Systems Engineering Product Breakdown Structure for the Hanford Cleanup Mission: First Issue

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**SYSTEMS ENGINEERING PRODUCT BREAKDOWN STRUCTURE
FOR THE HANFORD CLEANUP MISSION: FIRST ISSUE**

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SUMMARY

This document provides the product breakdown structure (PBS) for the upper level physical products that, when delivered, complete the Hanford Site Cleanup Mission. Development of the PBS is a continuation of the sitewide systems engineering work described in the sitewide functional analysis (Ref. 1), the architecture synthesis (Ref. 2), and the product description report (Ref. 3) and is generally consistent with guidance contained in the Hanford Mission Plan (Ref. 4). The PBS presents the interrelationship of products produced by the functions that are necessary to perform the clean up mission from their initial source through interim products to final product disposition.

The PBS is directly derived from the referenced documents and presents the products resulting from the cleanup mission in a hierarchical format. As in the case of the preceding documents, no attempt has been made to integrate the products into an optimum set. Optimization of the product set and product breakdown structure will require analysis of the "raw" products for the following purposes.

- Reveal opportunities to satisfy several functions with one product.
- Eliminate overlap.
- Fill in gaps.

Once the optimization targets are identified, the functional analysis and architectural synthesis will be revisited and updated to reflect the improvement opportunities. The whole process will need to be repeated a

number of times to become internally consistent. It should be noted that the architectural synthesis has yet to be analyzed in detail for cost, risk, regulatory, and public acceptance issues and must be subjected to all appropriate regulatory approval processes and validation by the U. S. Department of Energy (DOE) before it can be adopted as the technical basis for the Hanford Cleanup Mission. Because of this, the product breakdown structure provided here must be considered only as reflecting the initial identification of products and their relationship to the site mission.

This document is organized as follows:

- Section 1.0 provides the PBS graphically showing the hierarchical relationship of the various products, subproducts, and interim products. Because the overall PBS is too large to be presented in a single figure, the structure has been logically separated into related products and presented in Figure 1-1 through 1-24. Figure 1-1 provides the top-level PBS and an index to the remaining figures.
- Section 2.0 describes the products presented in the PBS.

Information provided in this report emphasizes the physical outputs of the system functions associated with Function 4, Remedy Unsafe and Unacceptable Conditions and Function 5, Transition Resources for Beneficial Use. All subfunctions of Function 4 are included down to level 4 (4.X.X.X) with the exception of Function 4.6, Correct Unsafe Infrastructure Conditions. Additional work is required to integrate Function 4.6 work with the sitewide system.

As a result of the activity associated with developing the product description report (Ref. 3), the names of some of the outputs of functions depicted in the Integrated Definition Language Notation (IDEF0) diagrams contained in the functional analysis (Ref. 1) were decomposed to lend the required physical attributes to the function outputs and to better support the development of a product breakdown structure. An example of this

decomposition is the conversion of the "Dispositioned Legacy" product contained in the functional analysis documentation (Ref. 1) into "Released Effluents," "Waste/Materials Dispositioned Offsite," and "Waste/Materials Dispositioned Onsite." In these cases, the decompositions also will be reflected when the second issue of the functional analysis is published. Also, some specific function outputs were determined to be missing from the functional analysis (Ref. 1) and have been added as products in Section 1.0 of this report.

Consistency with previous reports has been maintained utilizing the RDD-100® tool.

The next step in the sitewide systems engineering analysis work is to examine the functional analysis for areas of overlap or omission and to optimize the system. The functional analysis will then be updated and the resulting initial technical baseline will be documented through the development of detailed product/process functional specifications.

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LIST OF TERMS

DOE	U.S. Department of Energy
IDEFO	Integrated Definition Language Notation
PBS	Product Breakdown Structure

1.0 PRODUCT BREAKDOWN STRUCTURE

Figures 1-1 through 1-24 present the product breakdown structure (PBS) for the upper level physical products that, when delivered, complete the Hanford Cleanup Mission. These figures show the hierarchical relationship of the various products, subproducts, and interim products. Figure 1-1 provides the top level PBS. Each lowest level product box contained the number of a figure number identifies the lower level product breakdown structure. For example, the eighth box from the left, LLW/LLMW, contains the reference to Figure 1-11. Figure 1-7 is the PBS for LLW/LLMW.

The site level PBS was generated manually from the data contained in the RDD-100® tool, but only to level 4 of the functional analysis. This is consistent with the product description report (Ref. 3). Therefore, this product structure has not taken advantage of decompositions below level 4 of the functions and products in the RDD-100® tool. The RDD-100® tool is being improved to provide the capability to generate product structures at any level using the full data set (lowest level decomposition). It is anticipated that this capability will be in place in time to support the final version of this PBS.

Most of the products in the PBS have associated numbers enclosed in brackets. These numbers indicate the function from the functional analysis (Ref. 1) that produces the product. A number such as "4.3.1.all" indicate that all next lower level functions to 4.3.1 produce the product. Products without an associated function have yet to be properly tunneled, that is associated with (or connected to) other functions within the functional analysis.

It should be noted that all lowest level products in Figure 1-1 do not have an applicable lower level product breakdown structure. This is true for Transferable Waste from Solid Waste, Transferable Resources from Infrastructure, RCRA Covered Trench, Sanitary Sewage, Landfill Wastes, and Sanitary Landfill Waste. These products either have no applicable lower level

products, as in the case of a byproduct resulting from performing a function, or no lower level product structure exists because the functional decomposition is incomplete.

Refinement of the functional analysis will result in a further decomposition of the system functions and products and will be used in the generation of the final version of the PBS.

Cleaned Up Site

Figure 1-1. Clean Up Hanford

Transfe
Resource
Deactivati

Transferrable
Resources from
(Type 1)
Deactivation [4.1.1]
(See Fig. 1-3)

Transferrable
Resources from
(Type 2)
Deactivation [4.1.2]
(See Fig. 1-4)

Figure 1-2. Transferable Resources from Deactivation

Figure 1-3. Transferable Resources from Deactivation (Type 1)

Transferable
Resources from
Deactivation
(Type 2)
[2.3]

Compliant
Resources (Type 2)
[2.1]

Figure 1-4. Transferable Resources from Deactivation (Type 2)

Tran
Resou
(T)
Deac
[4.

Safe &
Resourc
[4.

Figure 1-5. Transferable Resources from Deactivation (Type 3)

Figure 1-6. Transferable Resources from Deactivation (Type 4)

Figure 1-7. Transferable Resources from Tank Waste Remediation

Figure 1-8. Transferable Resources from Remedy/Restore

Figure 1-9. Transferable Resources from Aqueous Waste

Figure 1-10. Transferable Resources from SNM/NM/NF Cleanup

Figure 1-11. LLW/LLMW

Figure 1-12. Treated Effluent and Documentation

Figure 1-13. Untreated Effluent and Documentation

Closed Waste Disposal [4.4.4]

Figure 1-14. Closed Waste Disposal Facility

Figure 1-15. Closed ILLW Sites

Waste t
[4.2

Existing Tank Waste

Liquid SW for
Storage
[4.2.3.1/.3]

Tank Waste from
Solid Waste Cleanup
[4.3.1.1/.2]

Tank Waste from
SNM/NM/NF
Cleanup
[4.7.1/.3/.5]

Figure 1-16. Waste to Storage
1-18

Figure 1-17. Hazardous Waste

Figure 1-18. Deactivated Facilities

Figure 1-19. Immobilized HLW

Overpacked Capsules
[4.2]

Interim Stored
Overpacked Capsules
[4.2.2.4]

Overpacked Cs/Sr
Capsules for
Storage/Disposal
[4.2.2.3]

Cesium/Strontium
Capsules
[4.2.1.4]

Retrieved
Cesium/Strontium
Capsules
[4.2.1.3]

Cesium/Strontium
Capsules for
Retrieval
[4.2.1.1]

Existing
Cesium/Strontium
Capsules

Figure 1-20. Overpacked Capsules

Figure 1-21. Immobilized TRU Waste

Figure 1-22. Processed Post-70 TRU/TRUM

Figure 1-23. SNM/NM/NF Dispositioned Off-Site
1-25

Released Effluent
[0]

Released Liquid
Effluents
[4]

Released Liquid
Effluents from R&R
[4.4.5]

Releasable Liquid
from Aqueous Waste
[4.5.5]

Secondary Waste &
Documentation
[4.5.4]

Treated Effluent &
Documentation
[4.5.4]
(See Fig 1-12)

Untreated Effluent &
Documentation
[4.5.3]
(See Fig 1-13)

Gaseous Waste
ILLW
[4.2.3.1]

Solid Waste &
Documentation
Generated During
AW Cleanup
[4.5.1]

Figure 1-24. Released Effluents

2.0 PRODUCT DESCRIPTIONS

Information contained in the tables in this section includes the name of the function and its definition as contained in the functional analysis. The "Product" column of the table lists, in alphabetical order, each product contained in the product breakdown structure. The "Description" column contains a definition of each product.

(Product descriptions to be provided in the final version of the document.)

TABLE 2-1 Product Descriptions

<i>Product</i>	<i>Description</i>
Accepted Materials	Materials that meet the acceptance criteria and their form, type, consistency, and quantity have been verified.
Allocated Resources	Financial resources authorized to the implementing organization for completion of the function
Aqueous Waste from Deactivation	Waste water containing TRU, radioactive or hazardous materials resulting from deactivation of facilities.
Aqueous Waste from Deactivation (Type 1)	Waste water containing TRU, radioactive or hazardous materials resulting from deactivation of type 1 facilities.
Aqueous Waste from Deactivation (Type 2)	Waste water containing radioactive or hazardous materials resulting from deactivation of type 2 facilities.
Aqueous Waste from Deactivation (Type 3)	Waste water containing hazardous materials resulting from deactivation of type 3 facilities.
Aqueous Waste from Infrastructure	Aqueous waste containing materials resulting from correction of unsafe or non-compliant conditions or from providing common services in support of the Hanford Cleanup mission.
Aqueous Waste from Remedy/Restore	Low level or low level mixed aqueous waste needing treatment.
Aqueous Waste from SNM/NM/NF Cleanup	All liquid waste that meets the acceptance criteria of the Manage Aqueous Wastes function. Includes liquid wastes with low level radioactive and hazardous contamination levels.
Aqueous Waste from Solid Waste Cleanup	Low level or low level mixed aqueous waste resulting from solid waste cleanup operations.
Aqueous Waste from Tank Waste Remediation	All liquid waste that meets the acceptance criteria of the Manage Aqueous Wastes function. Includes liquid wastes with low level radioactive and hazardous contamination levels.
Authorization for Transfer of Resources	Approval of the recommended disposition of resources that satisfy the transfer requirements and constraints for transfer outside of mission.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Certified Solid Waste	This is solid waste that meets the certification requirements that allow either on-site or off-site disposition.
Certified Solid Waste Archive Data and Samples	This is archive data and samples that were part of the solid waste certification process that were requested to support further certification work.
Certified Solid Waste Data and Samples	This is data and samples that were part of the solid waste certification process that require archival storage.
Cesium/Strontium Capsules	Cs/Sr capsules in storage at Hanford or returned from offsite sources to Hanford.
Cesium/Strontium Capsules for Retrieval	Cesium and strontium capsules residing in storage that have been identified for transfer to the Process Waste function for final disposition.
Cleaning Waste	Liquids evolved from management of solid waste. These liquids are primarily expected from waste decontamination, but may also be generated from other material management activities (e.g., package or shipping cask decontamination, material stabilization).
Cleanup Program Information	Cleanup Program Information consisting of program plans for review, comment and information, progress information, and resource allocation information to the OBTAIN PUBLIC TRUST function for public review and information.
Closed ILLW Sites	Solidified or otherwise immobilized and stabilized LLW resulting from high level tank waste processing, in engineered disposal structures and their sites that have been closed with appropriate long-term monitoring instrumentation in place.
Closed Waste Disposal Facility	A waste disposal facility containing LLW and LLMW resulting from remediation and environmental restoration of Hanford sites.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Closure-Ready DSTs	DSTs that have been emptied of waste, decontaminated, isolated, and are ready to be transferred to the site-level Deactivate Facilities function (4.1) (D&D) for closure. This does not preclude external, site reuse.
Closure-Ready SSTs	SSTs that have been emptied of waste, decontaminated, isolated, and are ready for transfer to the sitewide Deactivate Facilities function (4.1) (D&D) for closure.
Concentrate Waste Feed	Liquid waste, with required characterization information, delivered to the evaporator for processing into a low-volume concentrate.
Conditioned Waste for Sampling	Solid and liquid wastes that have been conditioned before initiating transfer that have been identified for characterization requiring laboratory or in situ analysis.
Contaminated aquifer	Uncontained, untreated, unmodified contaminated aquifer.
Contaminated sites	RA land to be remediated with areas of radiological and/or hazardous contamination.
Data/Samples for Characterization	This is new waste information and samples obtained during solid waste access and removal operations and through the verification process associated with acceptance.
Deactivated Facilities	Facilities placed in an acceptable condition for demolition or as a transferrable resource.
Deactivated Type 3 Facility	Type 3 facilities with hazardous materials stabilized, terminated utility services and facility interties.
Deactivated Type 4 Facility	Type 4 facility with terminated utility services and facility interties.
Deactivated facilities removed	Decontaminated and demolished retired surplus facilities removed.

TABLE 2-1 Product Descriptions (Continued)

<i>Product</i>	<i>Description</i>
Defined Work Package	Documentation describing the specific work; work authorization, description, procedures, resource limits and schedules; controlling performance of the function
Direction & Control	Management guidance based on the status of implementation of the Defined Work Packages
Dispositioned Gaseous Effluent	Conditioned gases appropriate for discharge directly to the environment from process and containment buildings.
Dispositioned Liquid Effluent	Treated liquid effluent from the DLE function to the Manage Aqueous Waste function. May contain environmentally releasable effluent.
Dispositioned Solid Waste (TWRS)	Dispositioned solid waste includes all packaged and shipped waste that meets the disposal criteria for the appropriate disposal destination, including sanitary, hazardous, mixed, and radioactive wastes. This includes failed melter packages as high-level solid waste to a geologic repository, minus any scrap glass that can be fed back into the IHLW process via output interface 4.2.3.4 O7, Scrap Glass.
Effective Management System	The management organization, infrastructure, principles and policies established to formulate and execute the programs required to complete the Hanford cleanup mission successfully.
Enhanced Local Economy	Cleanup resources that have been expended in a manner to support independence of the local/private sector economy. This can be achieved through development of public/private sector partnerships, transfer of technologies for use elsewhere, etc. Also, expenditure of these resources should, where possible, provide national and international benefit by making technology and expertise broadly available.
Excess Aqueous Waste Disposition Facilities	The excess facilities and equipment from the disposition function.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Excess Aqueous Waste Facilities	Excess receiving, treatment, storage, and disposition facilities.
Excess Aqueous Waste Receive/Transport Facilities	Excess facilities generated by the Receive/Transport Aqueous Waste function.
Excess Aqueous Waste Treatment Facilities	The excess facilities and equipment from aqueous waste treatment.
Excess Facilities from DRM	DRM excess facilities that have reached their useful life and have no currently identifiable or planned programmatic use in the DRM function.
Excess Facilities from ILLW	ILLW excess facilities that have reached their useful life and have no currently identifiable or planned programmatic use.
Excess Facilities from MTW	MTW excess facilities that have reached their useful life and have no currently identifiable or planned programmatic use in the MTW function.
Excess Facilities from PW	PW excess facilities that have reached their useful life and have no currently identifiable or planned programmatic use in the PW function.
Excess Infrastructure Facilities	Facilities used in providing basic, commonly-used services, that are no longer required.
Excess Remedy/Restore Facilities	Remedy/Restore facilities no longer required for performance of Hanford cleanup mission functions.
Excess SNM/NM/NF Facilities	The excess facilities and equipment associated with the storage, treatment, and disposition of SNM/NM/NF materials.
Excess Solid Waste Facilities	Facilities that have had a mission in the Hanford Cleanup Mission. It includes excess sites for disposition (e.g. potentially contaminated retrieved trench).
Excess Solid Waste Samples	These are excess solid waste samples that will be received as solid waste requiring disposition.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Excess Tank Waste Facilities	TWRS (non-tank) facilities that have been emptied, decontaminated, disabled, except for essential surveillance and monitoring systems and are ready for transfer to the site-level Deactivate Facilities (4.1) function.
Excess Type 1 Facilities	Excess facilities containing SNM/NM/NF, and radioactive waste and hazardous waste.
Excess Type 2 Facilities	Excess facilities containing radioactive waste and hazardous waste, but no SNM/NM/NF.
Excess Type 3 Facilities	Excess facilities containing hazardous waste, including asbestos.
Excess Type 4 Facilities	Excess facilities containing no radioactive waste or hazardous waste.
Existing Cesium/Strontium Capsules	Encapsulated cesium and strontium previously removed from the existing tank wastes.
Existing Tank Waste	Existing tank waste including waste within transfer lines
Gaseous Effluent from DEF	Gaseous effluent generated from the process of removing hazardous and radioactive inventories and decontaminating excess facilities.
Gaseous Effluent from DLE	Vessel vent and HVAC flows from evaporator process condensate treatment facility type activities.
Gaseous Effluent from DRM	Gaseous effluent that are a byproduct from DRM treatment or interim storage such as ventilation exhaust.
Gaseous Effluent from DSW	Gases evolving from management of solid waste. These gases are primarily expected from solid waste management enclosures but may also be generated from material management activities or radiolysis.
Gaseous Waste from ILLW	Gaseous effluents from melter off gas, process vessel offgas, and facility offgas are treated to meet emission requirements and released.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Groundwater treatment contaminated materials	Contaminated materials resulting from groundwater extraction and treatment methods.
Hazardous Waste	Hazardous waste as defined by federal, state, or local laws.
ID Key Issues For PI	Specific issues pertaining to Hanford cleanup identified as significant concerns to the public.
IHLW for Storage	IHLW sealed in containers suitable for interim storage and emplacement in the HLW geologic repository.
ITRU Waste for Storage	ITRU sealed in containers suitable for interim storage and emplacement in WIPP/geologic repository (as required).
Immobilized HLW	Sealed containers of immobilized HLW derived from treatment of tank wastes (e.g., existing and new tank wastes). The containers of IHLW are placed in a transport cask, that is loaded onto a transport vehicle. At the time of shipment the waste will be certified to meet repository acceptance requirements.
Immobilized TRU Waste	Solidified TRU waste sealed in containers, with required characterization information, and transport casks along with the transport vehicle delivered to the designated WIPP Site Facility.
Immobilized LLW	(Interim product of 4.2.3.1)
In-Process Waste	Pretreated HLW, pretreated TRU tank waste, pretreated LLW and partially pretreated waste, with required characterization information, suitable for transfer to Manage Tank Waste (4.2.1) function.
Infrastructure Support	Basic, commonly used goods and services provided to multiple functions to sustain their operations.
Initial disposal facility	Disposal facility buildings, rail facilities, equipment and initial disposal cell capacity ready to accept waste material

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Institutional Information	Institutional information provided to the regulators concerning planning, progress, and priority actions.
Interim Stored IHLW	(Interim product of 4.2.2.4)
Interim Stored ITRU Waste	(Interim product of 4.2.2.5)
Interim Stored Overpacked Capsules	(Interim product of 4.2.2.4)
LLMW/LLW	Low level waste and low level mixed waste.
Laboratory Waste from Characterization	Liquid and slurry wastes generated by the laboratories during handling, preparation, and analysis of MTW Characterization Samples. This waste also includes excess samples that are disposed of by the laboratory. These wastes are collected and transferred to DST's and Liquid SW for Storage from the MSGW & EF function.
Landfill Wastes	Waste suitable for disposition in a landfill. Does not include solid, tank, or effluent waste.
Legacy Solid Waste	It is existing waste resulting from Hanford's defense material production and energy production missions.
Less Dependent Local Economy	Resources used during cleanup have provided secondary benefits to enhance the economic viability of the regional economy.
Liquid Effluent from DEF	Residues, cleaning wastes, and other liquid or slurry wastes originating from the removal of chemical inventories and decontamination of excess facilities.
Liquid Effluent from DGE	Includes all liquid streams generated from condensation, scrubbing, and filtration of off-gas streams.
Liquid Effluent from DRM	Liquid effluent that requires disposal (not reusable) and is generated as a byproduct from treatment or interim storage of DRM.
Liquid Effluent from ILLW	Liquid waste generated from functions associated with immobilization and disposition of low-level tank waste.

TABLE 2-1 Product Descriptions (Continued)

<i>Product</i>	<i>Description</i>
Liquid SW for Storage	Liquid secondary waste for storage, with required characterization information, produced in the MSGW & EF (4.2.3) function. This includes cleaning waste, lab waste from sample characterization, but no packaged waste.
Liquid Wastes and Documentation Generated During AW Cleanup	All liquid waste that meets the acceptance criteria of the Manage Aqueous Wastes function. Includes liquid wastes with low level radioactive and hazardous contamination levels and required documentation.
Low Level SW	Secondary LLW for immobilization. This includes LLW glass material separated from container decontamination waste, off-standard glass requiring rework, glass spillage, glass from radioactive melter tests, and glass removed from failed melters. Scrap glass is fed directly back into the Immobilize & Dispose LLW function.
MTW SG Gaseous Waste	Radioactive and mixed gaseous waste generated by the Manage Tank Waste function that requires treatment prior to discharging to the environment.
MTW SG Liquid Effluent	Liquids generated during the operation of equipment and systems that are or may be contaminated with trace amounts of hazardous or radioactive components and as minimum require monitoring to insure regulatory compliance. Included are liquids discharged from single pass cooling systems, and steam and process condensate generated from the concentrate function. Low level liquid waste generated by any process will be treated as tank waste.
MTW SG Solid Waste	Solid waste generated from functions associated with managing tank waste.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
MTW SGW & EF	All excess facilities and wastes, with required characterization information, generated during MTW activities except that portion that will be processed into Immobilized High-Level Waste (IHLW), Immobilized TRU Waste (ITRU), or Immobilized Low-Level Tank Waste (ILLTW). This includes equipment and facilities that have fulfilled their purpose but are now available for appropriate reuse or final disposition: mixed, hazardous, or radiological waste in liquid or solid form (including spent samples) being returned from laboratories that originated in the MTW function, and all nonradioactive, nonhazardous liquid and solid effluent. Also included in the tank waste is the following nonprocess solid waste: fallen equipment, severed pipes, lead bricks, cobalt slugs, fuel pin elements, etc.
Mission Essential Capabilities	Mission essential capabilities in the form of all physical resources, manpower, technology, infrastructure, expertise required by all the other functions to conduct their submissions.
Mission Requirements	Externally- and internally-imposed product specifications and process constraints derived from all applicable laws, directives, policies, standards, agreements with stakeholders, engineering studies, safety analyses, and findings from surveillances and audits.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
New Tank Waste	New waste, with required characterization information, added to the DSTs from activities conducted to Deactivate Facilities (4.1), Remedy Solid Waste (4.3), Remedy/Restore Sites, Facilities and Ground Water (4.4), Manage Aqueous Waste (4.5), Correct Infrastructure Deficiencies (4.6), and Store, Treat and Disposition SNM/NM/NF Materials (4.7) (as defined in WHC-EP-0722, Systems Engineering Functions and Requirements for the Hanford Cleanup Mission: First Issue, draft December 1993, J. J. Holmes). Waste will be conditioned by the generator to meet the acceptance criteria of the Remediate Tank Waste function prior to acceptance.
Non-Compliant Effluent & Documentation	The effluent of the aqueous waste treatment which is non-compliant and may need further treatment.
Non-Issue Information	Information released to the public for general knowledge.
Off-site Certified Solid Waste	This is solid waste that meets the certification requirements that allow off-site disposition.
On-site Certified Solid Waste	This is solid waste that meets the certification requirements that allow on-site disposition.
OverPacked Capsules	Cesium and strontium capsules placed in an overpack container and certified for transfer to the HLW repository.
Overpacked Cs/Sr Capsules for Storage/Disposal	Cs/Sr capsules in containers/canisters suitable for interim storage and long term disposal offsite.
PW SG Gaseous Waste	Gaseous waste, with required characterization information, generated from functions associated with processing tank waste.
PW SG Liquid Effluent	Liquid waste, with required characterization information, generated from functions associated with processing tank waste.
PW SG Solid Waste	Solid waste, with required characterization information, generated from functions associated with processing tank waste.

TABLE 2-1 Product Descriptions (Continued)

<i>Product</i>	<i>Description</i>
PW SGW & EF	<p>Excess facilities with waste and miscellaneous wastes generated from processing of tank waste.</p> <p>a.Excess Facilities for PW Facilities fulfilling their purpose but are now available for appropriate reuse, following cleaning.</p> <p>b.Miscellaneous Wastes Any mixed or radioactive waste, industrial waste, gaseous waste, TRU solid waste, dangerous waste, uranium, chemicals, liquid effluents, or sanitary waste, requiring conditioning by the Manage System Generated Waste and Excess Facilities function prior to transfer to appropriate interface for reuse or final disposition.</p>
Packaged Solid Waste	This is solid waste that meets the certification requirements that allow on-site disposition.
Pretreated HLW for Immobilization	Pretreated HLW, with required characterization information, blended and/or concentrated to final composition meeting specifications for feed to immobilization.
Pretreated LLW for Immobilization	Tank waste that meets the LLW feed specifications for feed to the LLW immobilization process.
Pretreated TRU Waste for Immobilization	Pretreated TRU Tank Waste, with required characterization information, blended and/or concentrated to final composition meeting specifications for feed to immobilization.
Processed Post-70 TRU/TRUM	Transuranic waste and transuranic mixed waste processed after 1970 resulting from cleanup of facilities or sites.
Public Acceptance	<p>Public trust and acceptance is obtained.</p> <p>A prerequisite for successful completion of the cleanup mission is obtaining public trust. This trust is essential to gaining the broad public acceptance needed to close the site. Embedded in this end state is the information supplied to the public on progress, planning, and unusual events during mission implementation.</p>

TABLE 2-1 Product Descriptions (Continued)

<i>Product</i>	<i>Description</i>
Public Group Specific PI Plan	The public involvement plan for identifying and developing or obtaining information necessary to alleviate public concerns, for providing the information to the public, and reconciling differences between the public and site needs and expectations.
Public Information	Public information to entities outside the mission consisting of press releases, position papers, educational matter, policy, strategy, etc.
Public Needs/Information	In the course of acquiring public trust and acceptance, needs and information may be discovered which may impact direction & control, mission requirements, and defined work packages. This information must be fed back to the MANAGE PROGRAM function for evaluation.
Public Values	Public values to the program planning process from the OBTAIN PUBLIC ACCEPTANCE function.
Quality Assurance Solid Waste Samples	This is solid waste treatment process quality samples used to certify that the treated waste product meets the solid waste disposition requirements.
RA area sites cleaned up	RA excavation sites that have undergone remedial action and are cleaned up to acceptable levels for intended land use.
RCRA Covered Trench	Legacy TRU disposal trench with post-1970 TRU/TRUM removed and covered to RCRA requirements.
Received Aqueous Waste and Documentation	Aqueous waste and associated descriptive documentation containing low level radioactive and hazardous contamination levels.
Received Solid Waste	This is solid waste received from solid waste operations, cleanup operations, and other missions, including removed legacy waste, that is now ready for disposition.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Recycled Containers and Transporters	Transporter and shipping containers suitable for reuse.
Releasable Liquid from Aqueous Waste	Liquids cleaned to standards acceptable for release to the environment.
Released Effluents	Fluids and gases resulting from Hanford Cleanup operations that are released to the environment or site aquifer.
Released Gaseous Effluents	Gaseous effluents resulting from Hanford Cleanup operations that are released to the atmosphere.
Released Liquid Effluents	Liquid effluents resulting from Hanford Cleanup operations that are released into the environment.
Released Liquid Effluents from R&R	Liquid effluents resulting from remedy and restore activities released to the environment or into the site aquifer.
Remediated Aquifer	Aquifer that has undergone remedial action to attain acceptable levels of water quality utilizing various methods of containment and/or treatment.
Resource In Need Of Maintenance	Operational infrastructure resources requiring maintenance.
Resource Transition Needs/Information	Program formulation, progress, evaluation, and resource requirements information
Resources Redirected for Mission	Resources released from current Hanford use and reassigned for use in the Hanford clean-up mission.
Resources Transferred	Land and other resources transferred for external socially beneficial uses. Land and other resources recovered and returned for beneficial uses by the Hanford Cleanup Program (e.g., caretaker, dual use infrastructure, and other Hanford Site missions).
Retrieved Cesium/Strontium Capsules	Cesium and strontium capsules removed from storage to initiate transfer to the Process Waste function for final disposition.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Retrieved Solid Waste	Solid waste that has been received or retrieved and is ready for disposition.
Retrieved Tank Waste	Waste removed from underground storage tanks (DSTs, SSTs, and miscellaneous tanks) with required characterization information, that will ultimately be processed by the IHLW, ITRU, or ILLW functions and is ready for transfer to other facilities.
Reusable Facilities	Excess facilities, excluding tanks, that have reached their useful life and have no currently identifiable or planned programmatic use in TWRS. These facilities may be used at the site-level to support SST and DST closure activities.
Reusable Liquid from Aqueous Waste	Liquid from aqueous waste processing that can be reused by on-site systems.
Reusable Liquid from DLE	Process condensates and environmentally dischargeable liquids suitable for reuse.
Reusable Materials for MSGW & EF	Materials that can be reused or recycled by other MSGW & EF functions.
Reusable Materials for MTW	Equipment, chemicals (including water), or facilities that have fulfilled their original purpose and are now available and appropriate for use by Manage Waste Tank function.
Reusable Materials for PW	Equipment, chemicals (including water), or facilities that have fulfilled their original purpose and are now available and appropriate for use by Process Waste function.
Reusable Materials for Site	Equipment, chemicals (including water), that have fulfilled their original purpose and are now available and appropriate for use by non-TWRS, site-level functions.
Reusable Solids from DSW	Solid materials segregated from solid waste that can be beneficially reused or recycled.
SNM/NM/NF Dispositioned Off Site	SNM, NM, and NF shipped off site.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
SNM/NM/NF Materials Transferred To Beneficial Uses	Nuclear material that is recovered during facility deactivation and transferred to the public or private domains.
SNM/NM/NF Materials for Disposition	SNM/NM/NF materials that are being transfer from storage for disposition. These materials may require further treatment prior to transfer to final disposition.
SNM/NM/NF Recovered from Deactivation	SNM/NM/NF removed from a facility in order to place it in a deactivated state.
SW for Processing	Secondary waste for processing consists of scrap glass (e.g., glass recovered from failed melters), and TRU tank solids scrap, with required characterization information for both. Scrap glass and TRU tank solids scrap can be fed directly back to the immobilization function.
SW from Immobilize & Dispose LLW	This material will consist of processing wastes, typically fluids, and out of specification immobilized and/or recovered immobilized tank wastes requiring additional treatment as a result of pending "leave or retrieve for additional treatment" decisions. This material will consist of any treated waste not meeting acceptance requirements and any material retrieved for further processing.
Safe and Compliant Resources (Type 1)	All necessary resources for safe and compliant operation of type 1 facilities in accordance with governing safety codes and regulations.
Safe and Compliant Resources (Type 2)	All necessary resources for safe and compliant operation of type 2 facilities in accordance with governing safety codes and regulations.
Safe and Compliant Resources (Type 3)	All necessary resources for safe and compliant operation of type 3 facilities in accordance with governing safety codes and regulations.
Safe and Compliant Resources (Type 4)	All necessary resources for safe and compliant operation of type 4 facilities in accordance with governing safety codes and regulations.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Samples of Waste Requiring Additional Characterization	Solid waste that needs additional characterization data before final disposition can be made.
Sanitary Landfill Waste	Waste materials other than those containing radioactive, TRU, hazardous, or sanitary sewage.
Sanitary Sewage	Refuse liquids or waste matter generated on site.
Secondary Wastes And Documentation	The secondary wastes generated from aqueous waste treatment and the associated documentation.
Solid Waste Archive Samples	Solid waste samples retrieved from archival storage for further analysis.
Solid Waste From Other Missions	Solid waste that comes from other DOE missions outside of the Hanford Cleanup Mission.
Solid Waste Generated During Solid Waste Cleanup Operations	Contaminated tools, equipment and materials generated as a direct result of cleanup operations; including used cleaning solvents, rags, stack filters and similar items requiring processing prior to disposal or transfer to a useful function within or outside the Cleanup Hanford mission
Solid Waste Samples	Solid waste samples that were used to analyze the waste inventory that now require archiving.
Solid Waste from Aqueous Waste Processing	Solid waste generated from functions associated with processing aqueous waste.
Solid Waste from DEF	Solid waste generated from removal of hazardous and radioactive inventories and decontamination of excess facilities.
Solid Waste from DGE	Solid waste from DGE includes wastes generated from excess filters, particulates, etc. generated from off-gas stream treatment and disposition.
Solid Waste from DLE	Solid wastes generated by condensate treatment processes. This stream may include ion exchange resins, precipitated sludges, and ammonium sulfate salts from waste neutralization. Failed process equipment and expended support equipment (i.e., HEPA filters) will be included in this stream.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Solid Waste from DRM	Solid waste that requires disposal (not reusable) and is generated as a byproduct from treatment or interim storage of DRM.
Solid Waste from Deactivation	Solid waste materials contaminated with radioactive or hazardous materials resulting from deactivating the facility and from maintaining the facility prior to deactivation and until demolition or transfer.
Solid Waste from Deactivation (Type 1)	Solid waste materials contaminated with radioactive or hazardous materials resulting from deactivating the type 1 facility and from maintaining the facility prior to deactivation and until demolition or transfer.
Solid Waste from Deactivation (Type 2)	Solid waste materials contaminated with radioactive or hazardous materials resulting from deactivating the type 2 facility and from maintaining the facility prior to deactivation and until demolition or transfer.
Solid Waste from Deactivation (Type 3)	Solid waste materials contaminated with radioactive or hazardous materials resulting from deactivating the type 3 facility and from maintaining the facility prior to deactivation and until demolition or transfer.
Solid Waste from ILLW	Solid waste generated from functions associated with immobilization and disposition of low-level tank waste.
Solid Waste from Infrastructure	Solid waste materials contaminated with radioactive or hazardous materials resulting from correcting unsafe or non-compliant conditions or from operation of Hanford Cleanup mission infrastructure systems.
Solid Waste from Remedy/Restore	Solid waste resulting from functions associated with site remediation and restoration.
Solid Waste from SNM/NM/NF Cleanup	Radioactive or hazardous material or solid objects from the cleanup of SNM/NM/NF materials.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Solid Waste from Tank Waste Remediation	Dispositioned solid waste includes all packaged solid waste that meets acceptance criteria of Remediate Solid Waste function. Includes hazardous, mixed and radioactive wastes, minus any scrap glass that is fed back into the IHLW process.
Solid Wastes and Documentation Generated During AW Cleanup	Radioactive or hazardous material or solid objects from the cleanup of Aqueous Wastes.
Stabilized Type 1 Facility	Type 1 facility with initial stabilization or preparation activities involving SNM/NM/NF materials and radioactive waste.
Stabilized Type 2 Facility	Type 2 facility with stabilized radioactive materials.
Stabilized Type 3 Facility	Type 3 facility with stabilized hazardous material.
System Architecture	System design (architecture) is the set of activities which selects the solution concept and formulates a system description suitable for implementing and/or procuring a system (that will achieve the Hanford cleanup mission).
System Functional Definition	An identification of the functions that must be performed to achieve the Hanford cleanup mission.
System Requirements	An identification of the set of activities necessary to determine how well a function must be performed and under what conditions it must be performed.
Tank Waste for Pretreatment	Tank waste to be pretreated. This includes partially pretreated waste and untreated waste.
Tank Waste for Retrieval	Wastes stored in underground storage tanks (DSTs, SSTs, and miscellaneous tanks).
Tank Waste for Sampling	Solid, liquid, and gaseous substances residing within the Store Waste function that have been identified for characterization requiring laboratory or in situ analysis.
Tank Waste from Aqueous Waste Processing	Tank waste materials resulting from processing of aqueous waste containing a high level of hazardous or mixed waste.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Tank Waste from Deactivation	Tank waste materials resulting from deactivation of facilities containing a high level of hazardous or mixed waste.
Tank Waste from Deactivation (Type 1)	Tank waste materials resulting from deactivation of type 1 facilities containing a high level of hazardous or mixed waste.
Tank Waste from Deactivation (Type 2)	Tank waste materials resulting from deactivation of type 2 facilities containing a high level of hazardous or mixed waste.
Tank Waste from Remedy/Restore	Tank waste materials resulting from remediation and restoration of sites containing a high level of hazardous or mixed waste.
Tank Waste from SNM/NM/NF Cleanup	Tank waste resulting from the cleanup of SNM/NM/NF containing a high level of radioactive, hazardous, or mixed waste.
Tank Waste from Solid Waste Cleanup	Tank waste materials resulting from cleanup of solid waste items containing a high level of hazardous or mixed waste.
Transfer Agreement	Transfer Agreements consisting of identification of resources to be used in building the local economy which essentially causes transferrable items to be removed from the "disposal" list to the transfer list.
Transferrable Resources	Any item having a new owner identified.
Transferrable Resources from (Type 1) Deactivation	Equipment, components, or materials from deactivation of Type 1 facilities cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from (Type 2) Deactivation	Equipment, components, or materials from deactivation of Type 2 facilities cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from (Type 3) Deactivation	Equipment, components, or materials from deactivation of Type 3 facilities cleaned up to acceptable levels and having a new owner identified.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Transferrable Resources from (Type 4) Deactivation	Equipment, components, or materials from deactivation of Type 4 facilities cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from Aqueous Waste	Equipment, components, or materials from aqueous waste processing cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from Deactivation	Equipment, components, or materials from deactivation cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from Infrastructure	Equipment, components, or materials resulting from correcting unsafe or non-compliant infrastructure conditions, cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from Remedy/Restore	Equipment, components, or materials resulting from site remediation and restoration cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from SNM/NM/NF Cleanup	Equipment, components, and materials from SNM/NM/NF treatment, storage and disposal cleaned up to acceptable levels and having a new owner or user identified.
Transferrable Resources from Solid Waste	Equipment or components cleaned up to acceptable levels and having a new owner identified.
Transferrable Resources from Tank Waste Remediation	Equipment, components, or materials resulting from tank waste remediation cleaned up to acceptable levels and having a new owner identified.
Transferrable Technology	Technologies that are transferrable for uses outside of the Hanford clean-up mission after modifications/upgrades are completed to make the technology useable outside of the Hanford clean-up mission.

TABLE 2-1 Product Descriptions (Continued)

<i>Product</i>	<i>Description</i>
Transitioned Economy	<p>Resources (e.g., technology, people, expertise) developed and used during cleanup have been leveraged to enhance the economic viability of the regional economy.</p> <p>Cleanup resources will have been expended in a manner to support independence of the local/private sector economy. This can be achieved through development of public/private sector partnerships, transfer of technologies for use elsewhere, etc. Also, expenditure of these resources should, where possible, provide national and international benefit by making technology and expertise broadly available.</p>
Treated Effluent And Documentation	The effluents resulting for aqueous waste treatment along with required effluent data collected during treatment.
Treated Solid Waste	This is solid waste that has been treated so that it meets the disposition requirements and is ready for packaging.
Treatment, Storage, and Disposition	Collection of top level waste related products. (not currently a product)
Untreated Aqueous Waste and Documentation	The waste and documentation which needs no treatment and is passed directly to Disposition Aqueous Waste.

TABLE 2-1 Product Descriptions (Continued)

Product	Description
Waste Concentrate	<p>The concentrated product generated by removal of excess moisture from tank waste using a vacuum evaporator, and returned to the DST's.</p> <p>The Evaporator can produce two products: (1) double-shell slurry (DSS) and (2) DSSF. These products are defined by their relationship to the sodium-aluminate boundary. When this boundary is crossed, aluminate solids (specifically sodium-aluminate crystals) precipitate out of solution and form DSS, the most concentrated product the Evaporator can produce. Although sodium-aluminate crystals represent only a small percentage of the solids in DSS, they greatly increase its viscosity (up to 100 cP) making it more difficult to pump from DSTs once transferred from the Evaporator. Although it has been produced in the past, there currently are no plans to produce DSS. Processing of complexed wastes and phosphate wastes in the Evaporator requires more characterization to identify the end product density, temperature, and boiling point. Typically, these wastes enter the concentrator as dilute feeds and require multiple passes through the Evaporator to achieve the desired product concentration. Phosphate and complexed wastes cannot be concentrated to a DSS product because these wastes have very small or no dissolved aluminates. The DSSF is defined as a slurry with a chemical composition that is below the sodium-aluminate boundary but that could be concentrated past the sodium-aluminate boundary, with a single additional pass through the Evaporator. In contrast to DSS, the viscosity of SDDF typically ranges from 20 to 40 cP. Double-shell slurry feed is the planned product of the Evaporator.</p>
Waste Concentrate for Sampling	<p>Concentrated waste product of the Concentrate Waste function that have been identified for characterization requiring laboratory or in situ analysis as required for process control.</p>

TABLE 2-1 Product Descriptions (Continued)

<i>Product</i>	<i>Description</i>
Waste Concentration Feed for Sampling	Liquid or slurry waste feed to the Concentrate Waste function that have been identified for characterization requiring laboratory or in situ analysis as required for process control.
Waste material (DD)	Decontaminated and demolished retired surplus facilities removed.
Waste material (RA)	Contaminated material generated from excavation of RA sites.
Waste to Storage	Transferable waste, including supernates and interstitial liquids from saltwell pumping, transferred from one storage tank to another to provide additional capacity for new waste entering the Manage Tank Waste function or to mitigate or resolve a safety issue. Also, includes waste externally generated and introduced into the Manage Tank Waste function requiring storage prior to processing or disposal. The concentrate created by the Concentrate Waste function is returned to storage as Waste to Storage as well as In-process wastes returned for the Process Waste function.
Waste/Materials Dispositioned Off-Site	High level, hazardous, and TRU waste or SNM/NM/NF transferred to external entities for disposal or disposition.
Waste/Materials Dispositioned On-Site	Low level waste disposed on the 200 area plateau.

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