applicable environmental protection requirements. The WTP Project is over 50 percent complete and cannot be considered a "new project;" therefore, the existing WTP Project EMS requirements will be met.

5.7 CRITICAL PATH SCHEDULE

DOE O 413.3A specified that "a critical path schedule and a project master schedule be developed and maintained for the project." DOE O 413.3B modified the requirement to include a resource-loaded schedule containing "labor, material, and equipment costs to include unit prices and quantities." The contractor's certified Earned Value Management System (EVMS) includes a number of subordinate planning and control systems where resource information is

developed and maintained outside the project schedule. The WTP contractor continues to use their certified EVMS and existing planning and control software systems, which are capable of producing equivalent resource-loaded information stored outside the project baseline schedule.

5.8 VALUE MANAGEMENT/ENGINEERING

DOE O 413.3B added a contractor requirement to submit an annual progress report to the DOE Office of Engineering and Construction Management (OECM) that identifies value engineering accomplishments. The WTP Project institutionalized its value engineering process through the implementation of a Six Sigma program. This program includes practices to streamline WTP Project operations, improve quality, and reduce lifecycle costs. As part of its value management program, the WTP Project establishes annual goals for the identification and execution of savings opportunities, and performance is monitored quarterly. The results of the Six Sigma program satisfy this revised annual value engineering reporting requirement.

5.9 CONFIGURATION MANAGEMENT

DOE O 413.3B adds an additional reference for configuration management beyond the previous reference to ANSI/EIA-649, *National Consensus Standard for Configuration Management.* 24590-WTP-PL-MG-01-002, *WTP Configuration Management Plan*, is based on a number of consensus standards and International Organization for Standardization (ISO) guidelines for configuration management, including ISO 10007:1995(E), ANSI EIC-649A, and ASME NQA-1-2000 Part 1, Section 1, Requirement 3, and Section 802. It has been determined that the existing WTP configuration management process meets the intent of existing national standards.

5.10 INTEGRATION OF SAFETY INTO THE DESIGN PROCESS

DOE O 413.3B requires implementation of DOE-STD-1189, *Integration of Safety into the Design Process,* for new projects and major modifications classified as Hazard Category 1, 2, and 3 nuclear facilities. The WTP Project was authorized for construction prior to the issuance of DOE-STD-1189 (i.e., beyond CD-3). However, the WTP Project has implemented a process that has developed a specific basis of design, a safety requirements document, and a preliminary documented safety analysis consistent with the format of DOE-STD-1189. As well, the project is currently developing an overall authorization basis development plan that outlines the path to deliver a DOE-STD-3009-compliant documented safety analysis in accordance with 10 CFR 830, Subpart B, "rule" requirements, which are included in the BNI contract. This approach to development of final nuclear safety authorization basis documents is included as part of the project Code of Record and serves as the basis for design and construction of the WTP.

6.0 PROJECT ORGANIZATION, ROLES, AND RESPONSIBILITIES

The DOE WTP Project Office (DOE-WTP) is an integral and critical component of the DOE-ORP and pivotal to the cleanup mission to treat and immobilize Hanford tank waste. Recognizing the challenges in design, construction, and commissioning of the WTP, the DOE Acquisition Executive increased the authority delegated to the FPD relative to that previously provided. Those additional authorities were documented in a series of decision memorandums approved by the Deputy Secretary of Energy, and are being executed within the framework of the DOE-EM and the DOE-ORP functional organizations, as shown in Figure 6-1. The WTP Project is led and managed by the WTP FPD, two Deputy FPDs, five FPMs, and direct and matrixed personnel. The organizational interfaces among the various ORP organizational elements are intended to maximize collaboration and to enable WTP project delivery consistent with RPP mission objectives. As the project progresses, these organizational interfaces will evolve to maximize WTP operational effectiveness.

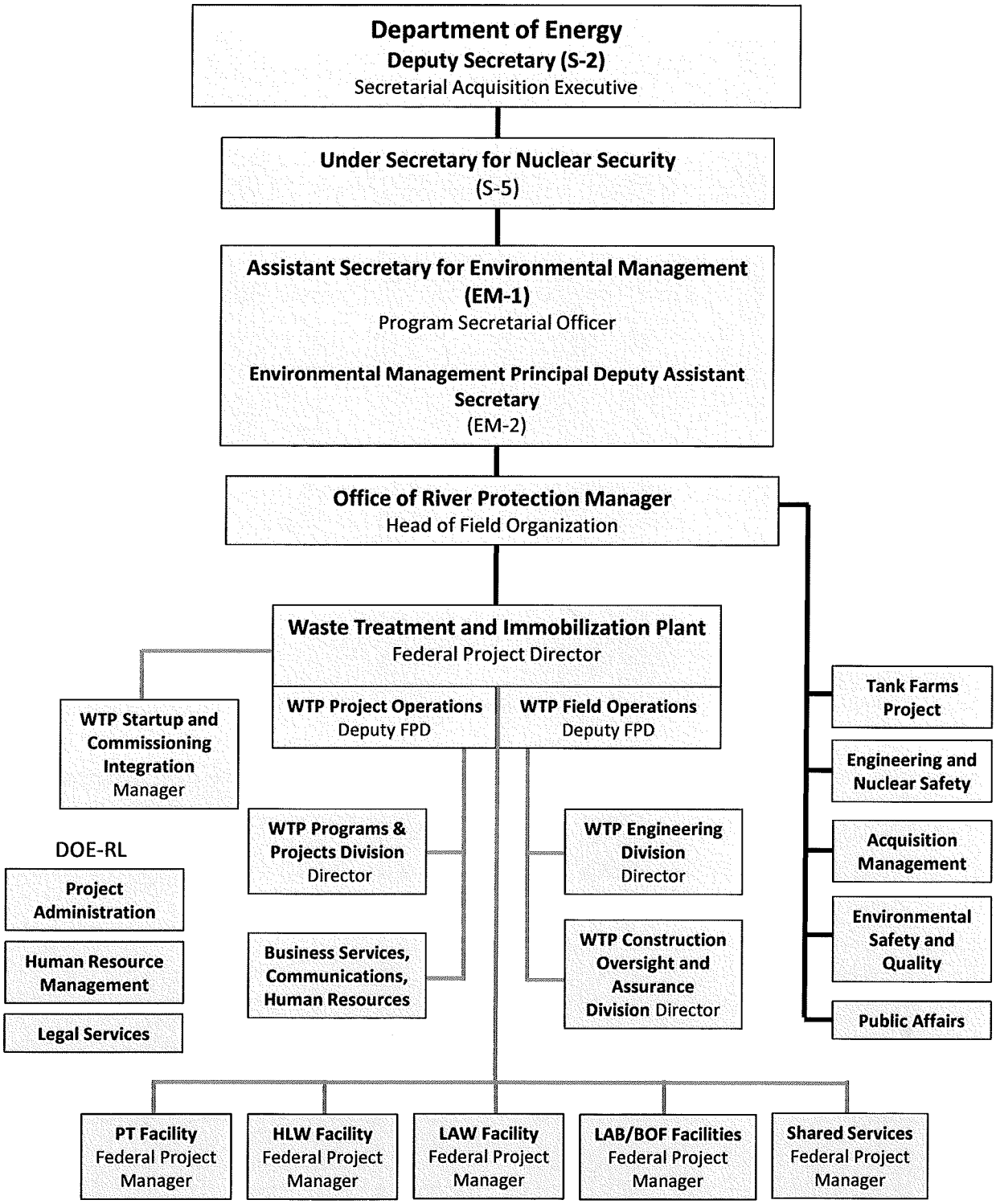

Figure 6-1. Waste Treatment and Immobilization Plant Project Organizational Structure.

6.1 ROLES AND RESPONSIBILITIES

WTP Project roles and responsibilities for specific leadership functions are described in the following sections.

6.1.1 Overall DOE Project Roles and Responsibilities

The WTP Project is being managed as a Major System Project, in accordance with DOE O 413.3B. The Deputy Secretary serves as the Secretarial Acquisition Executive (SAE) and the Assistant Secretary for Environment Management (EM-1) is the Program Secretarial Officer. These and other DOE-HQ roles, responsibilities, and authorities for project management functions of the WTP Project are defined in DOE O 413.3B.

6.1.2 Tank Waste and Nuclear Materials Deputy Assistant Secretary

The mission of the Office of Tank Waste and Nuclear Materials (EM-20) is to perform program management functions and to identify and advance strategies to plan and optimize, among other things, tank waste processing and programs to ensure optimized management of these projects and processes and to incorporate transformational technologies into these projects. EM-20 develops policy and guidance and provides technical advice on tank waste systems and provides leadership to planning and executing EM programs for the storage, retrieval, pretreatment, treatment, and final preparation of these materials for disposal and tank closure planning. In this role EM-20:

- Identifies and advances technologies, processes and technical practices that improve the performance of EM tank waste over their entire lifecycle through disposal or final disposition
- Provides for the highest level of interdisciplinary engineering consultation, guidance, expertise and continuity in this program area within the EM organization
- Provides programmatic input to the Office of Program Planning and Budget (EM-60) for budget formulation, strategic plans and performance measures, and supports development of execution guidance for Project Baseline Summaries (PBS) PBS-11, PBS-12, PBS-14 series and PBS-60
- Works with cognizant sites to assess potential adverse impacts to tank waste programs from proposed budget scenarios; and recommends mitigating strategies to EM-60 and EM senior management
- Monitors performance of tank waste and nuclear materials activities to evaluate performance against established metrics, milestones, contract requirements, and other parameters as required
- Monitors grants, co-operative agreements, and Agreements-in-Principle related to mission areas, as appropriate.

6.1.3 Office of River Protection Manager

The DOE-ORP Manager establishes policies, requirements, and procedures for execution and management of the DOE-ORP, including strategic/long-term planning and direction. Specific responsibilities associated with the WTP Project include:

- Assuring integration of all activities within the River Protection Project to best accomplish the ORP mission, including ensuring waste feed delivery and handling system delivery requirements are aligned with WTP Project requirements
- Providing management systems for nuclear safety, environmental permitting, quality assurance, and other functions necessary for effective oversight and management of the WTP Project
- Ensuring DOE-ORP resources are appropriately allocated and managed for effective and efficient oversight and management of the WTP Project
- Approving documentation as delegated by EM-1 (e.g., documented safety analysis, quality assurance plan)
- Assuring the people, programs, and process facilities needed to support and operate the WTP facilities will be available and functioning when needed.

6.1.4 Federal Project Director – Waste Treatment and Immobilization Plant

The WTP FPD manages Federal actions needed to complete the WTP Project, including successful completion of ORRs and CD-4 approval decisions.

Key responsibilities of the WTP FPD are to:

- Oversee project planning, execution, and management of the WTP Project
- Design, construct, and commission the WTP consistent with environmental, safety, security, and quality requirements defined by contract, public law, regulations, and executive orders
- Serve as the primary COR
- Act as the designated Fee Determining Official and establishes the framework for the fee structure that is implemented through the CO
- Establish performance criteria to be included in the semi-annual Performance Evaluation and Measurement Plan so that it can be modified into the contract
- Work with the CO to process any contract modification resulting from a project baseline change that affects the cost, schedule, or scope of the contract
- Coordinate with TF FPD to integrate waste feed delivery and waste handling activities to support commissioning and transition to operations
- Coordinate with DOE-RL for site activities that support the WTP Project
- As delegated, pursuant to a memoranda signed by the Acquisition Executive on January 13, 2011, determine the applicability of DOE directives, other than nuclear safety

directives and DOE O 413.3B, to include equivalencies and/or exemptions to the contract, in accordance with DOE O 251.1C, *Departmental Directives Program.*

6.1.5 Waste Treatment and Immobilization Plant Deputy Federal Project Directors

Two Deputy FPDs are identified within the DOE-WTP Project organization: the Deputy for Field Operations and the Deputy for Project Operations. The Deputy FPDs report directly to the WTP FPD and support the supervision of staff responsible for ensuring the safe, effective, and efficient completion of the WTP Project. Key responsibilities include:

- Provide direction, planning, integration, and analysis of the WTP Project scope, schedule, and cost elements of the project baseline
- Ensure operational oversight and management of the policies and processes supporting project and field operations
- Act as the principal Federal technical and operational point of contact to lead internal problem-solving activities across the WTP Project
- Act as the authoritative source for decisions and guidance dealing with changes in project performance objectives
- Act as COR (as delegated) to provide technical direction to the contractor; serves as interface for the WTP Project with DOE-HQ, regulators, and stakeholders, as well as the TF Project.

Deputy FPDs share WTP FPD responsibilities for the WTP Project throughout the project lifecycle, with the following exceptions:

- Deputy FPDs cannot authorize the release of contingency funds
- Deputy FPDs are not Fee Determining Officials.

6.1.6 Waste Treatment and Immobilization Plant Startup and Commissioning Integration Manager

The DOE-WTP Project Startup and Commissioning Integration Manager (SCIM) is responsible for developing the processes, monitoring progress, and completing the oversight of activities supporting the progression from construction to startup and commissioning for WTP facilities. The SCIM interfaces with the TF Project to ensure the availability of tank waste feed to support hot commissioning of the plant following completion of the WTP project. The SCIM reports directly to the WTP FPD for accountability of project and contractor performance with regard to commissioning issue identification and resolution and is authorized as COR (as delegated) to provide technical direction to the WTP contractor. As a critical interface, the SCIM will work closely with the TF FPD to ensure system integration, and is a key participant in managing DOE-ORP contractor interfaces. Specific responsibilities associated with the WTP Project include:

- Planning and administering the WTP startup oversight and surveillance program

- Developing and managing a WTP system-wide integrated flowsheet that identifies the technical integration functions that must be delivered for startup of WTP
- Ensuring integration consistency between the WTP Project and other external interfaces
- Developing a DOE and contractor Startup and Transition Integration Working Group to jointly prepare for facility ORRs and future facility transition to operations
- Resolving technical issues associated with the integrated flowsheet and interface control documents (ICD)
- Overseeing activities supporting transition of facilities to the long-term WTP operating contractor
- Ensuring that procedures, training, and qualification of staff meet design basis and limiting condition for operational objectives during cold commissioning.

6.1.7 Federal Project Managers

FPMs support the WTP FPD and manage the technical oversight of contract requirements for the WTP Project's major subprojects as shown in Table 6-1. Each FPM heads an IPT composed of support staff from several disciplines (e.g., engineering, operations, environmental, safety, project controls). FPMs report to the WTP FPD. Their responsibilities extend through startup and turnover of their respective facility.

Table 6-1. Responsibility Assignment Matrix for Federal Project Managers.

FPM/IPT Designation	Included Work Scope	Work Breakdown Structure Element
Pretreatment	Pretreatment Facility	1.01
High-Level Waste	High-Level Waste Facility	1.03
Low-Activity Waste	Low-Activity Waste Facility	1.02
BOF	Balance of Facilities	1.05
Lab	Analytical Laboratory	1.06
Shared Services	Shared Services	1.90

BOF = Balance of Facilities. Lab = Analytical laboratory.

FPMs have COR authority and will work with the CO to provide facility-specific technical direction and the interpretation of technical contract requirements. Other responsibilities include:

- Monitoring performance of design, construction, startup, commissioning, and ORRs for their respective facility through all WTP Project lifecycle phases
- Managing the facility scope, cost, and schedule elements of the project baseline, understanding the reasons for variances, and ensuring appropriate mitigation or corrective action is taken

- Ensuring that trends and potential baseline changes are identified early, are beneficial to the facility, and are communicated to the WTP FPD, as appropriate
- Maintaining awareness of the authorization basis and the process for changes and reviews and making recommendations regarding approval of authorization basis changes
- Managing risk and supporting the risk management process by ensuring early risk identification, assessment, and mitigation throughout the project lifecycle
- Chairing the facility-specific IPT and management of IPT resources
- Reviewing BNI inspection documents, test criteria, and commissioning procedures
- Ensuring that tests are adequate to achieve design validation and test results meet design requirements
- Integrating with other FPMs on common issues and facility-to-facility interfaces
- Reviewing BNI requests for equitable adjustments (REA) and making recommendations for disposition to the WTP FPD and CO.

6.1.8 Waste Treatment and Immobilization Plant Staff Organizations

The **WTP Engineering Division (WED)** supports the WTP Project and FPMs by overseeing the contractor's engineering programs, processes, and products through design, procurement, construction, systems testing, startup, and commissioning to ensure the plant will perform as intended, and within its authorization basis. WED staff provide technical support to permit and authorization basis change processes. WED staff includes facility area engineers, facility discipline engineers, safety system oversight engineers, and other subject matter experts.

The **WTP Construction Oversight and Assurance Division (WCD)** supports the WTP Project and FPMs by overseeing construction work, ensuring facilities are constructed as designed, and ensuring work is performed in compliance with occupational health and safety requirements. WCD staff oversee startup and acceptance testing, operability testing, readiness reviews, commissioning, and transition to operations activities. The WCD role includes oversight of construction management practices related to cost, schedule, efficiency, and constructability.

The **WTP Programs and Projects Division** supports the WTP Project and FPMs by establishing uniform project control and reporting policies, requirements, and procedures necessary to provide DOE management and WTP staff with accurate and reliable management information for informed decision making. This division establishes and maintains effective project management systems, provides baseline execution oversight for programmatic compliance, evaluates project performance, manages risk, and establishes integrated project management and control systems.

6.2 INTEGRATED PROJECT TEAM

The purpose of the WTP IPT is to provide broad oversight of the WTP Project; to support the WTP FPD in managing the WTP contract; and to facilitate the integration of the WTP Project

within DOE-ORP and with other Hanford Site organizations. Each major WTP facility is supported by an IPT led by the FPM. Key areas of IPT responsibility include the following:

- Worker safety and health
- Oversight of WTP Project design, construction, commissioning, and future operability
- Cost and schedule performance
- Contract management
- Risk management
- Issues identification and resolution
- Planning for startup and commissioning
- QA
- Integration with external interfaces
- Contractor and project performance.

Additional details exist in the *Waste Treatment and Immobilization Plant Project Integrated Project Team Charter* included as Attachment 1 to this PEP. Typical members of an IPT are shown in Figure 6-2. The WTP Project contractor is a member of the IPT and engages technical and functional support staff, when requested.

Each FPM leads their respective IPT composed of direct and matrixed staff from various technical and support disciplines (e.g., engineering, health and safety, environmental compliance, project controls, budget and finance, contract administration, construction inspection and acceptance, nuclear safety, fire protection, QA). All members of the IPT are responsible for understanding and implementing DOE's requirements to ensure completion and turnover of constructed facilities. Interpretation of contract requirements is provided to the IPT members through collaboration with the FPM, the WTP FPD, and the CO.

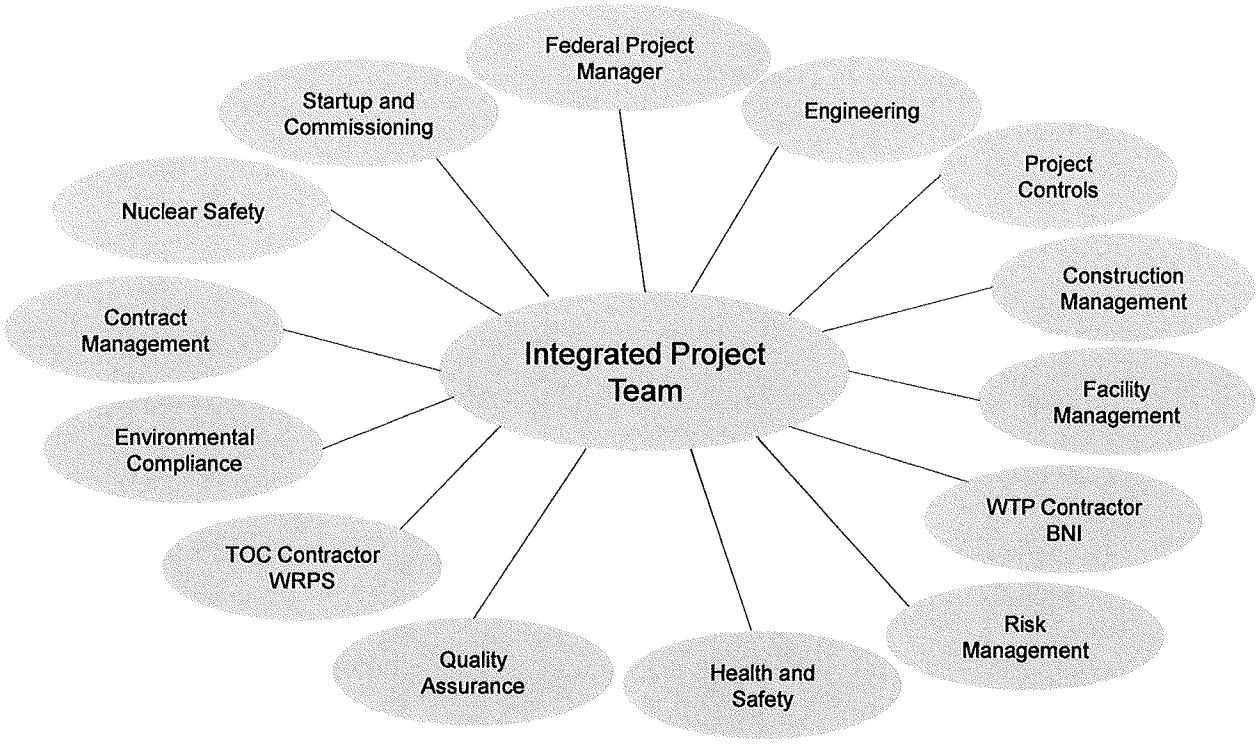

Figure 6-2. Waste Treatment and Immobilization Plant Project Integrated Project Team.

6.3 U.S. DEPARTMENT OF ENERGY OFFICE OF RIVER PROTECTION SUPPORT ORGANIZATIONS

Several DOE-ORP organizations have responsibilities for the execution of work on the WTP Project and have representatives assigned to IPTs or supporting the FPMs directly. Primary roles and responsibilities for these support functions are described in the following sections.

6.3.1 U.S. Department of Energy Office of River Protection Technical Support Organizations

The **Engineering and Nuclear Safety Office** is responsible for establishment and oversight of fire protection, criticality safety, and nuclear safety programs for the WTP Project, including establishing the requirements and procedures for and compliance with safety basis documents. This division integrates engineering, criticality safety, and nuclear safety programs across all RPP scope as a basis for authorization of a fully operational system.

The **Environmental, Safety and Quality Office** is responsible for oversight of programs for compliance with applicable laws, standards, regulations, and permits to protect the environment, workers, and the public. This division is responsible for oversight of programs and management systems associated with radiological protection, worker health and safety, accident investigation, and employee concerns. It includes the QA Team, the Verification and Confirmation Division, and the Environmental Compliance Division.

6.3.2 U.S. Department of Energy Office of River Protection Support Organizations

The **Acquisition Management Division** is responsible for managing contracting policies, programs, and operations, including the warrant system; assessing contractor procurement systems; determining contractor fees; and maximizing DOE-ORP and contractor use of small businesses. This division also maintains the balanced scorecard performance metrics and documentation.

The Office of the Chief of Staff manages and coordinates overall communications with external stakeholders and liaison with the Defense Nuclear Facilities Safety Board, Office of the Inspector General, and Government Accountability Office.

6.4 U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE SUPPORT ORGANIZATIONS

DOE-RL, in partnership with DOE-ORP, ensures effective integration between the WTP Project and other Hanford Site activities. DOE-RL provides administrative and technical support to the WTP Project, as requested. The following are key areas of integration.

- **Human Resources Management** supports the WTP Project in the area of recruiting, employment, benefits, awards management, and other human resource functions.

- **Employee Concerns Program** provides an independent process for both contractor and federal employees to formally document issues and concerns, including potential safety concerns
- **Legal Services** provides internal and external legal support for legal policies, issues management, negotiation of agreements, and DOE-HQ interface for legal matters.
- **Project Administration** supports budgeting, accounting, financial review, financial audit, and business service activities.

6.5 KEY STAKEHOLDERS AND MAJOR INTERFACES

Successful execution of the WTP Project requires accurate and timely communication among the WTP Project, its contractors, external regulators, and external oversight groups. These interfaces include the following:

- **Contractors:** The critical interfaces for the WTP Project mission success are those between the DOE-WTP Project staff and its contractors and the contractors with each other, particularly those involving engineering and technical requirements. The interface management system used by the WTP Project is described in Section 9.6.
- **Defense Nuclear Facilities Safety Board:** The interface procedure for DOE organizations and the Defense Nuclear Facilities Safety Board is described in DOE M 140.1-1B, *Interface with the Defense Nuclear Facilities Safety Board.*
- **Government Accountability Office and Office of Inspector General:** The DOE policy for interactions with the Government Accountability Office and Inspector General are described in DOE Order 2340.1C, *Coordination of General Accounting Office Activities*; DOE O 221.1A, *Reporting Fraud, Waste and Abuse to the Office of Inspector General*; DOE O 221.2A, *Cooperation with the Inspector General*; and DOE O 221.3A, *Establishment of Management Decisions on Office of Inspector General Reports.*
- **Federal and State environmental regulatory entities:** The DOE-EM policy for negotiating and approving environmental compliance and cleanup agreements is delineated in ESQ-EM-IP-06, *DOE-ORP Change Control Process for the Tri-Party Agreement.* DOE-ORP support organizations, with assistance from the WTP Project, maintain liaison with Washington State, the Washington State Department of Health, Washington State Department of Ecology (Ecology), and the U.S. Environmental Protection Agency (EPA). Although not a regulatory interface, liaison is maintained with the State of Oregon as a key stakeholder in protecting the Columbia River.
- **DOE-ORP, DOE-RL, and DOE-HQ:** Agreements between DOE-EM, DOE-ORP, and DOE-RL document DOE organizational authorities, roles, responsibilities, and reporting structure. The primary interface role of DOE-RL with DOE-ORP is to ensure effective integration between DOE-ORP and Hanford Site services. DOE-RL provides infrastructure and technical support to DOE-ORP upon request, maintains responsibility for Hanford Site safety and security, and acts as the signatory authority for certain site-wide permits and agreements. Overall completion of the WTP initial plant operations is governed and constrained by *Hanford Federal Facility Agreement and Consent Order*

(HFFACO) milestones and requirements of the Consent Decree in Case No. 08-5085-FVS, *State of Washington v.* Chu, United Stated District Court, Eastern District of Washington.

- **DOE-ORP, and local and State officials, public interest groups, the public, and Tribal Nations:** Official communications with stakeholders, the public, Tribal Nations, the Hanford Advisory Board, and other external organizations are typically formal in nature. Ongoing, working-level communications may be more informal and can be used to communicate project information and enable the early identification and resolution of issues. Communications are documented through meeting minutes, correspondence, responses to advice and recommendations, memoranda of understanding, and/or emails.

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7.0 PROJECT PERFORMANCE MEASUREMENT BASELINE

The WTP FPD is responsible for baseline development, execution, performance measurement, and reporting in accordance with DOE O 413.3B. The technical work of the WTP Project and the associated cost and schedule for performing that work constitute the performance baseline. The WTP Project Controls System integrates scope, schedule, and cost elements to provide discipline in planning, performance measurement, reporting, and control. Baseline development and performance monitoring are essential DOE-WTP management responsibilities to ensure the project is successful in achieving its objectives. Planning, performance measurement, and reporting processes help the DOE-WTP Project staff to:

- Determine if enough time remains to meet scheduled deliverable dates, complete the remaining work, and meet project objectives within the constraints of the project baseline schedule
- Determine if adequate resources are available to meet scheduled deliverable dates, complete the remaining work, and meet project budget objectives
- Provide insight so that the WTP Project team can recommend or make decisions or take actions that favorably affects the performance of the remaining work
- Verify that risks are being adequately managed.

BNI's document 24590-WTP-PL-PC-06-0001, *WTP Project Earned Value Management System (EVMS) Description*, describes the project management systems used by the WTP Project for planning, performance measurement, reporting, and control. The key products of the EVMS are the WTP contractor Project Monthly Status Report and accompanying supporting analysis and performance data. Contractor project and facility-specific reviews along with the Contractor's Monthly Status Report are used as input to DOE-WTP's assessment of cost and schedule performance.

On December 22, 2006, DOE approved a new performance baseline for the WTP Project, in accordance with DOE O 413.3A. This new performance baseline was based upon:

- A May 2006 estimate at completion that the contractor proposed to DOE
- Recommendations from the U.S. Army Corps of Engineers' independent validation review
- An external independent review
- The recommendation of DOE's OECM.

The TPC for the WTP Project was increased from $5.781B to $12.263B, and the expected contract completion date was extended from July 2011 to November 2019. This revised cost and schedule baseline represented an 80 percent confidence level for successfully completing the project within baseline cost and schedule objectives.

All of the five facilities originally were scheduled to be commissioned at roughly the same time. However, with the change in the seismic criteria, construction for the PT and HLW Facilities was suspended at the end of FY 2005. DOE-ORP received Secretarial certification of the final seismic ground motion criteria on August 10, 2007. Construction resumed at the HLW Facility

in August 2007 and at the PT Facility in December 2007, after the contractor successfully completed readiness reviews for each facility.

As previously discussed, the suspension in construction on the PT and HLW Facilities resulted in construction of the LBL being substantially ahead of the PT and HLW Facilities. Consequently, LBL construction and startup testing may be completed several years ahead of the remaining facilities. The staggered completion of construction presents an opportunity to conduct cold commissioning and an ORR for the lower hazard category LBL facilities earlier than the 2006 project baseline plan had established.

7.1 WORK BREAKDOWN STRUCTURE / SCOPE BASELINE

The project work breakdown structure (WBS) is a hierarchical grouping of elements that form the basis for planning and scheduling work, budgeting, and reporting, and is a direct representation of the baseline scope of work to be performed on the WTP Project. The top-level WTP Project WBS is shown in Figure 7-1. WBS dictionary sheets defining top-level work scope for work elements defined in Figure 7-1 are contained in Appendix D of 24590-WTP-PL-PC-06-0001, as modified.

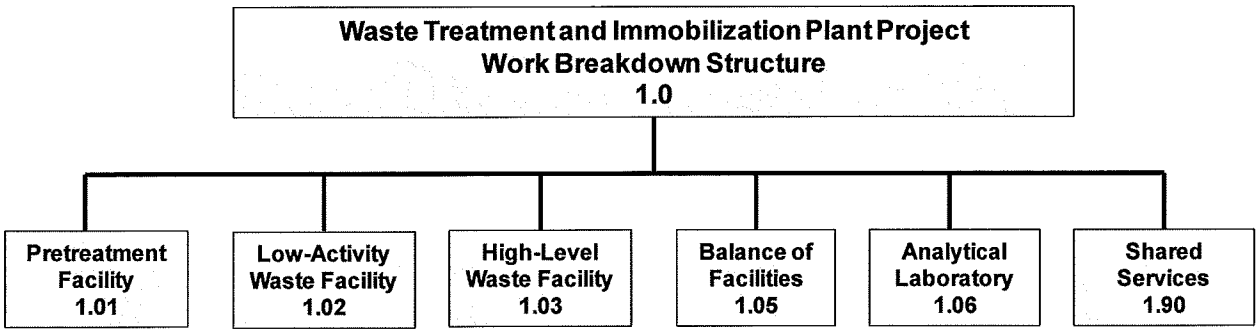

Figure 7-1. Waste Treatment and Immobilization Plant Project Work Breakdown Structure.

7.2 TECHNICAL BASELINE

The WTP Project technical baseline is based on the currently approved set of design requirements and design documents that define the physical and functional characteristics of the facility and safety-significant SSCs.

Design basis documents form the collective set of design criteria and inputs, design constraints, design analyses, and calculations. The following documents comprise the design basis:

- Contract DE-AC27-01RV14136, *Bechtel National, Inc., Design, Construction, and Commissioning of the Hanford Tank Waste Treatment and Immobilization Plant*
- 24590-WTP-DB-ENG-01-001, *Basis of Design*
- 24590-WTP-GPP-SREG-002, *E&NS Screening and Authorization Basis Maintenance*
- 24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document Volume II*

- 24590-WTP-PSAR-ESH-01-002-01, *Preliminary Documented Safety Analysis to Support Construction Authorization*
- Preliminary documented safety analysis, per facility
- 24590-WTP-RPT-OP-01-001, *Operations Requirement Document*
- ICDs (see Section 9.6)
- State Regulations, environmental permits, and licenses (see Section 9.7)
- Waste compliance plans for the ILAW and IHLW waste forms
- 24590-WTP-QAM-QA-06-001, *Quality Assurance Manual*
- 24590-WTP-IAR-QA-03-016, *Radiological Protection Program*
- Preliminary fire hazards analysis, per facility
- Engineering discipline-specific design criteria.

WTP Project design criteria documents are identified in 24590-WTP-RPT-ENG-01-001, *Technical Baseline Description.* The WTP is designed to:

- Receive and separately store LAW feed and HLW feed
- Treat and immobilize the LAW fraction and provide final waste products that meet on-site waste disposal criteria
- Implement a sludge treatment process for solids washing, caustic leaching, and oxidative leaching and immobilize the HLW feed and radionuclides separated from LAW feed for return to DOE for eventual shipment to a national high-level nuclear waste repository
- Provide radiochemical analytical laboratory capability to support the operations of the facilities.

The waste treatment capacity for each major facility is defined as a product of the facility design capacity multiplied by the integrated facility availability factor, which has been established at 70 percent of design capacity. Immobilized waste products must meet waste loading and canister design requirements, as defined within the WTP Contract Specification 1, "Immobilized High-Level Waste Product," and Specification 2, "Immobilized Low-Activity Waste Product." Additionally, the Lab and BOF must be able to support the WTP Project key performance parameters (KPP).

KPPs for the WTP Project include performance requirements that, if changed, would have a major impact on the ability to complete mission objectives. The facility specification contained within the WTP design, construction, and commissioning contract establishes minimum WTP functional requirements for the process and facility design, including waste treatment capacity requirements.[10] Table 7-1 establishes the performance objectives for the WTP Project. The threshold KPP values in this table establish the project KPPs.

[10] See Section C.7 of the Waste Treatment and Immobilization Plant contract for the "facility specification."

Table 7-1. Waste Treatment and Immobilization Plant Key Project Performance Parameters.

Facility Capacity	Threshold KPP [b] (Minimum Capacity)	Treatment Capacity	Design Capacity
LAW Pretreatment	2,244 MT sodium per year [a]	2,620 MT sodium per year [a]	3,740 MT sodium per year [a]
HLW Pretreatment	735 MT as-delivered solids per year [a]	860 MT as-delivered solids per year [a]	1,225 MT as-delivered solids per year [a]
LAW Vitrification	18 MT glass per day	24 MT glass per day	30 MT glass per day
HLW Vitrification	3.6 MT glass per day	4.2 MT glass per day	6.0 MT glass per day

[a] Pretreatment annual threshold capacity will be achieved by demonstrating equivalency during 20-day HLW and LAW cold commissioning capacity test period.
[b] Key performance parameters based on WTP Contract DE-AC27-01RV14136, Table C.6-5.1, "Cold Commissioning Capacity Testing Criteria."
HLW= High-Level Waste (Facility).
KPP = key performance parameter.
LAW= Low-Activity Waste (Facility).
MT = metric ton.

7.3 SCHEDULE BASELINE

The WTP Project schedule establishes the timeframe and sequence for executing the work scope defined in the WBS. The schedule provides a logical sequence of work leading to facility and project completion milestones and decision points to ensure the schedule supports the project technical and budget objectives. The WTP Project schedule was developed and is maintained through an iterative planning process in conjunction with the resource plan and cost baseline, consistent with WTP Contract requirements. The schedule is the primary tool used for integrating the activities of the WTP Project and also is one of the tools used to measure progress and report performance.

The WTP Project schedule identifies and establishes interface milestones to ensure integration with external stakeholder activities, including other contractors, and regulatory agencies. Interfaces between the WTP Project and elements of the RPP are captured through schedule milestones established in the ICDs.

CD milestones to support the WTP Project mission objectives are shown in Table 7-2. CD-0 through CD-3c and the revised cost and schedule baseline milestones have been completed. Based on a sequential startup and commissioning strategy for individual WTP facilities, multiple CD-4 approval decisions are being planned for consideration. CD-4 is defined as the successful completion of an ORR and approval to start up each facility consistent with DOE O 425.1D, which signifies project completion and approval to commence hot commissioning. The WTP FPD has the authority to plan and sequence cold commissioning and ORR activities to optimize a safe and efficient startup strategy and will work closely with the DOE ORR team leader to establish the ORR plan of action. The initial and full facility operations-specific CD-4 forecast completion dates listed in Table 7-2 are assumed to occur 6 weeks following approval of the DOE-HQ ORR.

Overall completion of the WTP facility startup is governed by and constrained by *Hanford Federal Facility Agreement and Consent Order* (HFFACO) milestones and requirements of the Consent Decree in Case No. 08-5085-FVS, *State of Washington v. Chu,* United States District Court, Eastern District of Washington.[11]

Table 7-2. Critical Decision Milestones.

Critical Decision	Project Execution Phase Approval	Date
CD-0 [a]	Approve Mission Need	September 1995 (A)
CD-1 [a]	Approve Alternative Selection and Cost Range	September 1996 (A)
CD-2 [a]	Approve Performance Baseline	August 1998 (A)
CD-3a	Approve Limited Construction	October 2001 (A)
CD-3b	Approve Preliminary Construction	May 2002 (A)
CD-3c	Approve Full Construction	April 2003 (A)
N/A	Approval of Revised Cost and Schedule Baseline	December 2006 (A)
CD-4a	Approve Start of Initial Operations	6 weeks after LAW ORR approval
CD-4b	Approve Start of Full Operations	6 weeks after HLW ORR approval

[a] CD-0 through CD-2 were approved during initial Waste Treatment and Immobilization Plant privatization acquisition strategy.
CD = Critical Decision.
HLW= High-Level Waste (Facility).
LAW= Low-Activity Waste (Facility).
ORR = operational readiness review.

Critical Decision 4 Definitions:[12]

- CD-4a – Approve Start of Initial Operations. Approval to start initial operations is defined as follows:
  - Successfully demonstrating initial operation of one LAW melter and achieving threshold KPP of 9 MT of glass per day during cold commissioning.
  - Successful completion of an ORR and approval to commence hot commissioning activities in the LAW Facility consistent with DOE O 425.1D.
- CD-4b – Approve Start of Full Operations. Approval to start full operations is defined as follows:
  - Successfully achieving KPPs during cold commissioning as defined in Table 7-1. Threshold KPPs are 2,244 MT of sodium per year for LAW Pretreatment, 735 MT as-

[11] The settlement of this litigation included not only this consent decree, but also modifications to several milestones in the *Hanford Federal Facility Agreement and Consent Order*, also known as the Tri-Party Agreement.

[12] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

delivered solids per year for HLW Pretreatment, 18 MT of glass per day for LAW, and 3.6 MT of glass per day for HLW.

- Successful completion of an ORR and approval to commence hot commissioning activities in the PT Facility consistent with DOE O 425.1D.
- Successful completion of an ORR and approval to commence hot commissioning activities in the HLW Facility consistent with DOE O 425.1D.

Following CD-4a/b approval, post CD-4 commissioning services would be performed consistent with the WTP Contract, however this work would be outside the WTP Project TPC. This PEP does not change the current performance baseline approved in December 2006.

7.4 COST BASELINE

The TPC for the WTP Project, including estimated contractor fee, is $12.263B[13]. This TPC covers all WTP Contract work scope up through and including facility transition to operations. While the TPC is approved by the SAE, individual facility costs are not; these are likely to change as the project evolves and risks are realized or avoided.

The annual and cumulative time phased performance measurement baseline for the WTP Project is shown in Figure 7-2. This figure is as of November 2011 and does not include contractor fee, DOE contingency, or other previously incurred cost that is not included in the contractors authorized work scope.

[13] The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

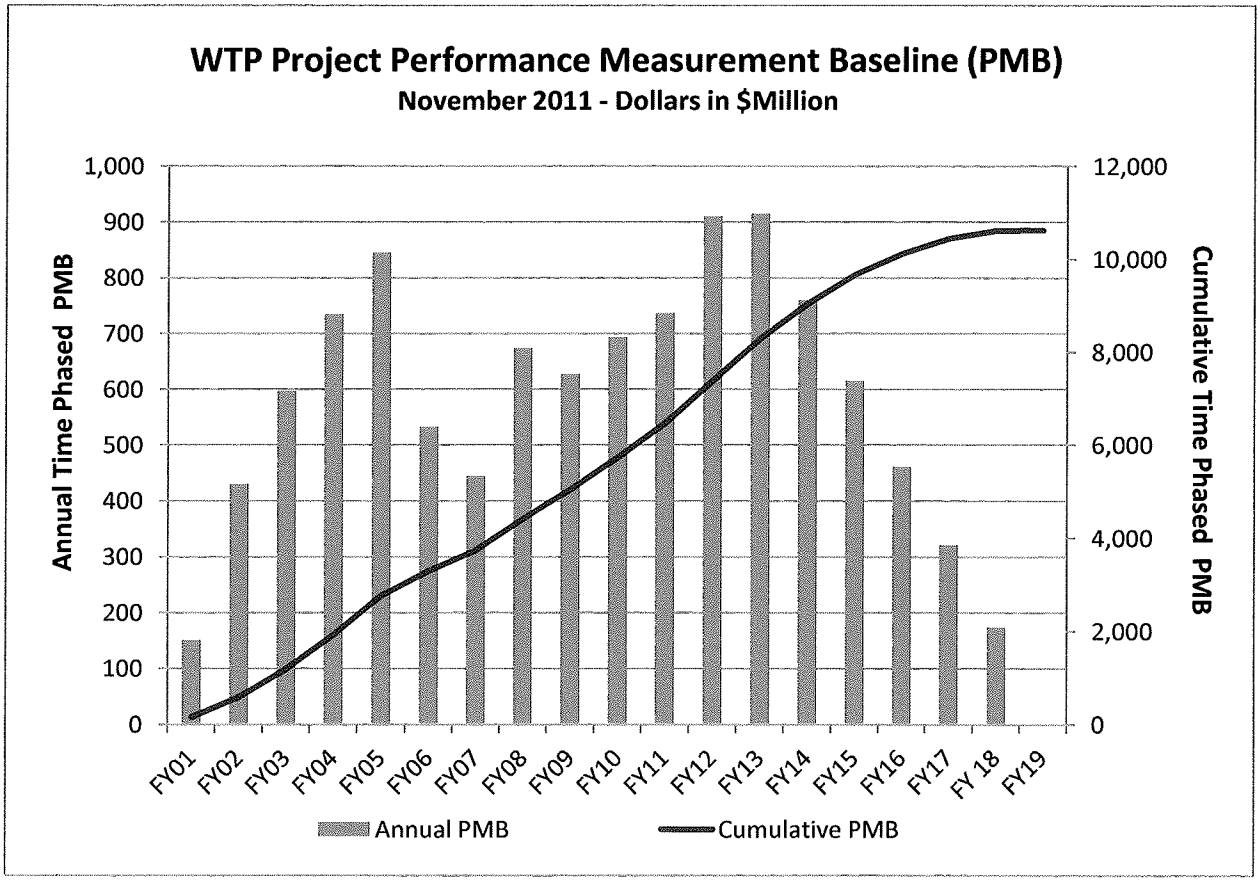

Figure 7-2. Waste Treatment and Immobilization Plant Project Performance Measurement Baseline.

7.5 FUNDING PROFILE

The WTP Project performance baseline objectives included in this PEP reflect the currently approved TPC and completion date. A re-baseline of the WTP project will commence in fiscal year 2012 and will be consistent with updated funding information.

The current WTP Project TPC contains work scope (e.g., hot commissioning) beyond the general EM practice. Planning for a revised project baseline for consideration will commence in FY 2012 and will result in the identification of operations activities for work following CD-4a/b that will be funded by operating expense funding and not part of the line item construction project. The planned sequential ORR process and initiative to begin treatment of LAW as early as 2017[14] will result in WTP operating dollars being needed earlier than previously planned. TF Project operating dollars would fund all post CD-4 activities associated with hot commissioning, initiating radioactive operations, facility turnover, and maintaining WTP operational facilities.

[14] A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

The WTP Project is moving toward a more general EM practice of TPC versus WTP operational funding boundaries as depicted in Figure 7-3. This PEP does not change the current performance baseline approved in December 2006.

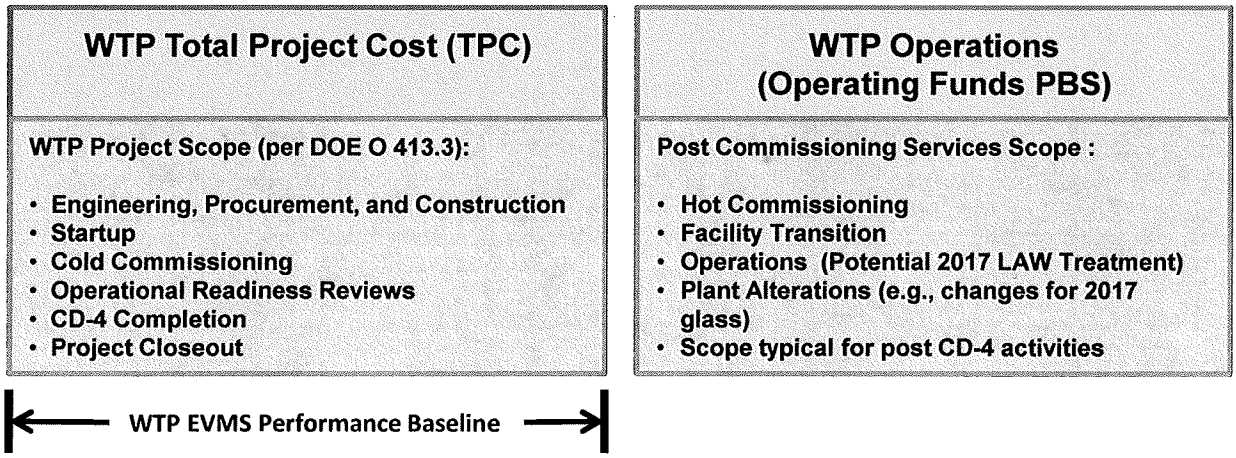

Figure 7-3. Proposed Waste Treatment and Immobilization Plant Funding Model.

7.6 BASELINE CHANGE CONTROL

7.6.1 Performance Baseline Change Control

The baseline revision and data maintenance process for the WTP Project is defined in MGT-PM-IP-05, *ORP Baseline Change Control for WTP*. This document provides requirements and the process for executing changes to the WTP Project's technical, schedule, and/or cost baseline. Performance baseline change approvals for the WTP Project are accomplished in accordance with the requirements in DOE O 413.3B. The hierarchy of approval authority limits for project performance baseline changes is reflected in Table 7-3.

Table 7-3. Performance Baseline Change Approval Thresholds.

Approval Authority	Technical	Schedule	Cost
Secretarial Acquisition Executive (S-2)	Any change in scope and/or performance that affect the ability to satisfy the mission need or are not in conformance with the PEP and Project Data Sheet.	Any change that impacts a Critical Decision milestone shown in Table 7-2 by more than 12 months, or that breaches the November 2019[3] WTP Project completion date.	Any single change greater than or equal to $100M or any change requiring an increase in the total project cost. Any change requiring modification of the Project Data Sheet Funding Profile.
WTP Federal Project Director	Changes within contract scope that do not affect mission need.	Up to a 12-month change in Critical Decision milestones shown in Table 7-2, without an impact to the November 2019[3] WTP Project completion date.	Any single change requiring contingency usage up to $100M or any contractor change as defined in the WTP contract and table footnote.[1&2]
Contractor	Changes not impacting contract requirements.	Schedule changes within contract scope not impacting performance measurement baseline early finish dates associated with facility completion milestones in Table B-2-C-1 within WTP Contract DE-AC27-01RV14136.	Changes within authorized management reserve limits and those described in the WTP contract and table footnote [1&2*]

* Baseline changes requiring DOE approval:

1. Baseline changes generated to convert project variances to budget, effectively reconciling a variance to enable improved manageability.
2. Baseline changes generated to support the cost and schedule impacts of a request for equitable adjustment. These changes will change the total estimated contract cost and may become the basis for earning additional fee through the contract change process.
3. The baseline referenced here reflects the currently approved performance baseline. A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

WTP = Waste Treatment and Immobilization Plant.

7.6.2 Change Management Oversight

The WTP Project manages changes in functional and physical requirements and evaluates the impact of changes on cost and schedule objectives by implementing a rigorous baseline change process. The essential elements of this process include a well-defined baseline, an effective method of evaluating and communicating changes, and documenting approved changes to the baseline when they occur. The process promotes an orderly evolution from the baseline design and ensures the effect of changes on cost, schedule, and technical scope are properly evaluated and documented. A fundamental element in the oversight of contractor performance is the monitoring of changes to baseline plans, strategies, schedules, and other project activities.

Proper oversight is critical to ensuring only authorized work scope is being performed and credible estimate at completion calculations are developed for the project. Oversight includes IPT member involvement in contractor meetings, briefings and reviews; engagement with contractor counterparts; monitoring of proposed contractor trends and BCPs; and analyses of design, procurement, and installation of key commodities, as well as contractor cost and schedule performance. IPT members review contractor baseline plans, schedules, strategies, and other

activities, ensuring that when the contractor prepares a BCP, there is knowledge of the change being proposed. Changes proposed at the contractor level are shared during the IPT meetings that the FPMs chair.

7.6.3 Configuration Management

Configuration management establishes and maintains consistency of the WTP Project's performance baseline throughout its lifecycle. Configuration management is applied consistent with DOE O 413.3B. The WTP Project also follows ANSI/EIA-649, *National Consensus Standard for Configuration Management,* which incorporates ISO 10007:2003, *Quality Management - Guidelines for Configuration Management,* and is tailored to support the Project's configuration management process.

Configuration management identifies, documents, and controls the configuration of SSCs, as described in 24590-WTP-PL-MG-01-002, *WTP Configuration Management Plan.* The configuration management plan describes the process used to document how performance baseline changes are developed, evaluated, approved, implemented, verified, and incorporated into design and facility documentation.

24590-WTP-PL-MG-01-002 is tailored to support WTP Project design, procurement, construction, and commissioning activities. This plan implements a configuration management process with four basic steps:

- **Identification and documentation:** Selecting configured items, documenting their physical and functional characteristics, and allocating unique identification.
- **Configuration control:** Controlling changes to a configured item after formal issue of its configuration documents.
- **Status tracking and reporting:** Recording and reporting of configured documents and the approved changes to those documents.
- **Configuration audit:** Examining review, inspection, and test records to determine that a configured item conforms to its configuration requirements.

7.6.4 Contract Management

Table 7-3 shows approval authorities for changes impacting the performance measurement baseline, and Table 7-4 shows approval authorities for WTP Contract changes. The majority of within-contract baseline changes are managed through WTP Project management reserve (MR) and 24590-WTP-GPP-GAB-422, *Change Control Program.* Contract changes occur when issues outside the control of the WTP contractor cause an increase or decrease in cost, time, or performance of any part of the work under the contract. In these cases, the contractor may submit an REA as defined in the contract. Resolution of REAs normally results in development of a BCP, which can decrease or increase WTP Project contingency. The WTP Project contingency management process is aligned closely with the WTP Project risk management process (Section 9.1) where DOE-WTP Project risks and opportunities are monitored throughout the life of the project.

Table 7-4. Contract Change Authority Thresholds.

Approval Authority	Schedule	Cost
Senior Procurement Executive (MA-60)	Any change impacting contract end date.	> $50M contract change
Head of Contracting Activity (EM-50)		< $50M contract change
Contracting Officer (WTP CO)	Any change impacting contract end date.	< $50M contract change with approval of DOE-ORP Acquisition Management Division Director

CO = Contracting Officer.
DOE-ORP = U.S. Department of Energy, Office of River Protection.
WTP = Waste Treatment and Immobilization Plant.

7.7 PERFORMANCE MEASUREMENT, REPORTING, AND FORECASTING

The WTP FPD is responsible for baseline development, execution, performance measurement, and reporting on the project in accordance with DOE O 413.3B. The WTP FPD measures progress through the completion of performance incentives, contract deliverables, and achievement of HFFACO milestones and Consent Decree, Case No. 08-5085-FVS, *State of Washington v. Chu*, United States District Court, Eastern District of Washington.

A key objective of performance oversight is to ensure the contractor maintains an EVMS that is compliant with ANSI/EIA-748, *Earned Value Management Systems*. The DOE Secretary certified the WTP Project EVMS on March 4, 2008, as compliant. DOE-WTP Project staff conducts and/or participates in periodic but no less than annual EVMS assessments to ensure ongoing compliance. The WTP EVMS provides information to support weekly, biweekly, and/or monthly data, reports, and/or analysis as necessary. Monthly performance information is reported to the DOE-HQ Project Assessment and Reporting System (PARS II).

Additional oversight, analysis, and assessment of contractor performance by the IPTs include the following.

- **Technical:** The WED oversees contractor engineering performance through assessments, surveillances, and design oversight reviews. Assessments and surveillances focus on the programmatic and process aspects of contractor engineering, while design reviews evaluate the contractor's designs against requirements. Design reviews focus specifically on technical reviews of SSCs. Additionally, specific technical issues are identified and tracked to resolution through the use of technical issue summary sheets (i.e., cut sheets).
- **Schedule:** DOE-WTP Project staff and the contractor have regular IPT schedule review meetings. In these meetings, the statuses of current and near-term activities, as well as critical path activities, are discussed. DOE-WTP performs its own independent schedule analysis and assessment each month. Reports are generated and the information is evaluated and used by FPMs and IPT members to engage the contractor on areas of

concern. In addition to these standard reports, logic traces, specific data extracts, and other special requests from the IPTs are supported.

- **Cost:** Cost and productivity are monitored and analyzed through briefings at IPT meetings and upon receipt of the contractor's monthly earned value and project controls data defined in the WTP Contract. DOE-WTP staff provide oversight to the Contractor's project control systems and data to determine contractor adherence to established project performance, cost, and schedule goals. These analyses typically focus on topics such as commodity design release and construction installation, material and equipment procurement, engineering design performance, change control and MR utilization, and management of risks. Cumulative and current-period metrics are issued each month to assess contractor productivity, including cost and schedule performance compared to the planned rate of performance. A variety of report types are prepared and assembled by the IPTs to provide the WTP Project with accomplishments and issues, to include forward-looking problem mitigation strategies.

7.8 PROJECT REVIEWS

Reviews of the WTP Project are a principal component of the assurance process. Project management performance reviews presented to senior leadership are performed monthly through the project lifecycle. The reviews provide both information exchange and more detailed information than that provided in status reports.

External independent reviews are conducted by the DOE and the contractor in many technical and project management areas. Corrective actions resulting from these reviews are tracked and closed using DOE-ORP's Action Reporting System (OARS). In addition to external reviews, the WTP Project conducts several design assessments each year, typically focused on safety-significant SSCs. Consistent with the SAE responsibility to direct project reviews, the WTP Project will continue to sponsor construction project reviews, no less than annually, to satisfy the DOE O 413.3B requirement to conduct annual project peer reviews for projects with a TPC greater than $100M.

Design oversight includes ad hoc and planned design reviews in accordance with ESQ-OA-IP-01, *Integrated Assessment Process*, to review specific contractor design products or processes. This type of oversight is governed by desk instruction MGT-PM-DI-03, *Conduct of Engineering Oversight*, which also includes reviews of the design processes used to develop the WTP engineering products. These activities are performed principally by members of the WED with assistance from other DOE personnel and, when necessary, industry experts.

Construction oversight includes Facility Representative operational and safety oversight, and Facility Representative and nationally qualified code Site Inspector (SI) construction quality oversight performed in accordance with ESQ-OA-IP-01 and ESQ-OA-IP-02, *Operational Awareness Oversight Database*. This type of oversight is governed by desk instruction MGT-PM-DI-04, *WCD Construction Oversight*. These oversight activities are performed to ensure safe construction activities, and to confirm adequacy of construction quality and system configuration, in accordance with design and contract requirements.

Since 2006, the WTP Project has retained a broad range of external, senior professionals from private industry, academia, and other government agencies to review the key elements of the

WTP Project, including technology, cost and schedule, project management, project controls, and earthquake seismic criteria. Actions resulting from these reviews are formally documented and tracked to closure. Progress is continually monitored by the DOE-WTP Project senior management team and IPTs.

DOE-WTP manages a yearly assessment program to facilitate oversight of contractor activities and allow Federal staff to:

- Monitor the contractors' performance to ascertain program status
- Continually improve contractors' design, construction, and commissioning processes
- Determine the effectiveness of implementing applicable DOE orders, State and Federal regulations, national codes and standards, and contract requirements, including authorization basis requirements
- Oversee the effectiveness of the WTP Project Risk Management Program
- Evaluate the effectiveness of contractor assurance systems.

WTP Project reviews focus on performance and effectiveness, not just compliance with requirements. The WTP FPD uses an engineering and construction oversight process as defined in ESQ-OA-IP-01. Each year, elements of the design, construction, and/or commissioning process are reviewed.

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8.0 TRANSITION TO OPERATIONS

Transition to operations defines the basis for attaining operating capability through completion of inspection and acceptance reports, documenting that project completion criteria have been met, technical performance has been acceptably demonstrated, and the mission need has been satisfied. The successful completion of transition to operations ensures that DOE's asset management goals and financial closure requirements are achieved.

8.1 CONSTRUCTION ACCEPTANCE AND TESTING

The WTP Project has established a construction, procurement, and acceptance testing oversight program to ensure the work performed conforms to facility design and operability requirements. DOE-WTP Project staff perform this oversight in accordance with ESQ-OA-IP-01, MGT-PM-DI-03, and MGT-PM-DI-04.

The contractor's testing and acceptance program is outlined in the commissioning strategy document, 24590-WTP-RPT-OP-10-007, *2010 Contract Compliant WTP Commissioning Strategy with Sequential ORR*. This commissioning strategy document refers to the various procedures and plans for conducting construction testing, factory acceptance testing and process technology testing. These programs require inspection of facilities as they are constructed, including testing of vendor-provided materials and equipment.

DOE-WTP has two divisions (WCD and WED) that oversee construction and vendor tests in support of the FPMs and facility IPTs. WCD and WED ensure testing meets:

- Contract and design requirements
- Safety and quality requirements
- Drawings and specifications requirements
- Authorization basis and Dangerous Waste Permit requirements.

8.2 COMMISSIONING AND TRANSITION TO OPERATIONS

The commissioning and startup of a hazardous nuclear and chemical plant the size, complexity, and uniqueness of the WTP Project is an enormous undertaking. First-of-a-kind facilities like the WTP require a series of component, system, and facility acceptance tests, followed by cold commissioning and readiness reviews. During the testing and commissioning process, new issues are discovered and resolved. Operators are trained and qualified and become intimately familiar with the controls and procedures for both normal and off-normal events before acceptance testing is completed. WTP operations, similar to what is required to operate and oversee reactors and chemical reprocessing plants or canyons, has not taken place at Hanford for decades and presents an operational challenge that will require recruitment of the best and brightest within the American chemical and nuclear industries.

The WTP Project will undergo a phased commissioning program to ensure that equipment performance and staff proficiency are demonstrated, while the plant is operated at the lowest practical risk levels. The contractor's commissioning program will include a management self-

assessment that will demonstrate readiness for a contractor ORR. A successful contractor ORR and DOE ORR for each nuclear facility will be the basis for project completion and approval to start operations (CD-4). Following the achievement of KPPs and receipt of an approved CD-4, the WTP contractor could demonstrate integrated operations of the WTP outside the project TPC using radioactive materials and transition the facility to a WTP post commissioning contractor to maintain radioactive (hot) operations. Concurrent operation of the PT, HLW, LAW, BOF, and Lab could be demonstrated following completion of the WTP Project activities to demonstrate sustained and integrated operations of the complete tank waste vitrification process.

To realize the benefits of sequential commissioning, a phased approach to bringing WTP facilities online and transition to operations is being planned for consideration. This revised approach involves uncoupling the commissioning, ORR, and turnover of each WTP facility, and defining a phased CD-4 ("Approve Start of Operations") process. This would facilitate operation of the LBL, sequential transition to operations for all facilities, and potential treatment of tank waste as early as 2017[15].

A strategic approach for conducting sequential ORRs is documented in 24590-WTP-RPT-OP-10-005, *WTP Operational Readiness Review Strategy*. The ORR strategy defines actions needed to support DOE O 425.1D core requirements associated with the seven principles in the WTP Integrated Safety Management Program. For each core requirement, specific actions required for the ORR process are identified, and if not yet complete, the mechanism for tracking closure of the action is defined.

Based on collective integration with the TF Project, the WTP Project would establish a commissioning strategy that includes:

- Sequential commissioning of facilities to support current contract deliverables
- An ORR strategy tailored to leverage sequential commissioning by reducing the risk and scope of a single and more complex ORR
- A schedule that supports starting the treatment of tank waste as early as 2017[15]
- Development of an ORR plan of action defined by DOE O 425.1D
- Definition of depth and breadth of the ORR
- Identification of the Startup Authority
- Identification of the programs and procedures to be validated during specific ORRs or stages of ORRs.

The WTP Project will develop and implement an interface management plan and a facility transition plan that describe the strategy, schedule, and requirements for safe, efficient, and sequential transfer of the WTP facilities, associated workforce, and all activities that support transition of operations from the WTP construction contractor to the WTP operator.

[15] A re-baseline of the WTP Project will commence in FY 2012, after which an update of the performance baseline will be considered.

The WTP SCIM is responsible for coordinating startup and commissioning activities and is supported by staff from the WCD and WED. In the commissioning strategy, each WTP facility undergoes a sequence of tests of progressively increasing complexity for both personnel and equipment to demonstrate that the WTP facilities will operate as designed and meet KPPs. See Figure 8-1 for the logic involved in this process.

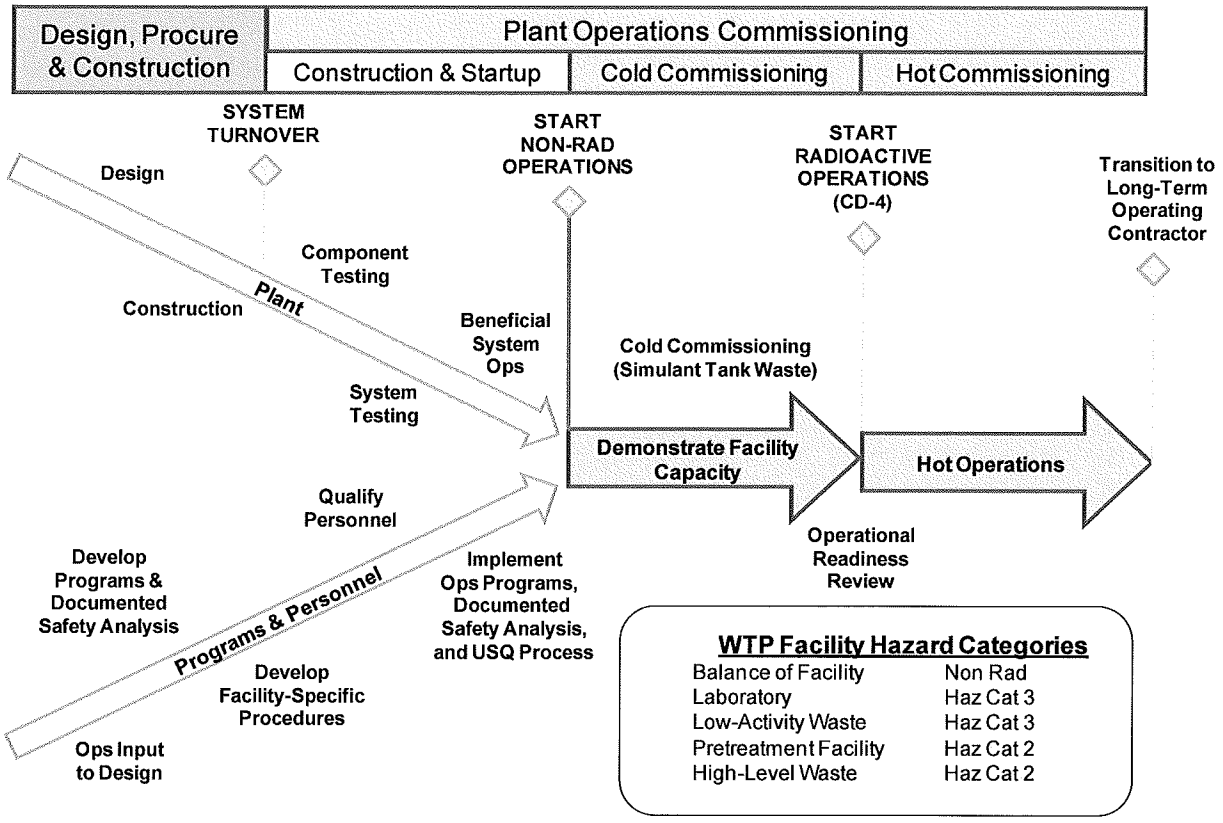

Figure 8-1. Proposed Waste Treatment and Immobilization Plant Facility Startup and Commissioning Process.

The successful commissioning of the WTP will require an integrated effort between the WTP and TF Project contractors. A sequential facility startup and commissioning strategy is a lower risk approach to facility completion and will result in a ramp up to operations similar to what is experienced on other complex chemical and radiological facilities

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9.0 WASTE TREATMENT AND IMMOBILIZATION PLANT PROJECT MANAGEMENT SYSTEMS

The WTP Project is supported by operational and business-oriented management systems that enable organizational success and assist in the progression between the WTP Project lifecycle phases. Leadership and control for the WTP Project is governed by policies, processes, and human interactions that together set the goals and objectives, outline the strategies and tactics, and develop the plans and controls necessary to manage the project. Management systems are the framework of processes and procedures used to ensure that the WTP Project can fulfill all project responsibilities that are required to achieve mission objectives. Table 9-1 summarizes the management systems used on the WTP Project and identifies the DOE organizational responsibility for establishment and maintenance for these key systems. The significant WTP Project management systems are defined in the remainder of this section.

Table 9-1. Waste Treatment and Immobilization Plant Management Systems and Organizational Responsibility.

Management System	Management System Responsibility		
	DOE-WTP Project	DOE-ORP	DOE-RL
Risk Management	✓		
Human Resource Management			✓
Integrated Safety Management	✓	✓	
Systems Engineering and Value Management	✓		
Quality Assurance		✓	
Interface Management	✓		
Environmental, Licensing, and Permitting		✓	✓
Safeguards and Security			✓
Records Management		✓	

DOE-ORP = U.S. Department of Energy, Office of River Protection.
DOE-RL = U.S. Department of Energy, Richland Operations Office.
DOE-WTP = U.S. Department of Energy, Waste Treatment and Immobilization Plant Project Office.

9.1 RISK MANAGEMENT

The WTP risk management process is based on the principle that risk and opportunity management must be analytical, forward-looking, structured, informative, and continuous. Effective risk management is an essential element of WTP Project management and is fully integrated with the baseline planning process to incorporate mitigating actions. Undesirable events are identified and analyzed in terms of the likelihood of occurrence and the resulting consequences, and mitigation strategies are included in and maintained against the performance baseline.

The WTP Project risk process is documented in MGT-PM-PL-11, *WTP Project Risk Management Plan.* This plan describes the integrated risk process for risks and opportunities that cross between DOE organizations (i.e., RL and ORP) as well as the process used by the contractor to manage risk. The contractor risk process is documented in 24590-WTP-PL-PR-01-003, *Risk Management Plan*, and is supported by 24590-WTP-GPP-PT-003, *Project Risk Assessment and Management.* This plan is consistent with the risk management intent described in DOE O 413.3B and DOE G 413.3-7, *Risk Management Guide.*

The WTP Project risk management process focuses on those risks that affect the WTP Project and includes determining the managing entity (contractor or DOE) and the funding source (contractor MR or DOE contingency). Integration of the WTP Project risk process is coordinated through a Joint Risk Management Team (JRMT). Risk management on the WTP Project is integrated with the DOE-ORP Risk Management Program to ensure external project risks are factored into the assessment process.

The WTP contractor is responsible for managing risks within the scope of the WTP Contract, using the MR designated for mitigation of performance baseline and contract risk. Project risks outside of the contractor's area of responsibility are managed by DOE, and mitigation actions not included in the contractor's performance baseline may be funded by DOE contingency.

Three types of risks are tracked and managed:

- **Contractor engineering, procurement and construction (EPC) risks:**
  - Execution uncertainties: These are estimate and work performance uncertainties (e.g., quantities, pricing, productivity) within the WTP contractor's scope of work.
  - Technical/other risks: These are risks primarily from design evolution and interpretation of contract requirements that are within the scope of the WTP Contract.
- **DOE technology and programmatic (including regulatory) risks:** These are risks to the WTP Project within the contract period but outside the contractor's scope of work. These are project risks typically resulting from the development and application of first-of-a-kind process technologies, including process uncertainties that may require research and technology (R&T) development, potential impacts from regulatory decisions, funding shortfalls, other Hanford Site contractor interfaces, and certain economic factors, etc.
- **Opportunities:** These are positive technical, programmatic, or execution improvements, regardless of owner (contractor or DOE), that may result in savings.

Both contractor and DOE project risks and opportunities are assessed and managed utilizing the WTP Project risk management program and are included on the project risk register for monitoring and reporting purposes. EPC risks are in-scope risks to the execution of the WTP Project and are the contractor's responsibility. Contractor mitigation actions associated with DOE risks may require a contract modification to transfer scope and budget to the WTP Project baseline for mitigation actions. Opportunities are managed by BNI and may require DOE acceptance and approval to realize a positive result (e.g., change in requirements).

The risk management process and its integration and execution throughout the facility project areas and organization is overseen by the JRMT. The JRMT meets at least monthly and results of JRMT proceedings are maintained and support DOE risk reporting requirements. The JRMT Charter identifies the objectives, composition, and operation of the JRMT.

9.2 HUMAN RESOURCE REQUIREMENTS

DOE-WTP's staffing strategy is guided by the results of an IPT effectiveness study that was developed in response to the August 2009 Construction Project Review.[16] To support the unique aspects of the project, DOE-WTP maintains a broad-based workforce essential to successful management of a complex project encompassing dozens of individual disciplines and knowledge areas. By hiring people with varying areas of expertise, the WTP Project maintains depth in the project workforce.

A significant recruiting and training effort is required to secure sufficient Federal and contractor staff to support sequential startup and commissioning of the WTP. Staff also will be required to manage WTP interfaces with TOC and other Hanford contractors. DOE will be assessed as part of the ORR process, and qualified staff must be in place to oversee the startup and commissioning process. To accomplish this, DOE will be required to assess modifications to the staffing profiles to prepare for startup and commissioning, beginning as early as FY 2012. Lead time for DOE-WTP Project startup and commissioning staff (e.g., Facility Startup Managers, Safety System Oversight Engineers, Facility Representatives) will be longer than normal, because of the specialized training and qualification process. The normal hiring process can take as long as 3 to 4 months; however, because of the WTP's uniqueness and the number of positions and specialized training required, this process may take longer. A typical qualification cycle will take 12 to 18 months for these individuals.

9.3 INTEGRATED SAFETY MANAGEMENT

MGT-PM-PL-02 R4, *Safety Management Functions, Responsibilities, and Authorities Manual,* defines the safety functions, responsibilities, and authorities for management of work activities performed by WTP staff. WTP line management is responsible for implementing integrated safety management into work practices to ensure work is conducted efficiently and in a manner that protects the workers, the public, and the environment. Where contractors are used to plan and conduct work on the WTP Project, DOE-WTP line management fulfills its safety responsibility by establishing expectations and contractual requirements, overseeing compliance, and managing contracts.

MGT-PM-PL-03, *Integrated Safety Management System Description,* defines how the WTP Project integrates environmental, safety, health, and quality (ESH&Q) requirements and management controls into WTP Project activities and oversees implementation of integrated safety management with contractors. 24590-WTP-ISMSD-ESH-01-001, *WTP Project Integrated Safety Management System Description,* describes the contractor's Integrated Safety Management System. ISMS is implemented and maintained on all aspects of the project to

[16] Construction Project Review commissioned by DOE-HQ and conducted in August 2009.

ensure design, construction, and commissioning of the WTP Project 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.

Annually DOE-ORP provides a readiness declaration for its ISMS and its contractor's ISMS for the upcoming fiscal year, based on self, independent, and external assessments, as well as an analysis of the previous year's safety performance. The DOE-ORP ISMS declarations are consistent with DOE M 450.4-1, *Integrated Safety Management System Manual,* and address the evaluation criteria required by the DOE-EM Program.

9.4 SYSTEMS ENGINEERING AND VALUE MANAGEMENT

9.4.1 Systems Engineering

Systems engineering functions are distributed across the contractor's engineering organizations. A contractor WTP Systems Engineering group is responsible for requirements management, configuration management, and interface control.

9.4.2 Requirements Management

The WTP FPD establishes and maintains the Code of Record and ensures orders and requirements have a basis in "need," not just a basis in "history," to mitigate cost growth associated with misinterpretation of guidance tied to managing and operating requirements. The WTP FPD ensures the Code of Record serves as the basis for design and construction of the WTP. The WTP Project Code of Record is documented in DOE-WTP Letter 10-WTP-300, dated November 17, 2010, and is comprised of the following:

- Contract DE-AC27-01RV14136
- 24590-WTP-DB-ENG-01-001, *Basis of Design*
- 24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document Volume II.*

Systems engineers identify and manage requirements that form the design criteria for the project. These criteria come either directly from the contract or permits, or from documents deriving requirements from these sources. A document hierarchy shows how the requirements flow from upper-tier documents into design products. The document hierarchy is identified in 24590-WTP-RPT-ENG-01-001, *Technical Baseline Description.*

The WTP Project Systems Engineering group maintains a design criteria database; maintains the basis of design documents; supports development of system descriptions, requirements verification matrices, and test acceptance criteria; and supports development of other system-level requirements and design verification activities. These items provide a controlled basis from which design and tests may develop.

9.4.3 Research and Technology Management

Considerable research and development in waste processing and vitrification has occurred both domestically and abroad over the last 30 years. In addition, the successful startup and operation

of vitrification facilities at the West Valley Demonstration Project in New York State, the Defense Waste Processing Facility at the Savannah River Site, and the Advanced Mixed Waste Treatment Project at the Idaho National Laboratory have provided approaches and a basis for resolving issues with similar technical risk as those on the WTP Project. The R&T program addresses technical issues, leverages lessons learned from a historical perspective, and builds on this experience, while not repeating work that was previously completed.

The WTP Project R&T Testing Program includes requirements for development and maintenance of an R&T Program Plan that describes the work activities that support process and facility design, determine plant process operating limits, support qualification testing of the immobilized waste forms and secondary wastes, and provide information to support environmental permitting and the authorization basis. Specific R&T topics include:

- Characterization of LAW and HLW feeds
- Waste separations process testing
- Validation of sludge-washing processes
- Immobilized LAW process and qualification testing
- Immobilized HLW process and qualification testing
- Process and facility modeling requirements, including assessments of operations research modeling, tank utilization, RPP mission waste feed vector optimization, material balance, and process flowsheet.

WTP Project document 24590-WTP-PL-RT-01-002, *Research and Technology Plan*, and addendums (24590-WTP-PL-RT-04-001 and 24590-WTP-PL-RT-07-002) compile the technical issues and requirements needing resolution, and describe the methodology and activities that will be used to achieve closure of these items. In addition, a compilation of technical issues and plans for resolution associated with WTP mixing, transport or sampling is provided in 24590-PTF-ENS-11-0007, *Plan and Schedule to Systematically Evaluate Hazards of Known Technical Issues, M3 Vessel Assessment Summary Reports, LOAM Benchmark Data and LSIT – Response to DNFSB Recommendation 2010-2 Implementation Plan Commitment 5.7.3.1.*

9.4.4 Value Engineering

The WTP Project uses value management/engineering to identify high-cost project activities and to realize a maximum return on investment through the use of systems engineering trade-offs and functional analyses and to identify alternate means of safely achieving the same function at a lower lifecycle cost. The WTP Project has institutionalized its value engineering process through the implementation of a Six Sigma program that is documented in 24590-WTP-PL-MGT-09-0002, *WTP Project Six Sigma 2010 Business Plan.* This program is complemented by Six Sigma and lean practices to streamline operations, improve quality, and reduce lifecycle costs. Owners of WTP Project processes and deliverables are responsible for integrating the principles of process and value improvement in their day-to-day management responsibilities.

The WTP Project establishes annual goals for the identification and execution of savings opportunities. Six Sigma performance is monitored and updated on a monthly basis and is reported on a quarterly Project Six Sigma Report Card.

9.4.5 Alternatives, Optimization, and Trade-offs

Studies and analyses of design alternatives and trade-offs were performed in the course of the development of the conceptual design. After the conceptual design was completed, additional work optimized the lifecycle performance, cost, and schedule of the WTP design, including the process design, facility design, and technologies that formed the technical baseline configuration. WTP optimizations studies were completed during the preliminary design period and additional studies will continue on an as-needed basis.

9.5 QUALITY ASSURANCE

The WTP Project QA Program is established for the WTP Project in accordance with DOE O 414.1C, and meets the August 2000 contractual QA requirements specified from the following sources:

1. 10 CFR 830 Subpart A (10 CFR 8310.121 [a]).
2. ANSI/ASME NQA-1-2000 Part I and Subpart 2.7 (DOE O 414.1 C, Attachment 2,2.a.[2][a]).
3. DOE/RW-0333P Rev. 20 (DOE O 414.1C, Attachment 2,2.a[4][d]).
4. 24590-WTP-SRD-ESH-01-001-02 requires the contractor to apply ASME NQA-1-2004 to perform Commercial Grade Dedication activities.

The WTP Project QA Program is documented in MGT-PM-PL-04, *Project Quality Assurance Program Description* (QAPD), and provides for the control of the WTP Project activities that affect or will affect the quality of SSCs and include all activities necessary to provide adequate confidence that such SSCs will perform satisfactorily in service. The QAPD is also applied to certain equipment and activities that are not safety-related but support safe plant operations, and to other DOE requirements that will lead to the establishment of additional program requirements. The QAPD also applies to the R&T activities that support the design and permitting of WTP safety-related SSCs, utilizing a graded approach in applying QA requirements, based on quality levels established through a risk-determination process. The WTP Project graded approach to selection of quality levels is defined in ESQ-QSH-IP-10, *ORP Graded Approach.* 24590-WTP-QAM-QA-06-001 and associated document 24590-WTP-PD-MGT-0001, *WTP Graded Approach*, also address DOE O 414.1C requirements.

DOE-WTP has responsibility for design assurance and the WTP Project contractor has responsibility for design authority. These roles are integrated into the project audit, assessment, and surveillance process and used to implement the DOE field element oversight function. The objective of the integrated assessment process is to eliminate redundant quality requirements or conflicting requirements that extend beyond the WTP Project approved Code of Record and may dilute focus from constructing and commissioning a safe and efficient waste treatment plant.

The QAPD is the top-level policy document that establishes the manner in which quality is to be achieved and presents the WTP Project's overall philosophy regarding achievement and assurance of quality. Contractor-implemented documents assign more detailed responsibilities and requirements and define the organizational interfaces involved in conducting activities within the scope of the QA Program.

9.6 INTERFACE MANAGEMENT

Successful construction and transition to operations of the WTP Project require management of multiple interfaces throughout the Hanford Site. The principal mechanism for managing interfaces is through the use of ICDs. Each ICD defines an interface and the responsibilities of the organizations involved in making the interconnection between two systems function. The ICD describes the physical interface (e.g., location, design, construction), the product to be transferred (e.g., tank waste, glass, water, electricity), and the administrative and procedural controls surrounding operation of the interface (e.g., schedules, procedures, reports, cost sharing).

WTP Project document 24590-WTP-PL-MG-01-001, *Interface Management Plan* (IMP) describes the roles and responsibilities of participating organizations and describes the means to identify and resolve interface incompatibilities and determine the impact of interface changes. A list of current WTP Project ICDs is shown in Table 9-2. The IMP describes the management of designated interfaces between the WTP Project and contractors managing the following Hanford Site entities:

- DOE-ORP and DOE-RL
- TOC
- Plateau Remediation Contract
- Mission Support Contract.

Table 9-2. Waste Treatment and Immobilization Plant Project Interface Control Documents.

Interface Control Document No.	Interface Name
1	Raw Water
2	Potable Water
3	Radioactive Solid Wastes
5	Nonradioactive, Non-dangerous Liquid Effluents
6	Radioactive, Dangerous Liquid Effluents
9	Land for Siting
11	Electricity
12	Roads
14	Immobilized High-Level Waste
15	Immobilized Low-Activity Waste
19	Waste Feed
23	Waste Treatability Samples

Table 9-2. Waste Treatment and Immobilization Plant Project Interface Control Documents.

Interface Control Document No.	Interface Name
28	Pit 30 Aggregate Supply for Construction
29	Waste Sodium

9.7 ENVIRONMENTAL, LICENSING, AND PERMITTING STRATEGY

24590-WTP-PL-ENV-01-004 defines the contractor's strategy and timing of activities to comply with the environmental laws and regulations applicable to construction and commissioning of the WTP. This plan identifies an approach for environmental protection, compliance, and permitting, including:

- Environmental permitting and compliance activities for design, construction, and commissioning the WTP
- Permitting and compliance schedule integrated with the technical baseline
- Monitoring and reporting requirements.

The execution of this environmental plan requires a coordinated effort by the DOE, Hanford Site contractors, Ecology, the Washington State Department of Health (WDOH), the EPA, and the WTP contractor.

Construction and commissioning of the WTP Project requires compliance with the following Federal and State environmental laws:

- *Atomic Energy Act of 1954*
- *Clean Air Act of 1970*
- *Clean Water Act of 1977*
- "Dangerous Waste Regulations" (*Washington Administrative Code* [WAC] 173-303)
- *Emergency Planning and Community Right-to-Know Act of 1986*
- *Hanford Federal Facility Agreement and Consent Order / Consent Decree, Case No. 08-5095-FVS*
- *Hazardous Waste Management Act* – Revised Code of Washington (RCW) 70.105
- *National Environmental Policy Act of 1969* (NEPA)
- *Resource Conservation and Recovery Act of 1976* (RCRA)
- *Toxic Substances Control Act*
- *Washington Clean Air Act* – RCW 70.94
- *Washington State Environmental Policy Act* (SEPA)
- *Water Pollution Control Act* – RCW 90.48.

The WTP Project is committed to involving stakeholders throughout the design process, the permitting process, and during the construction and commissioning of the facilities. Formal and informal public interaction activities comply with regulatory requirements and meet the project's objectives for full disclosure to the stakeholders.

The DOE-ORP is the regulatory authority for radioactive material requirements under the *Atomic Energy Act of 1954*. DOE-ORP is responsible for regulating the nuclear, process, and radiological activities affecting worker safety at the WTP. DOE-ORP reviews and approves the authorization basis prepared by the contractor, as required for designing, constructing, and commissioning the WTP facilities. DOE-ORP consults with the Washington State regulators in aspects of the project that would affect both regulatory bodies.

9.7.1 Hanford Federal Facility Agreement and Consent Order and the Consent Decree in Case No 08-5085-FVS

Signed on May 15, 1989, between the DOE, EPA, and Ecology, the HFFACO describes the actions and timetable necessary to achieve compliance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) and RCRA. Construction and operations of the WTP must comply with permits issued by Ecology under its EPA-authorized *Hazardous Waste Management Act of 1977* and its implementing "Dangerous Waste Regulations," as well as permits under the Federal *Clean Air Act of 1970* and the State *Washington Clean Air Act*. The Consent Decree in Case No. 08-5085-FVS, United States District Court for the Eastern District of Washington, governs and constrains overall WTP facility startup activities required by that Consent Decree.

9.7.2 Air Permits

DOE submitted a permit application for "Prevention of Significant Deterioration" to Ecology. The application for the "Notices of Construction for Radioactive Air Emissions" was submitted to the WDOH and the EPA, while the "Toxic Emissions" permit applications were sent to Ecology. The three air permit applications have been approved for WTP facility construction, which allows all construction activities to proceed. The permits will be modified as the project approaches operational status.

9.7.3 Resource Conservation and Recovery Act of 1976

Washington State implements the federally mandated RCRA through the *Hazardous Waste Management Act of 1977* and WAC 173-303. WAC 173-303 regulations apply to all facilities within Washington State that treat, store, and/or dispose of dangerous waste. Ecology administers the RCRA program in accordance with Federal standards and guidelines. To comply with RCRA, a Dangerous Waste Permit has been issued for the WTP. This permit has been incorporated as Operating Unit 10 of the *Dangerous Waste Portion of the RCRA Permit for the Treatment, Storage, and Disposal of Dangerous Waste Hanford Site-Wide Permit* (Ecology 2001). WTP-specific permit conditions are included in the Dangerous Waste Portion of the Hanford Facility RCRA permit. Detailed WTP Project environmental control processes and procedures are found in 24590-WTP-GPP-SENV-001 through -021.

9.7.4 National Environmental Policy Act

In 1996, DOE and Ecology co-authored the *Tank Waste Remediation System, Hanford Site, Richland, Washington, Final Environmental Impact Statement* (TWRS EIS) (DOE 1996). DOE published the "Record of Decision for the Tank Waste Remediation System, Hanford Site, Richland, WA," (62 FR 8693), implementing the preferred alternative for retrieval, treatment, and disposal of tank waste. This implemented a two-phased approach to tank waste treatment that included an initial demonstration phase lasting 10 years (Phase I), followed by a large production facility deployed to treat the remainder of the waste by 2028 (Phase II). NEPA coverage for the WTP was provided by the TWRS EIS Record of Decision. In 2001, DOE initiated a supplemental analysis that addressed changes to the WTP since issuance of the TWRS EIS. The original plan for the Phase II plant was determined to be prohibitively expensive, and the WTP, being constructed as part of Phase I, was implemented. Based on this decision, the mission of the WTP was changed from a demonstration plant to a full-scale production facility.

In 2003, DOE published "Notice of Intent To Prepare an Environmental Impact Statement for Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, WA" (68 FR 1052), otherwise referred to as the Tank Closure EIS. The Tank Closure EIS evaluated additional treatment capability needs and closure of the single-shell tanks. A separate EIS, the *Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington* (HSW EIS) (DOE 2004), included evaluation of disposal activities onsite, and was the subject of litigation by Ecology.

Due to technical issues found in the HSW EIS during litigation, DOE and Ecology announced a Settlement Agreement ending NEPA litigation on the HSW EIS on January 9, 2006. The agreement called for an expansion of the Tank Closure EIS to provide a single, integrated set of analyses merging the HSW EIS with the Tank Closure EIS. The expanded EIS was renamed the *Tank Closure and Waste Management Environmental Impact Statement* (TC&WM EIS), and a Notice of Intent was published on February 2, 2006 (71 FR 5655). The TC&WM EIS supports potential decisions for the RPP related to treatment, storage, and disposal of waste generated from tank farms and WTP operations and closure of the single-shell tanks. A notice of availability was published on October 30, 2009 (74 FR 56194). The EIS was released for a 185-day public comment period ending May 3, 2010.

Proposed changes to the WTP may necessitate NEPA review. Examples of such proposed changes include changes to site layout, additional land usage, or configuration changes of facility equipment. Should such changes be proposed on the WTP Project, technical information, data, and support will be provided to DOE-ORP for any additional NEPA review that may be required.

9.8 SAFEGUARDS AND SECURITY

The RPP Safeguards and Security (SAS) Program is implemented in accordance with Federal laws and DOE SAS standards and requirements to ensure the protection of DOE-owned material, property, and information. The scope of SAS Program includes:

- Physical protection
- Material control and accountability

- Protection of DOE information and the Hanford Site access requirements
- Government property protection.

As set forth in agreements between DOE-EM, DOE-ORP, and DOE-RL, the DOE-RL Manager is responsible for Hanford Site security. Specific SAS roles and responsibilities have been defined in agreements between DOE-ORP and DOE-RL regarding security and emergency services. The Hanford Mission Support Contract DE-AC06-08RL14728, Section J, "MSC Services and Interface Activities," defines SAS responsibilities for the WTP and other Site contractors.

9.9 DOCUMENTS, PROCEDURES, AND RECORDS MANAGEMENT

The WTP Project has established a document control process to control the access and distribution of all project information, including procedures, letters, memoranda, forms, and reports. All external letters and business-related internal memoranda and external letters are identified using a unique set of alphanumeric characters. Electronic mail and non-business-related internal memoranda are not assigned correspondence numbers. Individuals who must know the document contents to perform their jobs are identified in controlled distribution lists. Individuals verify through the Document Management and Control System or the current DOE-ORP Management System website that the current version is being used.

The WTP Project management system control process is governed by MGT-PM-IP-01, *ORP Management System Work Process Control.* Before procedures or reports are issued or revised, a review and approval process takes place which verifies document correctness and consistency with higher-level documents. The completed approval page provides evidence of the review process and is retained with the record copy of the document. The concurrence ladder for each document provides the means to ensure WTP Project products are reviewed and found to be acceptable.

The WTP Project manages records consistent with ESQ-QSH-IP-08, *Records Management* System Process. All project staff must ensure that records are maintained in accordance with approved implementing procedures. DOE-WTP and DOE-ORP procedures identify which documents are to be retained as records. Managers and staff are responsible for implementing this aspect of the documents and records process in their areas of responsibility. The WTP Project uses the Hanford Local Area Network for access and control of procedures. Records management activities are controlled on the WTP Project through use of the Integrated Document Management System. The WTP contractor uses BNI-specific systems for procedure and records management and provides these documents to DOE as required using a BNI-specific application called WTP eRoom.

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Waste Treatment and Immobilization Plant Project

Integrated Project Team Charter

February 2012

U.S. Department of Energy

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INTRODUCTION

Consistent with MGT-PM-PL-06, *Project Execution Plan for the Waste Treatment and Immobilization Plant (WTP) Project*; DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets*; DOE G 413.3-18, *Integrated Project Teams Guide for use with DOE O 413.3A*, and *Federal Acquisition Regulation* (FAR) Subpart 1.102, "Statement of guiding principles for the Federal Acquisition System," this charter establishes Integrated Project Teams (IPT) to align and coordinate activities for completing the WTP Project. This charter will be updated as the project evolves.

IPTs are cross-functional groups of individuals organized for the specific purpose of delivering a project to meet Departmental mission objectives. IPTs are the crossroads where the technical, management, budgetary, safety, and security interest meet. DOE O 413.3B requires that all projects establish IPTs led by a Federal Project Director (FPD). The purpose of IPTs on the WTP Project is to support the WTP FPD in executing the responsibilities associated with managing Contract DE-AC-01RV14136, "Design and Construction of the Hanford Tank Waste Treatment and Immobilization Plant." The scope of this contract is to design, construct, permit, and commission the WTP. In addition to providing oversight of the WTP Contract, WTP IPTs assist the FPD and Federal Project Managers (FPM) with interfaces and integration with other U.S. Department of Energy (DOE) Office of River Protection (DOE-ORP) organizations, DOE Richland Operations Office (DOE-RL), Tank Operations Contractor (TOC), and other Hanford Site contractors.

Based on the size and complexity of the WTP Project, multiple DOE-led IPTs are necessary and are established to oversee each major WTP facility and the cross-cutting Shared Services element. These primary facility groupings and Shared Services have been delineated into four IPTs as follows:

- Pretreatment Facility
- High-Level Waste Facility
- Low-Activity Waste, Balance of Plant, and Analytical Laboratory (LBL) Facilities
- Shared Services.

Additional IPTs may be established by the FPD as the project progresses towards completion. Each IPT is led by an FPM who reports organizationally to the FPD. Each IPT provides support to the FPM in performing management and oversight tasks and accomplishing WTP Project objectives. Specifically, each IPT will assist with:

- Maintaining high safety performance
- Ensuring that the WTP Project is completed on schedule and within cost
- Eliminating barriers to an efficient and cost-effective project management process
- Providing early identification, communication, and recovery from performance problems
- Integrating the WTP with the Tank Farms Project to successfully achieve the objectives of the River Protection Project
- Managing project progression through the Critical Decision process (DOE O 413.3B)

- Ensuring all project interfaces have been identified, described/defined, and are being managed
- Reviewing and assessing project performance against established performance metrics, baselines, milestones, and deliverables
- Planning and participating in external project reviews, audits, appraisals, etc.
- Approving all performance baseline changes to interface control documents, feed characteristics, product specifications, and future operations activities
- Performing design, construction, and operability oversight of the WTP Project
- Providing quality assurance (QA) oversight
- Overseeing radiological, nuclear, and process safety, and non-radiological worker safety and health
- Performing reviews (and where required, engage other contractors) of Bechtel National, Inc. (BNI) ESH&Q actions for compatibility and integration with site-wide ESH&Q activities
- Planning and developing strategies for startup testing and commissioning
- Confirming that contract requirements are met
- Inspecting and accepting completed work on the WTP Project.

EXPECTATIONS

The IPT will function in accordance with MGT-PM-PL-06, applicable ORP management systems, DOE O 413.3B, and the supporting manuals and guidance documents. Issues and actions that arise during contractor oversight activities are collected within the DOE-ORP Action Reporting System (OARS) to provide a structured and consistent approach for the identification, tracking, reporting, and closure of action items.

BNI is the contractor responsible for the design, construction, and commissioning of the WTP. Day-to-day communications between IPT members and BNI staff are encouraged and required; however, IPT members shall not provide technical direction to BNI. Technical direction will be provided to BNI by the Contracting Officer (CO) or the authorized Contracting Officer's Representative (COR).

The FPM is the leader of each IPT and provides the "what, why, and when" guidance and expectations to members of the IPT. IPTs may be comprised of both Federal and contractor staff. Organizational managers of the IPT members provide functional standards and expectations as the team members carry out their WTP Project duties assigned by the FPM. The FPM provides performance input to the organizational management of each member of the IPT.

IPT members dedicate some or all of their time to the project, depending on the needs of the project. As the project progresses, IPT membership or team assignments may change. The FPM will ensure the necessary skills and expertise are available to adapt the IPT to meet changing project needs.

IPTs are led by the FPM with members providing necessary subject matter expertise. IPT members typically utilize a "matrix management" approach to complete assigned tasks. In the event a member is unavailable or requires re-assignment, the FPM will request the responsible organizational supervisor to provide the IPT with a suitable replacement in a timely manner.

IPT members are expected to be aware of the status of the project and respective facilities, to anticipate problems, and to provide solutions to those problems. The IPT will foster the attainment of mutually beneficial goals through effective communication and alignment to mutual values. To achieve these goals, it is expected that the IPT will meet at regularly scheduled times. It is the FPM's responsibility to schedule meetings, ensure that team members attend meetings, are provided clearly defined work assignments, and are able to complete assigned work.

TYPICAL INTEGRATED PROJECT TEAM MEMBERSHIP

The membership of an IPT consists of the following functions, as necessary:

- FPM (Chairman)
- Authorization Basis – Nuclear Safety Specialist
- Safety System Oversight Engineer
- Facility Area Engineer
- Facility Representative
- Construction Acceptance Inspectors
- Environmental Staff
- Regulatory and Permitting Staff
- Project Controls
- Risk Management
- Budget and Finance
- Fire Protection and Industrial Health and Safety
- Tank Farms Project
- BNI Project Representatives (when requested)
- Other support as required:
  - Contracting
  - Business Administration
  - Startup and Commissioning
  - Safeguards and Security
  - Legal
  - QA.

ROLES, RESPONSIBILITIES, AUTHORITIES, AND ACCOUNTABILITIES

FEDERAL PROJECT MANAGER

FPMs support the WTP FPD and manage technical oversight of contract requirements for each major WTP facility/area grouping. Each FPM heads an IPT composed of support staff from several disciplines to form a unit that willingly shares information, balances conflicting priorities, and jointly plans and executes the WTP Project mission. Responsibilities extend through startup, cold commissioning, and closeout of the WTP Project.

The FPD has delegated FPMs the following roles, responsibilities, authorities, and accountabilities for their assigned areas of the project:

- **Roles:** Each FPM serves as the single point of contact between Federal and contractor staff for all matters relating to their assigned portion of the project and its execution.
- **Responsibilities:** FPMs have overall responsibility for their assigned work breakdown structure (WBS) elements, monitoring the integrated technical/scope, cost, and schedule baseline through all phases; providing oversight of design, construction, startup, and commissioning; and ensuring that all DOE O 413.3B requirements are met, as applicable. The IPT will support the FPM in performing their responsibilities associated with the management of the WTP Contract. FPM responsibilities are similar to the WTP FPD except they are limited to the specific WBS elements for which responsibility is assigned.
- **Accountabilities:** Each FPM is accountable to the WTP Project FPD for their assigned project areas and for timely communication of performance, risk and issues being managed.

INTEGRATED PROJECT TEAM MEMBER

The roles, responsibilities, authorities, and accountabilities for facility-specific IPT members are as follows:

- **Roles:** Each team member is a primary resource assigned by their organizational manager to support the FPMs through a specific IPT in accordance with their functional area of expertise.
- **Responsibilities:** Members of the IPT will support the FPM in performing the responsibilities associated with management of the WTP Contract. Specifically, members of the IPT will assist by:
  - Maintaining real-time awareness of the status of the project related to their facility IPT membership role (e.g., Safety Authorization Basis, Engineering, Construction)
  - Ensuring that the IPT is aware of issues identified by their functional manager that relate to the project, and conversely that their functional manager is aware of issues identified by the IPT
  - Maintaining project integrated safety management performance
  - Ensuring that contract deliverables are completed on schedule and within cost
  - Eliminating barriers to an efficient and cost-effective project management process
  - Reporting status on actions assigned by the FPM, including if the action resolution is on schedule and steps are being taken to resolve pending issues
  - Providing early identification and recovery strategy when performance problems occur
  - Integrating the facility and shared services activities into the overall WTP Project
  - Managing project progression through the Critical Decision process (DOE O 413.3B)

- Ensuring all essential interfaces are identified, described/defined, and are being managed
- Reviewing and assessing project performance against established performance metrics, baselines, milestones, and deliverables
- Planning and participating in external project reviews, audits, appraisals, etc.
- Recommending approval of all performance baseline changes to interface control documents, feed characteristics, product specifications, and future operations activities
- Performing design, construction, and operability oversight within assigned areas or respective facility
- Providing QA oversight
- Ensuring that radiological, nuclear, and process safety, and non-radiological worker safety and health requirements for the subproject are met
- Performing reviews (and where required, engage other contractors) of BNI ESH&Q actions for compatibility and integration with site-wide ESH&Q activities
- Confirming that contract requirements are met
- Inspecting and recommending acceptance of the facility and deliverables
- Identifying the need for outside expertise to supplement IPT resources on specific activities that are complex or highly technical and seek FPM agreement to obtain these resources.

- **Authorities:** Acts on behalf of their organizational manager within limits agreed to by the team member and the organizational manager. The team members do not have the authority to assign IPT-related work to the WTP contractor. If WTP contractor support is needed, this issue must be mutually agreed to and approved by the FPM.
- **Accountabilities:** Each IPT member is considered a subject matter expert in their respective field and is expected to produce quality products as assigned, within agreed-upon schedules and completion dates. Team members will act as a conduit between the IPT and their organization providing the team with relevant organizational information and resources.

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