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PFP Requirements Development Planning Guide

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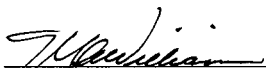
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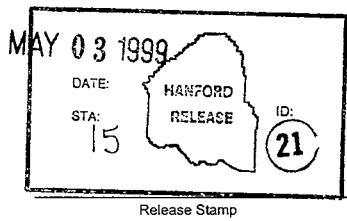
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Abstract: This document presents the strategy and process used for the identification, allocation, and maintenance of requirements within the PFP integrated project baseline.

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PFP Requirements Development Planning Guide

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1.0 Introduction

The PFP Requirements Development Planning Guide presents the strategy and process used for the identification, allocation, and maintenance of requirements within the Plutonium Finishing Plant (PFP) integrated project baseline. Future revisions to this document will be included as attachments (e.g., results of the PFP Requirements Analysis attributable to this approach).

This document is intended to be a Project-owned management tool. As such, this document will periodically require revisions resulting from improvements of the information, processes, and techniques as now described. Future updates may be made to this document by PFP management and final approval of the content will be accomplished in a Baseline Change Request as it impacts the Multi-Year Work Plan, or baseline information managed in the Hanford Site Systems Engineering Baseline.

2.0 Statement of Need

To complete the implementation of the overall Systems Engineering/Project Management Modified Approach to the development of the upgraded and accelerated PFP project baseline, a thorough analysis of driving requirements is required. A complete and approved requirements baseline will ensure that system functions (i.e., work breakdown structure) have considered and will meet requirements imposed by internal and external customers and stakeholders.

3.0 Background

The PFP Stabilization and Deactivation Project (hereafter referred to as the Project) is entering the stabilization and deactivation phases of its life cycle. A requirements baseline is needed to provide a planning basis for the Project's activities, which include the disposition of special nuclear material; the disposition of the physical structures, systems, and components; and the maintenance of safe and compliant operations until the end of the Project. Requirements define how well the functions, and therefore the system itself, must perform. Requirements originate from a variety of sources, and are of different types. Requirements are constantly changing, in some cases may conflict, may be superseded, may not be needed due to the current state of the Project, may be inadequate to provide definitive direction to the Project, or may be unclear. A Requirements Analysis is one of the first Systems Engineering tasks which must be undertaken in developing a viable technical baseline. It is the process by which the Project's customers' and stakeholders' wants and needs are formalized and documented. The resulting requirements baseline, maintained under configuration control, establishes the basis for all Project activities (functions) which must be performed to accomplish the Project's mission.

4.0 Definitions

The following provides the reader and the reviewer of the planning guides used in the development of the PFP Integrated Project Management Plan with common terms and their definitions:

Activity-Based Cost Estimate – An activity-based cost (ABC) estimate is prepared at the lowest practical level in the work breakdown structure (functional breakdown) where labor, equipment, and material costs can be defined for the activity.

Integrated Baseline – The interrelated aspects of the technical scope, project schedule, and activity-based cost estimate make up the Integrated Baseline. Key elements of the Project's Integrated Baseline will be documented electronically in the Technical Baseline Management System. Key baseline elements, which will be maintained electronically, include work breakdown structure and dictionary (e.g., functions and functional analysis), requirements, issues/assumptions, interfaces, location descriptions, basis of estimate, schedule information, milestones, and requirements closure criteria.

Functional Analysis – The Functional Analysis defines what the system must do (i.e., the activities or “functions”) to achieve the overall objectives (mission) and defines the internal and external interactions among the activities. The Functional Analysis is the basis for the Project's technical logic, work breakdown structure, definition of subprojects, the organization structure, the Project's files, process flow diagrams, and definition of the Project's Technical Baseline.

Requirements Analysis – The Requirements Analysis consists of the identification of the applicable requirements. This analysis results in the Project's requirements baseline, which is the foundation for identifying the activities, which will satisfy these requirements (the functional analysis). All requirements must be allocated to the individual functions or elements of the system. Requirements will be maintained in the Technical Baseline Management System, as an integral part of the Project's Technical Baseline.

Systems Engineering/Project Management Modified Approach – The Systems Engineering/Project Management Modified Approach is a focused accelerated effort undertaken to develop the upgraded and accelerated PFP project baseline. The approach uses the fundamental concepts of systems engineering, combined with the rigor of sound project management principles, to come up with a defensible and traceable requirements-based Technical Baseline.

Technical Baseline – The Technical Baseline is the body of technical information associated with the personnel, the processes, and the products required to accomplish the Project's mission. The initial Technical Baseline is a formal description of functions (activities), their sequence and interactions, and the requirements and constraints needed to define the system. The Technical Baseline also provides the basis to develop cost estimates and schedules used for management of work. A Technical Baseline may evolve over the Project's life cycle from a Requirements Baseline, through a Design Baseline, an As-built Baseline, an Operational Baseline, and a Deactivation Baseline.

Requirements Sources – Any customer-approved and current document may contain Project requirements. Top-level requirements sources include:

- Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1 Implementation Plan (once signed by the Secretary of Energy)
- Project Hanford Management Contract (PHMC) documents (including supporting plans, policies, and procedures)
- Standards/Requirements Identification Documents (S/RIDs)
- Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)
- U.S. Department of Energy (DOE) Orders
- Code of Federal Regulations (CFRs)
- Agreements with external interfaces such as the International Atomic Energy Agency, the Savannah River Site (SRS), the Los Alamos National Laboratory (LANL), and British Nuclear Fuels, Ltd. (BNFL).

Requirements Types – Requirements collected are categorized into a number of types based on the intent and source of the requirement.

Mission Requirement – Mission requirements are high-level requirements, based on the overall mission objectives, which are often used to establish major functional elements within the project. For the PFP Requirements Analysis, there are several sources for mission requirements, including those from site documentation, National Environmental Policy Act of 1969 (NEPA) documentation, and DNFSB Recommendations.

External Requirement - External requirements are the requirements being promulgated by organizations external to DOE and the Site contractors. For the PFP Requirements Analysis, there are several sources of external requirements including those from the Tri-Party Agreement, DNFSB, Waste Isolation Pilot Plant (WIPP) waste acceptance criteria, SRS Memorandum of Understanding, LANL Memorandum of Understanding, and BNFL Memorandum of Understanding.

Facility Requirement – Facility requirements are the requirements being promulgated by organizations internal to DOE and the Site contractors. For the PFP Requirements Analysis, there are several sources of facility requirements, including:

- PFP S/RIDs
- PFP Safety Basis
- Spent Nuclear Fuels Memorandum of Understanding
- Tank Waste Remediation System Memorandum of Understanding
- Waste Management Federal Services of Hanford, Inc. agreements
- On-site laboratories agreements
- Administrative requirements.

Completion Standard – Completion standards, or end points, are lower-level requirements used to define the end-state condition of the facility or process (i.e., how is it known when the feed material is thermally stabilized) necessary to meet the overall objectives.

Requirements Verification – An activity which must be conducted to ensure each requirement has been satisfied (closed) is a requirements verification activity. Activities usually include reviewing, analyzing, testing, inspecting, and/or demonstrating a system product against its functions and requirements.

5.0 Requirements Baseline Development Approach

The process described below is used to develop the requirements baseline for the upgraded and accelerated Project baseline.

5.1 Collection and Review of Documentation

The approach being taken to the Requirements Analysis includes the collection and review of existing PFP and Hanford Site documentation to identify applicable requirements. Figure 1 provides a PFP document hierarchy for extracting requirements. Documents are assessed to determine if they are a valid source of requirements. The documents that are outdated, have been replaced, or are not a source of requirements, are to be dropped from consideration. The assessment process includes a description of what documents have been reviewed (titles, document number, author, date), whether the document contains valid requirements, the requirement type, and any comments or notes.

5.2 Development of Completion Standards

The development of completion standards will be accomplished in the following manner, based on the following top-level Project functions.

Maintain Safe and Compliant Facility/Materials – Develop the basic products that the requirements either directly state (i.e., prepare a Pollution Prevention Plan) or imply (i.e., compilation of requirements requires the establishment of an infrastructure or “program” to manage).

Stabilize/Remove/Disposition Materials – Review the results of the functional analysis and process flow diagrams and ask the question “When is the function complete?” (i.e., how clean is clean, to what level is an item thermally stabilized). These do not include performance specification requirements (i.e., flow rates) or specific design requirements for a system (i.e., American Society of Mechanical Engineers standards).

Transition Facility – Review the results of the Functional Analysis and process flow diagrams and ask the question “When is the function complete?” (i.e., how clean is clean, to what level is an area stabilized).

5.3 Assembly of Valid Requirements

Once a source document is identified as having valid requirements, review and extract the requirements in a tabular format. For each requirement, record the requirement type, a descriptive requirement title, a brief description of the requirement, and the reference. Appendix A provides an example of how the requirements will be captured as a result of these efforts. As the requirements are assembled, they are reviewed and validated by subject matter experts and facility personnel. New requirements may be added while others may be consolidated, modified, or deleted based on the reviews and the technical basis for the changes. In some cases, these reviews may identify issues that must be resolved. An issues management list is established to deal with additional issues. Where necessary, enabling assumptions or planned decision points may be necessary to manage the issues in a manner that allows for the technical baseline development to proceed.

5.4 Allocation of Requirements

As the requirements are assembled and validated, each requirement is allocated to the applicable function or functions that it addresses. When the requirements allocation process is completed, each function or group of functions is linked to all applicable requirements. This is an iterative process and may identify areas where additional functions are needed or where identified functions are not required.

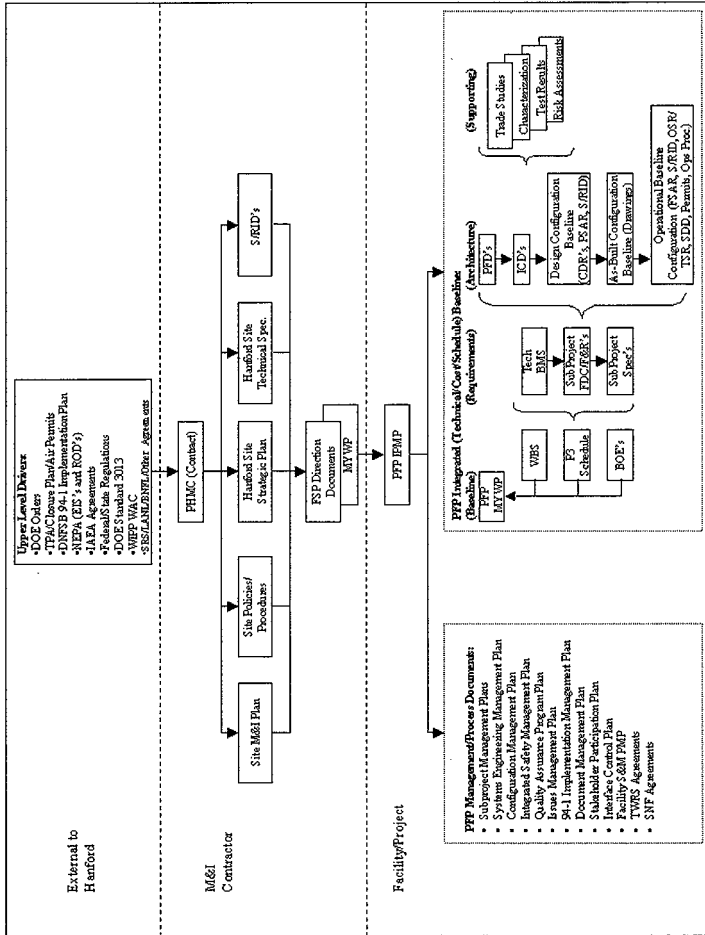
5.5 Integrated Baseline Development

The Functional and Requirements Analyses, along with the development of the Project and subproject process flow diagrams, results in the definition of a functional work breakdown structure that can be used in the development of the cost and schedule baselines. The tabular information collected during the Requirements Analysis is placed in the Technical Baseline management system database for future use. One future use is the development of Milestones and Performance measures. Selected requirements will be used for the measures. For these requirements, completion criteria or deliverable(s) will be defined, which is evidence that the requirement has been satisfied. This information, along with the requirement title and description, will form the basis for Milestone Description Sheets.

6.0 Requirements Baseline Management

The requirements baseline will be maintained by the Project under configuration control. The requirements that make up the baseline will be collected initially in the Technical Baseline management system.

Figure 1. PFP Document Hierarchy (Preliminary)



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Appendix A

Example: Requirements List

PFP Facility Requirements

WBS Number

1.04.05.01.03.02

WBS Title

Stabilization of Pu-bearing Solid Residues with <30 wt% Pu

Requirement ID Requirement Type

59 DNFSB

Requirement Title

Package and discard Process Residues

Requirement Description

Package and discard 1419 items of process residues (SSSC, Ash, Low Grade Oxides, and non-Polycube Combustibles) for WIPP discard

Deliverable Description

Disposition ready, process residues

Requirement ID Requirement Type

61 DNFSB

Requirement Title

Place Unstable Pu in Stable Form

Requirement Description

The objective of this remediation is to transform these materials to a form suitable for 50-year storage or for discard to WIPP. The specific materials in question include: Sludges, Incinerator Ash, Sand, Slag, and Crucible, Polycubes, and Metal turnings.

Deliverable Description

Stabilized Pu sludge, ash, sand, slag, crucible, polycubes and metal turnings

Requirement ID Requirement Type

302

Requirement Title

Materials Disposition Acceptance Criteria 4.2.6

Requirement Description

General Criteria for plutonium oxides: a) Total actinide content >30%-wt%; b) Materials having a total actinide content less than 30-wt% will be considered on a lot basis per 4.2.4; c) Known impurities of concern: Fluorine (F), Materials coming from the following sources may not be acceptable: 1) the precipitation product PuF-3 or sweepings from the PuF-3 cabinet, 2) the hydrofluorination product of PuO₂ whether fully fluorinated to PuF-4 or not; 3) the floor sweepings from the hydrofluorination cabinets; 4) the bomb reduction residues, known as SSSC; and 5) the floor sweepings from the bomb reduction cabinets. Material stabilized or purified to reduce fluoride will be assessed per 4.2.4.

Deliverable Description

Requirement ID Requirement Type

303

Requirement Title

Materials Disposition Acceptance Criteria 4.2.6

Requirement Description

Additional known impurities of concern: Carbon (C). Materials from points of origin known to leave significant quantities of carbon as part of processing, such as incinerator ash or graphite crucibles and fines, are unacceptable. Materials re-catched to reduce the carbon content will be assessed per 4.2.4. Calcium (Ca). Materials from points of origin known to leave significant quantities of calcium as part of processing, such as bomb reduction residues (SSSC) and direct oxide reduction salt residues, are unacceptable. d) Impurities introduced during and remaining after stabilization and/or purification shall not exceed 20% by weight of the plutonium content.

Deliverable Description

PFP Facility Requirements

WBS Number
1.04.05.01.03.02

WBS Title
Stabilization of Pu-bearing Solid Residues with <30 wt% Pu

Requirement ID **Requirement Type**
354 Other - External

Requirement Title

Air permit and draft AOP requirements for residue cementation to prepare recovered solids and sludges, which contain small amounts of Pu (usually less than 6 grams Pu), for disposal

Deliverable Description

Requirement Description

(1) Cementation will be used to prepare recovered solids and sludges, which contain small amounts of Pu (usually less than 6 grams Pu), for disposal.(2) Source term not to exceed that identified for thermal stabilization.(3) Compliant to 40 CFR 61, Subpart H, Compliant to WAC 246-247. Compliant to all applicable control technology standards.

PPF Facility Requirements

WBS Number
1.04.05.01.03.02.01.01

WBS Title
Characterize SS&C

<i>Requirement ID</i>	<i>Requirement Type</i>	<i>Requirement Title</i>	<i>Deliverable Description</i>
7	Administrative	FSP-PPF-5-8, Volume 1, Section 1.35 " Facility Process Sampling Schedule".	Process Sampling Schedule
<i>Requirement Description</i>			
This procedure provides requirements and responsibilities for the preparation of Facility Process Sampling Schedules at the Plutonium Finishing Plant (PFP). This procedure applies to schedules prepared by Facility technical support or engineering organizations for the processing operation conducted by PFP Operations.			
<i>Requirement ID</i>	<i>Requirement Type</i>	<i>Requirement Title</i>	<i>Deliverable Description</i>
70	DNFSB	Remove Spent Fuel from PFP	Removed SNF
<i>Requirement Description</i>			
Complete interim actions to remove fuel from PFP to support current facility mission and corrective actions to vulnerabilities identified in the November 1993 document, "DOE Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel and other Reactor Irradiated Nuclear Materials and the Environmental, Safety, and Health Vulnerabilities (DOE 1993).			
<i>Requirement ID</i>	<i>Requirement Type</i>	<i>Requirement Title</i>	<i>Deliverable Description</i>
71	DNFSB	Remove Spent Fuel from PFP	Removed SNF
<i>Requirement Description</i>			
All spent fuel contained within PFP will require re-packaging prior to final disposition. This re-packaging may or may not be conducted at PFP.			
<i>Requirement ID</i>	<i>Requirement Type</i>	<i>Requirement Title</i>	<i>Deliverable Description</i>
90	DNFSB	94-1d	Stabilized SNF
<i>Requirement Description</i>			
All 94-1 spent nuclear fuel shall be stabilized by dissolution or transferred to dry storage.			
<i>Requirement ID</i>	<i>Requirement Type</i>	<i>Requirement Title</i>	<i>Deliverable Description</i>
313	Onsite Acceptance Criteria	Manage SNF in accordance with DOE Orders	Stabilized SNF
<i>Requirement Description</i>			
Manage SNF consistent with requirements defined in DOE Order 5633.3B, Control and Accountability of Nuclear Material, DOE Order 5660.1B, Management of Nuclear Material, and the DOE Spent Fuel Program Requirements Document.			

PFP Facility Requirements

WBS Number
1.04.05.01.03.02.01.01

WBS Title
Characterize SS&C

Requirement ID	Requirement Type	Requirement Title	Deliverable Description
317	Onsite Acceptance Criteria	SNF Project Responsibilities in SNF MOU	

Requirement Description

1). Obtain EM-67 direction via SFD on which materials at PFP must be managed as SNF. Define long-term requirements for safe storage and final disposition of SNF at PFP. Obtain PFP Transition Project concurrence on those requirements that could affect safe storage and handling of the SNF at PFP. 2.) Review safety authorization bases for SNF management at PFP and provide comments on the safe storage and handling requirements. 3.) Maintain cognizance of PFP Transition Project activities to manage SNF at PFP. 4.) Review, accept, and maintain SNF data records. Confirm via SPD that the data records are acceptable to DOE-EM-67 and DOE-RW. 5.) Provide systems, equipment, funding, and resources needed for repackaging and transfer of PFP SNF as established in the long-term requirements for safe storage and final disposition of the SNF at PFP.

Requirement ID	Requirement Type	Requirement Title	Deliverable Description
387	Other - Internal	6.1.3 Stabilized Materials, Other Materials	

Requirement Description

(1) Fabricated fuel, consisting of sintered uranium-Pu oxide fuel pellets enclosed in a cladding, such as zircalloy or stainless steel, adequate for insertion into a nuclear reactor, that has an adequate quality and surveillance history to assure the integrity of the fuel cladding is considered to meet all the requirements for stabilization specified in Section 6.1.2 of this document without restabilization or testing. Fuel pellets extracted from such fuel are also considered to meet all the requirements of 6.1.2 at the time of removal from the cladding. (2) Sintered U-Pu oxide fuel pellets that are shown to satisfy the stabilization criteria of this Standard, as given in Section 6.1.2(3), are considered to meet all the requirements of 6.1.2 without restabilization. Sintered U-Pu oxide pellets that cannot meet the moisture requirements shall be stabilized by heating to at least 500 degrees C (932 deerees F) to remove sufficient moisture to meet the requirements of Section 6.1.2(3) of this Standard.

Requirement ID	Requirement Type	Requirement Title	Deliverable Description
1209	SRID	DOE ORDER 5480.7A Section 9.b.(15) SRID Number 12.4.4	

Requirement Description

Seismic Criteria - The design of the fire protection systems to withstand seismic events shall be in accordance with the criteria developed by the National Fire Protection Association, except as required by other DOE criteria.

PFP Facility Requirements

WBS Number

1.04.05.01.03.02.01.01

WBS Title

Characterize SS&C

Requirement ID **Requirement Type**

1210

SRID

Requirement Title

DOE ORDER 5480, 7A Section 9.b.(1) SRID Number 12.4.5

Requirement Description

Safety Class Equipment - In areas where a fire could cause damage to safety class equipment and where no redundant safety capability exists, a redundant fire protection system shall be provided for the safety class equipment. For new facilities, redundant Safety Class equipment shall be located in separate fire areas. Fire suppression systems shall be designed such that their actuation will not damage safety class equipment or cause a criticality incident.

Deliverable Description