10-TPD-166

ATTACHMENT 1

RADIOACTIVE WASTE DETERMINATION PROCESS PLAN FOR WASTE MANAGEMENT AREA C TANK WASTE RESIDUALS
(RPP-PLAN-47325, REVISION 0)

(59 pages, not including cover page)

DOCUMENT RELEASE FORM

(1) Document Number:	RPP-PLAN-47325	(2) Revision Number: 0	(3) Effective Date: 09/21/2010
(4) Document Type:	☐ Digital Image ☐ Hard copy ☒ PDF ☐ Video	(a) Number of pages (including the DRF) or number of digital images	59
(5) Release Type	☒ New ☐ Cancel	☐ Page Change	☐ Complete Revision
(6) Document Title:	Radioactive Waste Determination Process Plan for Waste Management Area C Tank Waste Residuals		
(7) Change/Release Description:	Initial release		
(8) Change Justification:	N/A		

(9) Associated Structure, System, and Component (SSC) and Building Number:	(a) Structure Location: N/A	(c) Building Number: N/A	(e) Project Number: N/A
	(b) System Designator: N/A	(d) Equipment ID Number (EIN): N/A	

(10) Impacted Documents:	(a) Document Type	(b) Document Number	(c) Document Revision
	N/A	N/A	N/A

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(12) Distribution:

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G. J. Johnson	H6-18		
R. W. Lober	H6-60		

Release Stamp

SEP 21 2010
DATE:
STA: 15
HANFORD RELEASE
ID: 65

(13) Clearance	(a) Cleared for Public Release	(b) Restricted Information?	(c) Restriction Type:
	☒ Yes ☐ No	☐ Yes ☒ No	

(14) Clearance Review (Print/Sign): NANCY A FOUAD / Nancy A Fouad — Date: 9-21-10

A-6003-881 (REV 2)

Radioactive Waste Determination Process Plan for Waste Management Area C Tank Waste Residuals

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U.S. Department of Energy Contract DE-AC27-08RV14800

EDT/ECN: UC:
Cost Center: Charge Code:
B&R Code: Total Pages: 59

Key Words: Waste Management Area, WMA, C Farm, 435.1, radioactive waste management, waste incidental to reprocessing, waste determination, M-045-80

Abstract: This plan describes the radioactive waste determination process that the U.S. Department of Energy will use for Hanford Site Waste Management Area C tank waste residuals subject to DOE authority under DOE Order 435.1, Radioactive Waste Management.

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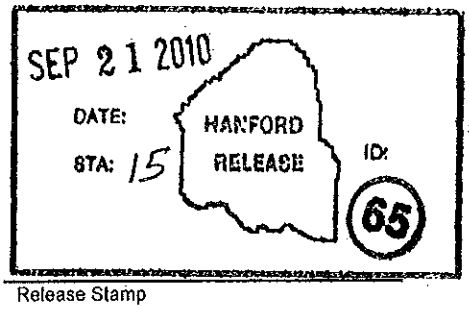

Nancy A Fouad 9-21-10
Release Approval Date

Release Stamp

Approved For Public Release

RPP-PLAN-47325
Revision 0

Radioactive Waste Determination Process Plan for Waste Management Area C Tank Waste Residuals

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Date Published
September 2010

washington river protection solutions

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-08RV14800

ABSTRACT

This plan describes the radioactive waste determination process that the U.S. Department of Energy (DOE) will use for Hanford Site Waste Management Area C (WMA C) tank waste residuals subject to DOE authority under DOE Order 435.1, *Radioactive Waste Management*. Preparation of this plan is a required component of actions the DOE-Office of River Protection (ORP) must take to fulfill proposed *Hanford Federal Facility Agreement and Consent Order* Milestone M-045-80.

Waste Management Area C is comprised of various single-shell tanks, encased and direct-buried pipes, diversion boxes, pump pits, and unplanned release sites (sites contaminated as a result of spills of tank waste to the environment). Since operations began in the late 1940s, the tanks in WMA C have continuously stored waste managed as high-level waste (HLW) that was derived from defense-related nuclear research, development, and weapons production activities. Planning for the final closure of WMA C is underway. This radioactive waste determination process plan assumes that tank closure will follow retrieval of as much tank waste as technically and economically practical. It is also assumed for the purposes of this plan that after completion of WMA C waste retrieval operations, the tanks will be backfilled with grout, and WMA C will be closed on site as a landfill.

Residual WMA C waste remaining after retrieval operations is managed as mixed HLW (mixed radioactive and dangerous waste). Landfill closure of the system must comply with the requirements of both *Washington Administrative Code,* Chapter 173-303, "Dangerous Waste Regulations," and DOE O 435.1. By definition, HLW must be disposed of in a permanent geologic repository. Therefore, WMA C on-site landfill closure would be limited to the disposal of residual waste classified as other than HLW.

Two separate regulatory pathways exist for reaching determinations that waste resulting from the processing of spent nuclear fuel is not HLW. Both of these processes, as well as the public, stakeholder, and regulatory review steps applicable to the classification processes, are described in this process plan. However, only one process is applicable for waste managed at the Hanford Site: the DOE Order 435.1 "waste incidental to reprocessing" (WIR) process. The WIR process must be applied to wastes in WMA C as a precursor to landfill closure.

As currently envisioned, the WIR process that will be applied to WMA C will require the development of basis documents that will demonstrate that the wastes can be safely disposed in place as determined by DOE in consultation with the U.S. Nuclear Regulatory Commission. Public, stakeholder, and regulator involvement will be critical components of the proposed DOE waste determination process.

Please note that the terms "classify" and "classification" are used in this process plan consistent with their common use in the nuclear industry and by the U.S. Nuclear Regulatory Commission, and not in terms of National Security. Both terms are used to connote the action or process of assigning a radioactive waste to a particular radioactive waste category.

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LIST OF TERMS

Abbreviations, Acronyms, and Initialisms

CERCLA	*Comprehensive Environmental Response, Compensation and Liability Act of 1980*
CFR	Code of Federal Regulations
CMS IP	Corrective Measures Study Implementation Plan
DOE	U.S. Department of Energy
FR	Federal Register
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
HLW	High-Level Waste
LLW	Low-Level Waste
LTCC	Lower than Class C
NDAA	*Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (Public Law 108-375)*
NEPA	*National Environmental Policy Act of 1969*
NRC	U.S. Nuclear Regulatory Commission
ORP	Office of River Protection
PA	Performance Assessment
RCRA	*Resource Conservation and Recovery Act of 1976*
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
SEPA	*State Environmental Policy Act*
TC & WM EIS	*Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*
TWRWP	Tank Waste Retrieval Work Plan
USC	U.S. Code
WIR	Waste Incidental to Reprocessing
WMA C	Waste Management Area C

1.0 PURPOSE AND SCOPE

This plan describes the radioactive waste determination process that the U.S. Department of Energy (DOE) will use for Hanford Site Waste Management Area (WMA) C tank waste residuals subject to DOE authority under DOE Order 435.1, *Radioactive Waste Management.* Preparation of this plan is a required component of actions the DOE-Office of River Protection (ORP) must take to fulfill proposed *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989) Milestone M-045-80. The HFFACO is in the process of being revised to modify milestones pertaining to tank waste retrieval and treatment, and the closure of Hanford's single-shell and double-shell tanks. The modifications, including the addition of Milestone M-045-80, are expected to be finalized during calendar year 2010.

Proposed Milestone M-045-80 calls for the completion, by January 31, 2011, of four actions necessary to complete development of a closure demonstration plan for WMA C. One of the four required actions is to complete this waste determination process plan for WMA C. The remaining three actions are being addressed through separate efforts. Proposed Milestone M-045-83 calls for completing closure of WMA C by June 30, 2019.

Waste Management Area C is comprised of various single-shell tanks, encased and direct-buried pipes, diversion boxes, pump pits, and unplanned release sites (sites contaminated as a result of spills of tank waste to the environment). Since operations began in the late 1940s, the tanks in WMA C have continuously stored waste managed as high-level waste (HLW) that was derived from defense-related nuclear research, development, and weapons production activities. Hanford's mission is now focused on the cleanup and ultimate closure of Hanford. Retrieval of waste from the WMA C tanks is underway, as is planning for the closure of WMA C.

In keeping with HFFACO Milestone M-045-00, this document assumes that tank closure will follow retrieval of as much tank waste as technically and economically practical, with tank waste residues not to exceed 360 ft^3 in each of the 100-series tanks, 30 ft^3 in each of the 200-series tanks, or the limit of waste retrieval technology capability, whichever is less. The final closure disposition alternatives for WMA C are being evaluated under the *National Environmental Policy Act of 1969* (NEPA), as amended. It is anticipated that once the NEPA process is concluded, final tank closure decisions will be made. However, it is assumed for the purposes of this document that after completion of WMA C waste retrieval operations, the tanks will be backfilled with grout, and WMA C will be closed on site as a landfill.

Residual WMA C waste remaining after retrieval operations is managed as mixed HLW (mixed radioactive and dangerous waste). Landfill closure of the system must comply with the requirements of both *Washington Administrative Code*, Chapter 173-303, "Dangerous Waste Regulations," and DOE O 435.1. By definition, HLW must be disposed of in a permanent geologic repository. Therefore, WMA C on-site landfill closure would be limited to the disposal of residual waste classified as other than HLW. This document describes the processes that have been established for classifying waste as other than HLW and identifies the specific path forward that will be taken to classify residual waste in WMA C as a precursor to implementing landfill closure.

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2.0 BACKGROUND

This section provides a basic description of WMA C; information about rules, regulations, and documents relevant to the disposal of radioactive waste in WMA C; and descriptions of the DOE processes for classifying radioactive waste.

2.1 WASTE MANAGEMENT AREA C

Waste Management Area C is located in the Hanford Site 200 East Area (Figures 1 and 2). Waste Management Area C encompasses 241-C Tank Farm, including soil that has been contaminated by C Farm operations. Initial construction work at C Farm was undertaken in 1944, and operations began in 1946. A review of the documents relevant to WMA C process history, waste inventory, vadose zone studies, and groundwater studies is presented in RPP-RPT-38152, *Data Quality Objectives Report Phase 2 Characterization for Waste Management Area C RCRA Field Investigation/Corrective Measures Study.*

Waste Management Area C consists of the following components:

- twelve 100-series single-shell tanks, each with a 1,892,700-L (535,000-gal) operating capacity
- four 200-series single-shell tanks, each with a 208,000-L (55,000-gal) operating capacity
- waste transfer pipelines
- tank ancillary equipment, including 7 diversion boxes, 3 valve boxes and 1 valve pit, the 241-C-301 catch tank, the 244-CR Vault (including 4 additional tanks), and other related structures
- multiple drywells around each 100-series single-shell tank used as leak detection systems
- associated unplanned releases to the soil.

A detailed listing of the WMA C components is provided as Table 2-6 in RPP-PLAN-39114, *Phase 2 RCRA Facility Investigation/Corrective Measures Study Work Plan for Waste Management Area C.* While most WMA C components are physically located within the C Farm fenceline, some components extend beyond the fenceline (e.g., pipelines). The types of components and ancillary equipment found in WMA C are typical of many of Hanford's tank farms.

Starting in 1946, the tanks in WMA C received waste from the bismuth-phosphate fuels separations process, including first cycle decontamination waste (which is HLW by definition) and cladding removal waste. In later years, a wide variety of wastes resulting from numerous and varied plant operations were added to and removed from the C Farm tanks. Waste remaining in the tanks is managed as HLW.

Figure 1. Location of Waste Management Area C at the Hanford Site 200 East Area

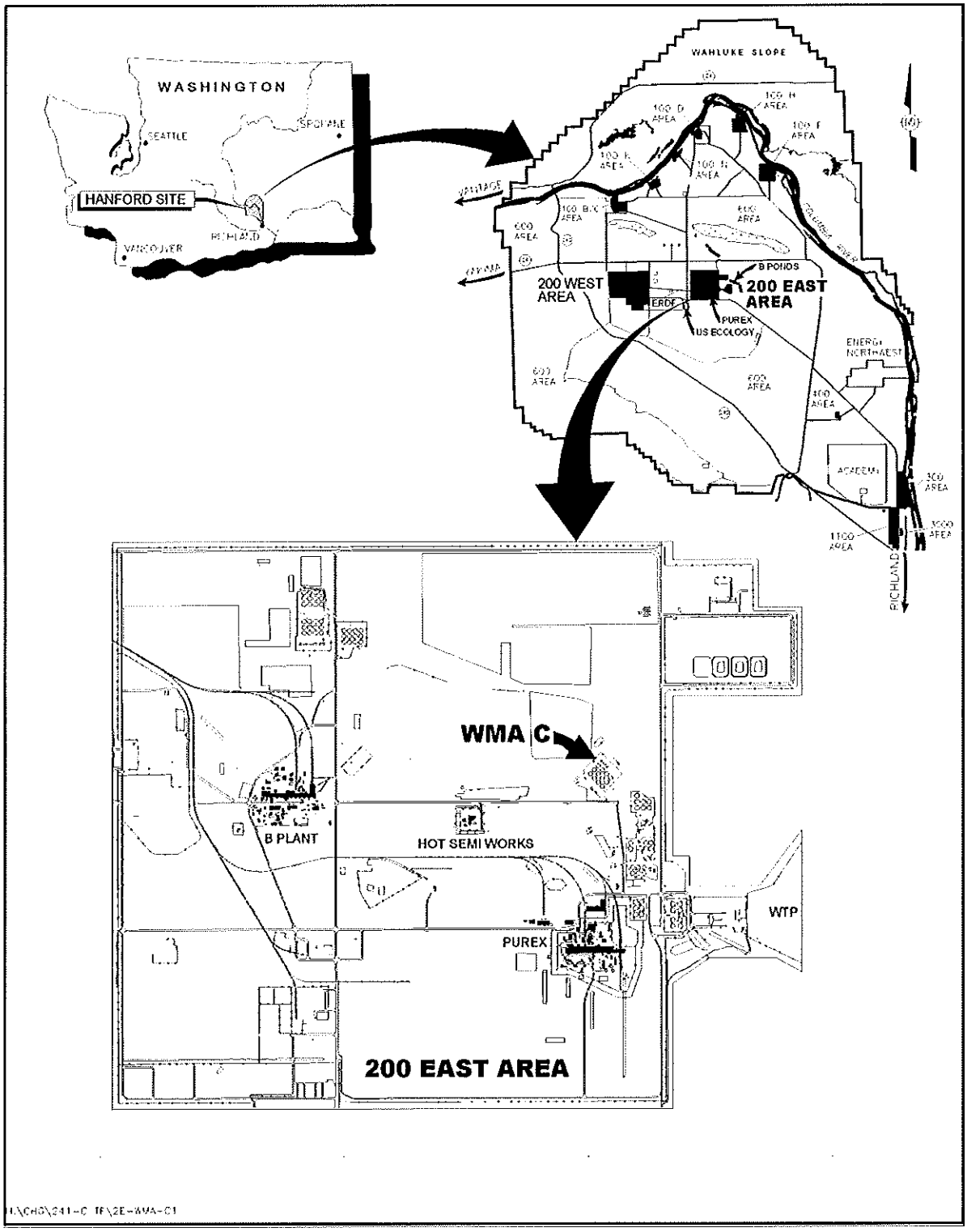
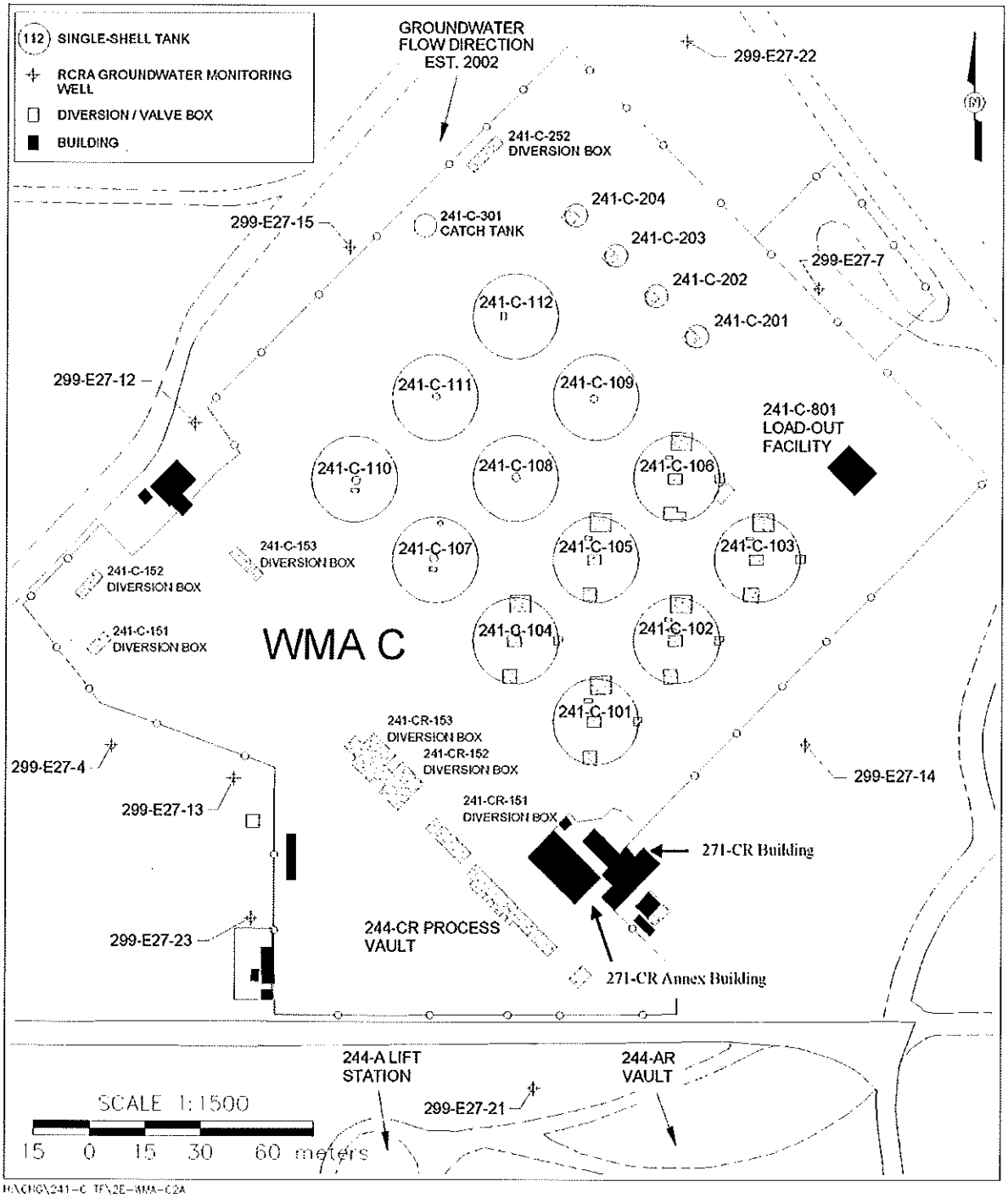


Figure 2. Detail of Waste Management Area C Location



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2.2 ATOMIC ENERGY ACT OF 1954

The *Atomic Energy Act of 1954*, as amended, establishes DOE as the governing body responsible for the development and production of nuclear weapons, promotion of nuclear power, and other energy-related work. The *Energy Reorganization Act of 1974* amended the *Atomic Energy Act* to establish the Nuclear Regulatory Commission (NRC) and assigned to it regulatory responsibilities for the development and safety regulation of the civilian uses of nuclear materials. The NRC regulatory authority over DOE actions is limited to DOE activities relating to the permanent storage of HLW.

2.3 NUCLEAR WASTE POLICY ACT OF 1982

The *Nuclear Waste Policy Act of 1982* establishes procedures for the evaluation, selection, and approval of deep geologic repositories for safe storage and/or disposal of HLW and spent nuclear fuel.

This Act provides for extensive State, Tribal, and public participation opportunities during HLW repository characterization, siting, and approval processes. If characterization of a candidate repository site indicates the site is suitable for use as a repository, Section 116 of the *Nuclear Waste Policy Act* allows that the Governor or legislature of the State in which such site is located, Tribal entities, and others may disapprove the site designation and submit to Congress a notice of disapproval. Any such notice is subject to Congressional review and action as specified in Section 115 of the Act.

If a candidate repository site is approved by Congress, the site is subject to NRC licensing action. Section 9 of the Act states that any repository for the disposal of high-level radioactive waste resulting from atomic energy defense activities only shall (A) be subject to licensing under Section 202 of the *Energy Reorganization Act of 1974*; and (B) comply with all requirements of the NRC for the siting, development, construction, and operation of a repository.

2.4 RADIOACTIVE WASTE CLASSIFICATION PROCESSES

Existing laws, regulations, and DOE Orders divide radioactive waste into three general categories, based on the radioactive content of the waste and the process history associated with the waste. These categories are HLW, transuranic waste, and low-level waste (LLW). Generally speaking, HLW is the highly radioactive material that results from the reprocessing of spent nuclear fuel. However, waste resulting from spent fuel reprocessing that is determined to be incidental to reprocessing is *not* HLW, and shall be managed as either transuranic waste or LLW. Spent fuel reprocessing waste that is determined not to be HLW is called waste incidental to reprocessing (WIR), and the process used to make such a determination is called the WIR process.

There are two basic frameworks for classifying waste as WIR: one provided in DOE O 435.1, and the other provided by Section 3116 of the *Ronald W. Reagan National Defense*

Authorization Act for Fiscal Year 2005 (NDAA).[1] Under both frameworks, similar technical evaluations and assessment of risks must be used to reach waste classification decisions. However, the frameworks differ markedly in the level of oversight and public involvement required during the classification process and implementation of subsequent waste management actions.

2.4.1 Waste Classification Under DOE O 435.1

In 1999, DOE issued DOE O 435.1. Pursuant to the authority granted under the *Atomic Energy Act of 1954*, as amended, DOE regulates radioactive waste under DOE O 435.1 and the associated implementing manual and guidance documents. In accordance with these documents, all radioactive waste subject to DOE O 435.1 must be categorized as HLW, transuranic waste, or LLW.

2.4.1.1 Radioactive Waste Types. The DOE M 435.1-1, *Radioactive Waste Management Manual*, Chapter II, defines HLW as the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation. The fission product-bearing waste streams managed in WMA C are managed as HLW.

The DOE O 435.1 implementing documents clarify that the HLW designation is potentially applicable not only to the waste resulting from the reprocessing of spent nuclear fuel, but also to equipment and components contaminated by such waste. Equipment specifically discussed in DOE O 435.1 implementing documents includes HLW tanks and ancillary equipment such as piping and catch tanks contaminated with HLW. The DOE O 435.1 is silent regarding the applicability of the Order to environmental media contaminated with HLW (e.g., soil contaminated with spilled tank waste).

The DOE M 435.1-1, Chapter III, defines transuranic waste as follows: radioactive waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for

- HLW;
- waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by the Title 40, *Code of Federal Regulations* (CFR), Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes" disposal regulations;

[1] A third framework, described in the *West Valley Demonstration Project Act of 1980* and associated policies, is applicable at only the DOE West Valley Demonstration Project site in New York State and is not addressed further in this document.

- waste that the NRC has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste."

The DOE M 435.1-1, Chapter IV, defines low-level radioactive waste as follows: Radioactive waste that is not HLW, spent nuclear fuel, transuranic waste, byproduct material (as defined in section 11e.(2) of the *Atomic Energy Act of 1954*, as amended), or naturally occurring radioactive material.

2.4.1.2 Waste Incidental to Reprocessing. In accordance with authority granted under the *Atomic Energy Act of 1954*, DOE has established the WIR process for classifying certain spent fuel reprocessing waste streams as other than HLW. Such radioactive waste streams must be managed as either transuranic waste or LLW and do not require permanent isolation upon disposal.

The WIR determination process is described in Chapter II of DOE M 435.1-1. When DOE O 435.1 is used to determine whether spent nuclear fuel reprocessing plant waste is to be managed as another waste type or as HLW, DOE uses either the WIR citation process or the WIR evaluation process.

2.4.1.2.1 Waste Incidental to Reprocessing Citation Process. Waste incidental to reprocessing by citation includes some of the waste types that meet the description included in 34 FR 8712, "Notice of Proposed Rulemaking" for proposed Appendix D, 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," Paragraphs 6 and 7. Such wastes were not produced during spent nuclear fuel reprocessing, are not highly radioactive, do not contain fission products in sufficient concentrations to require permanent isolation, or are only casually (not directly) associated with spent fuel reprocessing waste. Such wastes include material that became incidentally contaminated by reprocessing wastes (e.g., laboratory items like clothing, tools, and lab equipment). Use of the WIR citation process, as opposed to the WIR evaluation process, for classification of residual waste in WMA C equipment, or of the tanks and equipment in which residuals reside, is not appropriate. However, the WIR citation process is used for other tank waste-contaminated waste streams at Hanford.

2.4.1.2.2 Waste Incidental to Reprocessing Evaluation Process. Determination that any waste is incidental to reprocessing by the evaluation process requires that both the affected DOE field office and DOE Headquarters complete an in-depth evaluation of the characteristics and proposed management of the residual waste, and determine that the waste can be safely managed as either LLW or transuranic waste. Such wastes may include, but are not limited to, spent nuclear fuel reprocessing wastes that:

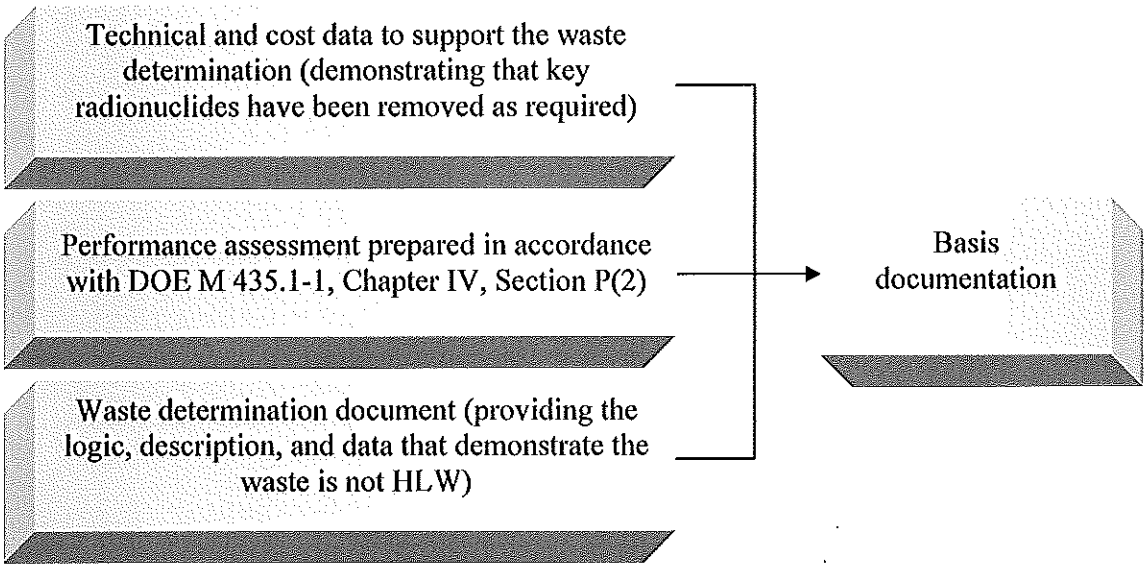
a) Will be managed as LLW and meet the following criteria:
   1. Have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical; and
   2. Will be managed to meet safety requirements comparable to the performance objectives set out in 10 CFR 61, Subpart C, "Performance Objectives;" and
   3. Are to be managed, pursuant to DOE's authority under the *Atomic Energy Act of 1954*, as amended, and in accordance with the provisions of Chapter IV of the

DOE O 435.1 implementation manual, provided the waste will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C LLW as set out in 10 CFR 61.55, "Waste Classification;" or will meet alternative requirements for waste classification and characterization as DOE may authorize.

b) Will be managed as transuranic waste and meet the following citeria:
   1. Have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical; and
   2. Will be incorporated in a solid physical form and meet alternative requirements for waste classification and characteristics, as DOE may authorize; and
   3. Are managed pursuant to DOE's authority under the *Atomic Energy Act of 1954*, as amended, in accordance with the provisions of Chapter III of the DOE O 435.1 implementation manual, as appropriate.

The basis for a waste determination (Figure 3) must be prepared to document how a waste stream that is under consideration for classification as WIR meets the applicable classification criteria noted above.

Figure 3. Waste Incidental to Reprocessing Determination Basis Documentation



As described in Chapter II of DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1*, use of the WIR evaluation process is appropriate for classifying residual radioactive tank wastes whose removal is not considered to be technically and economically achievable, and for HLW-contaminated equipment/components whose disposal can be demonstrated not to jeopardize health and safety. A process similar to the DOE O 435.1 WIR evaluation process has been used successfully to support the incidental waste classification of the low-activity fraction of Hanford tank waste that is to be immobilized and disposed on site.

2.4.1.2.3 Authorities. DOE O 435.1 allows that determinations using the citation or evaluation process may be performed by DOE pursuant to its authority under the *Atomic Energy Act of 1954*, as amended. There are no provisions in the Order requiring that DOE seek Congressional, State, Tribal, or public involvement in such determinations. Additionally, the implementing documents for the Order indicate that formal involvement by NRC in making incidental waste determinations (and in overseeing subsequent disposal of waste determined not to be HLW) is not required. However, the implementing documents also state that NRC involvement as a consultant on technical issues (and in particular in the development of the performance assessment) is recommended and strongly encouraged. The implementing documents also acknowledge NRC licensing authority over DOE facilities authorized for the long-term storage of DOE HLW.

2.4.2 Waste Classification Under Section 3116

Subsequent to the issuance of DOE O 435.1, use of the WIR evaluation process delineated in the Order was legally challenged by the Natural Resources Defense Council in the U.S. District Court in Idaho. At issue was whether application of the DOE O 435.1 process exceeded DOE's legal authority. In 2003, the Idaho District Court decided that DOE did not have authority to classify tank waste as other than high-level, or to dispose of it permanently on site through grouting or other means (NRDC v. Abraham, 271 F. Supp.2d 1260, 1266). The DOE appealed the 2003 ruling, and in 2004, the U.S. Court of Appeals for the Ninth Circuit ruled that the challenge to DOE O 435.1 was not "ripe" for review[2] (NRDC v. Abraham, 388 F. 3d 701) because DOE had only *planned* to implement DOE O 435.1 to grout tanks at the Savannah River Site, but had not yet done so. Thus, the court determined that DOE had not violated the *Nuclear Waste Policy Act* because it had not yet taken action.

In 2004, to address the need to move forward with waste classification and tank closure actions at DOE's Idaho National Laboratory and the Savannah River Site, Congress incorporated language into the annual Defense spending bill (the NDAA) that specifically addressed the radioactive waste classification process. This language provides a statutory basis for using an evaluation process to classify waste as incidental to reprocessing.[3] Section 3116 of the NDAA provides that certain waste from reprocessing spent nuclear fuel is not considered HLW if the Secretary of Energy, in consultation with the NRC, determines that the waste meets the statutory criteria set forth in Section 3116(a) of the Act.

Section 3116(a) generally reflects the waste classification requirements in DOE O 435.1, but adds requirements for NRC consultation on waste classification decisions, and both NRC and State involvement in subsequent waste disposal decisions and processes. Specifically, Section 3116(a) requires that disposal of waste classified as WIR must be conducted pursuant to a State-approved closure plan or State-issued permit (regulating the non-radioactive, hazardous portion of the waste), and in some cases, that the Secretary of Energy develop closure plans required by DOE O 435.1 in consultation with the NRC. The Law also calls for the perpetual monitoring of affected disposal actions by the NRC and requires that if NRC considers that the

[2] For a case to be ripe, there must be present "injury" (i.e., damage or violation) or significant threat of imminent injury.

[3] The statutory language does not affect use of the WIR citation process.

disposal actions are not compliant with the requirements of Section 3116(a), NRC must inform the DOE, the covered State, and Congress. Notably, Section 3116 also contains specific provisions regarding judicial review of waste determinations made by the Secretary of Energy. Appendix A contains the text of Section 3116.

It is critical to note that Section 3116 specifically limits DOE's use of the Section 3116 processes to waste that is to be disposed of in the States of South Carolina and Idaho, only. The process has been successfully used to classify residual tank waste and tank system components in the State of Idaho in support of a final closure action (Appendix B). South Carolina is actively pursuing approval to classify tank waste residuals as WIR pursuant to Section 3116 (Appendix C). Section 3116 is not applicable to waste in Washington State.

2.4.3 Subsequent U.S. Department of Energy Guidance

In 2006, DOE issued a *Program Execution Plan For Making Determinations that Certain Wastes from Spent Nuclear Fuel Reprocessing are not High-Level Waste* (DOE 2006). This Plan addresses use of the DOE O 435.1 WIR evaluation process for Hanford tank waste residuals. The Plan clarifies that a waste determination document should provide legally defensible technical information in support of the waste categorization, as well as information for stakeholders, State regulators, and the public that "provides a transparent implementation process." The Plan specifically calls for involving the DOE General Counsel in the DOE WIR determination review process. It also requires preparation of Federal Register notices to obtain public review of draft waste determinations and to announce the availability of the subsequently prepared public comment response document. Finally, Section 3.5 of the Plan also appears to encourage that WIR evaluation process determinations prepared under DOE O 435.1 be provided to NRC for review and evaluation and that waste determination decisions be formally communicated to Congressional and local government officials using a process similar to that required under Section 3116 of the NDAA.

Pursuant to the 2006 DOE Program Execution Plan, DOE ORP issued procedure ESQ-EM-IP-M435.1-1-01, "Waste Incidental to Reprocessing (WIR) Determinations," to provide guidance and establish minimum requirements for preparing and approving WIR determinations involving Hanford tank waste. This procedure addresses both the WIR citation process and the WIR evaluation process. The procedure also states that residual tank waste, contaminated tanks/facilities, and associated components may be stabilized and disposed in place if the residual waste is determined to be LLW pursuant to the DOE M 435.1-1 evaluation process.

Under the DOE ORP procedure, wastes that may be classified using the WIR citation process are secondary wastes that did not originate during (at the time of) reprocessing of spent nuclear fuel. Specific waste streams documented in the procedure as having already been approved for classification by the citation process as other than HLW include the following:

- solid wastes (such as conveyance piping, equipment, and construction materials) that were wetted by and contaminated with HLW, but which are removed, drained, rinsed, surveyed, and packaged for disposal in accordance with DOE-approved procedures, and

- soil or debris indirectly or directly contaminated by tank waste due to spills, leakage, and/or subsequent radionuclide migration AND which do not exceed Class C fission product concentrations on a bulk basis.

For spent fuel reprocessing waste to be classified and managed as LLW under the DOE ORP procedure WIR evaluation process, all three criteria of the DOE M 435.1-1 evaluation process identified in Section 2.4.1.2.2.a) of this document must be met. The DOE ORP procedure provides clarification and guidance about the documentation that must be submitted to demonstrate that the criteria will be met. The documents required to determine that residual waste is LLW include technical and cost data to support the waste determination, the performance assessment, and the waste determination itself – the document that provides, in a clear and transparent manner, the logic, description, and data required to make the determination.

If the first two WIR classification criteria can be met, but use of an alternate concentration limit must be used to meet the third criterion (which requires that the final waste form not contain greater than Class C concentrations), the DOE ORP procedure requires that NRC consultation and public comment be obtained on the waste determination documents.

2.4.4 Comparison of Waste Classification Processes

Both frameworks for classifying radioactive waste using an evaluative process (the DOE O 435.1 WIR evaluation process and NDAA Section 3116), require detailed evaluation of waste conditions against similar criteria, as well as extensive review of those evaluations, before a waste may be classified as WIR. Both frameworks require that action be taken to remove the bulk of the high risk radionuclides from the waste before disposal, and both require the development of detailed closure plans and assessments of potential long-term impacts of the closed system on human health and the environment. As noted previously, however, the frameworks differ markedly in the level of NRC oversight and public involvement required during the classification process and implementation of subsequent waste management actions.

Section 3116 of the NDAA includes a number of provisions for review and consultation not included in DOE O 435.1. However, application of the DOE O 435.1 process at Hanford must also reflect the requirements of DOE ORP procedure ESQ-EM-IP-M435.1-01, Rev. 0, which adds certain requirements to the basic WIR evaluation process in DOE O 435.1. Tables 1 and 2 summarize the key differences between the processes.

The DOE ORP procedure guiding application of the DOE O 435.1 WIR evaluation process at Hanford modifies the WIR process to effectively mirror the requirements of NDAA Section 3116. Such modification is in keeping with informal direction from the Secretary of Energy to implement a DOE O 435.1 WIR evaluation process that meets the requirements of NDAA 3116. In practice, the clear expectation of DOE is that State involvement and NRC consultation will be components of the DOE O 435.1 WIR evaluation process at Hanford. From a technical standpoint, implementation of the process pursuant to the DOE ORP procedure should provide equivalency to the requirements of NDAA Section 3116.

Table 1. Key Differences Between Waste Classification Authorities

Area of Difference	NDAA Section 3116	DOE O 435.1 WIR evaluation process	DOE O 435.1 WIR evaluation process as modified by DOE ORP procedure
DOE Authority	Federal Law (NDAA)	DOE Order, based on authority granted by *Atomic Energy Act of 1954*	DOE Order, based on authority granted by *Atomic Energy Act of 1954*
State Role	Disposal must be conducted pursuant to a State-approved closure plan or State-issued permit. State coordinates with NRC on disposal monitoring. Not applicable to waste transported out of South Carolina and Idaho; not applicable in Washington.	No involvement required in waste determination decisions. Involvement in disposal actions is as defined in applicable state regulations (e.g., closure plan for dangerous waste landfill) and/or Federal facility agreement.	State and public involvement in waste classification determinations are recommended but are required only if alternate concentration limit must be used to meet 3rd criterion (i.e., if concentrations are not LTCC). State and public involvement in disposal action would occur with processing of required State closure plans/permits and NEPA/SEPA documents. State monitors using information generated through State-approved closure plan and permit.
NRC Role	Requires consultation on waste determinations, as well as disposal monitoring in perpetuity.	NRC consultation on waste determinations is strongly encouraged.	NRC consultation is recommended, but is required only if alternate concentration limit must be used to meet 3rd criterion (i.e., if concentrations are not LTCC). For determinations made prior to completion of waste retrieval, NRC monitors using PAs updated as retrieval actions are completed.
Congressional Role	Congress is notified if NRC monitoring indicates disposal action is not in compliance with performance objectives.	No direct involvement required.	No direct involvement required.

DOE = U.S. Department of Energy
NDAA = *Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005*, Public Law 108-375
NEPA = *National Environmental Policy Act of 1969*, 42 USC 4321, et seq.
NRC = U.S. Nuclear Regulatory Commission
PA = Performance Assessment
WIR = waste incidental to reprocessing
LTCC = lower than Class C
ORP = Office of River Protection
SEPA = *Revised Code of Washington* 43.21C, "State Environmental Policy Act"

References:

Atomic Energy Act of 1954, 42 USC 2011, et seq.
DOE O 435.1, 1999, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

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Table 2. Key Differences Between Waste Classification Technical Criteria Applicable to On-Site Disposal

Area of Difference	NDAA Section 3116	DOE O 435.1 WIR evaluation process	DOE O 435.1 WIR evaluation process as modified by DOE ORP procedure
Requirement for Source Removal	Remove highly radioactive radionuclides to the maximum extent practical.	Remove key radionuclides to the maximum extent that is technically and economically practical.	Remove key radionuclides to the maximum extent that is technically and economically practical.
Requirements related to concentration limits	Determine waste does not exceed Class C LLW limits and will be disposed of in compliance with 10 CFR 61, Subpart C OR Determine waste exceeds Class C LLW limits but will be disposed of in compliance with 10 CFR 61, Subpart C AND pursuant to plans developed by the Secretary of Energy in consultation with the NRC.	Manage waste pursuant to DOE M 435.1-1 LLW requirements Incorporate waste into solid physical form such that concentrations do not exceed Class C LLW levels OR meet alternative requirements as authorized by DOE Manage waste to meet safety requirements comparable to performance objectives of 10 CFR 61, Subpart C	Manage waste pursuant to DOE M 435.1-1 LLW requirements Incorporate waste into solid physical form such that concentrations do not exceed Class C LLW levels OR meet alternative requirements as authorized by DOE in consultation with NRC Manage waste to meet safety requirements comparable to performance objectives of 10 CFR 61, Subpart C

DOE = U.S. Department of Energy
LLW = low-level waste
NDAA = *Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005*, Public Law 108-375
NRC = U.S. Nuclear Regulatory Commission
ORP = Office of River Protection
WIR = waste incidental to reprocessing

References:
10 CFR 61, Subpart C, "Performance Objectives," *Code of Federal Regulations*, as amended.
DOE M 435.1-1, 1999, *Radioactive Waste Management Manual*, U.S. Department of Energy, Washington, D.C.
DOE O 435.1, 1999, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

2.5 RELATIONSHIP TO ENVIRONMENTAL IMPACT STATEMENT

The implementing documents for DOE O 435.1 and subsequent DOE guidance documents specify that WIR evaluation process determinations resulting in the disposal of WIR are not to be finalized until completion of appropriate evaluations under NEPA. This direction is intended to prevent undue influence on the outcome of the required NEPA analyses of waste disposition alternatives. Programmatic closure requirements for Hanford Site tank farms, including WMA C, are evaluated in DOE/EIS-0391, *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (TC & WM EIS).

In this draft TC & WM EIS, DOE proposes to retrieve and treat waste from the Hanford Site single-shell tanks and ancillary equipment, and dispose of the treated waste in accordance with applicable regulatory requirements. Tank closure alternatives evaluated in the TC & WM EIS range from retrieval of 90% by volume of the contained waste and landfill closure of the system

components, to complete removal of all residuals and components for ultimate disposal elsewhere. The TC & WM EIS is undergoing public review during 2010.

As noted in NRC staff recommendation, internal letter SECY-97-083, "Classification of Hanford Low-Activity Tank Waste Fraction as Incidental," "the bulk of [Hanford's] tank waste could theoretically be classified as HLW because the waste in the tanks is a mixture from various sources, including reprocessing." Hanford tank waste residues and system components are being managed as HLW. Implementation of any of the tank closure alternatives that would dispose of tank residues and system components in place would require classification of the waste as other than HLW, including development of a performance assessment that demonstrates that the residues and system components can be safely disposed in situ.

The TC & WM EIS contains a performance assessment documenting the modeled long-term impacts associated with the disposal of radioactive wastes at Hanford. Modeled scenarios include the assumed landfill closure of WMA C and other Hanford tank farms. This body of work constitutes a composite analysis of the potential long-term impacts of multiple radioactively contaminated sources on human health and the environment. Potential impacts of various WMA C closure scenarios are included as a component of the composite analysis. A more detailed, WMA C-specific performance assessment also must be prepared to support the WMA C waste determination and closure action. Initial efforts to prepare a performance assessment specific to WMA C are underway as a separate effort from the TC & WM EIS process. The results of both the EIS composite analysis and WMA C performance assessment will be used in the waste determination effort that will be undertaken for WMA C tank residues and system components currently managed as HLW.

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3.0 WASTE CLASSIFICATION AT WASTE MANAGEMENT AREA C

As noted earlier in this document, Hanford Site tank residues and contaminated system components, such as those at WMA C, are managed as HLW. For the purposes of this plan, the assumed closure scenario for WMA C is retrieval of the bulk of the tank waste, stabilization of the remaining residue and tank components, and closure of the system on site as a landfill. Implementation of this closure scenario will require classification of the waste residue and contaminated components as WIR subject to LLW management requirements. Soils contaminated with tank waste have already been classified as LLW by DOE ORP, using the WIR citation process, as documented in procedure ESQ-EM-IP-M435.1-1-01, Rev. 0.

Under the current regulatory structure, DOE cannot use NDAA Section 3116 processes to classify Hanford Site tank waste currently managed as HLW, because the NDAA is not applicable in the State of Washington. Classification of residual Hanford tank waste remaining after conclusion of retrieval operations, as well as the tanks and ancillary equipment/components contaminated by such waste, must be performed using the DOE O 435.1 WIR evaluation process, as modified by supplemental DOE guidance applicable at Hanford. The process described in this document would be applicable not only to WMA C, but also to other Hanford Site HLW tank farms that might be closed in place.

3.1 SCOPING THE WASTE DETERMINATION

Depending on the site, wastes subject to a waste determination may consist of wastes from tanks, piping, valve boxes, and ancillary equipment, may include tank waste residuals, and may include the tanks, valve boxes and equipment themselves. Chapters I and II of DOE G 435.1-1 recommend that groups of waste streams or waste items that have similar characteristics be grouped within one evaluation process analysis. Preparation/submittal of analyses for individual waste streams/items is specifically discouraged by both DOE and NRC as a means to limit the number of determinations that need to be processed and to promote the wisest use of resources.

The 2006 DOE Program Execution Plan contains guidance on how to scope waste determinations and the basis documents that support the determinations. The following scoping considerations are provided in Appendix D of the Program Execution Plan.

- Tank wastes to be disposed of onsite generally should be addressed in consolidated waste determinations, with a limited number of waste determinations per site.
- Groupings of tank wastes should be consistent with Federal Facility Agreements.
- Groupings of tank wastes should be consistent with operational and logistical plans for waste retrieval and closure.
- The grouping approach should be compatible with technical factors (e.g., geographic, hydrologic, and geologic regimes) that are important to meeting the waste determination criteria.

- Ancillary equipment, pipelines, evaporators and other components that require waste determinations should be integrated into one or more planned groupings to the extent that doing so is logical and defensible.

- Groupings of tank wastes for waste determinations should not segment the demonstration that the performance objectives in 10 CFR 61.41, "Protection of the General Population from Releases of Radioactivity" can be met for groups of tank wastes contributing to the same groundwater transport path.

- Groupings of tank wastes should be consistent with applicable existing or ongoing NEPA analyses and Records of Decisions.

- Waste Determinations may be made before or after waste retrieval. For waste determinations that are based in limited part on projections made before retrieval, there must be a reasonable, logical, and defensible technical and regulatory basis for establishing final waste inventories and demonstrating that the waste determination criteria are met.

The 2006 Program Execution Plan presumes that at Hanford, initial waste determinations would be prepared for one to four single-shell tanks and would be used to establish templates for subsequent waste determinations, presumably of broader scope. As waste retrieval operations proceed at WMA C, DOE ORP is developing records for individual tanks that document the retrieval technologies used, quantify residual wastes, and evaluate residuals against performance criteria to demonstrate that HFFACO retrieval requirements have been met (e.g., RPP-RPT-35112, *Retrieval Data Report for Single-Shell Tank 241-S-112* and RPP-20658, *Basis for Exception to the Hanford Federal Facility Agreement and Consent Order Waste Retrieval Criteria for Single-Shell Tank 241-C-106*). However, in keeping with the considerations provided in the Program Execution Plan, for WMA C DOE ORP anticipates development of a single package of evaluation process waste determination documentation that addresses the whole of WMA C. This grouping is consistent with the closure planning language in the HFFACO, 08-5085-FVS, *Proposed Consent Decree between the U.S. Department of Energy and the State of Washington*, the TC & WM EIS, and other documentation, as well as with operational and logistical plans for waste retrieval and closure. It is likely that the initial waste determination documentation for WMA C will be prepared before completion of retrieval actions. Thus, the documentation is likely to contain a mixture of actual retrieval data for some of the tanks, and estimates of what is expected to be retrieved for other tanks. As retrieval operations proceed to conclusion, the waste determination documentation will be revised and reviewed as necessary to ensure that the basis for the final waste determination is sound.

3.2 DEVELOPMENT OF THE DOCUMENTATION

To complete the process of classifying tank waste to be managed as LLW using the WIR evaluation process, DOE must demonstrate that the remaining wastes will meet the criteria cited in Section 2.4.1.2(a) of this plan and summarized in Table 3. Information required to

demonstrate that these criteria will be met must be prepared in accordance with the requirements of DOE ORP procedure ESQ-EM-IP-M435.1-1-01. See Table 3.

Table 3. Information Required to Meet Waste Incidental to Reprocessing Evaluation Process Criteria

DOE M 435.1-1 WIR Evaluation Process Criterion	Information required under "WIR Determinations" (ESQ-EM-IP-M435.1-1-01)
Criterion 1: Process waste to remove key radionuclides to the maximum extent technically and economically practical.	Document ongoing waste retrieval actions to demonstrate meeting this criterion, taking care to provide specific analysis of removal of key radionuclides. Document radioactive material removal effectiveness and efficiency, programmatic and technical risk, possible constraints due to physical or chemical incompatibility, and potential impacts to the public, workers, and environment.
Criterion 2: Manage waste to meet requirements comparable to the performance objectives of 10 CFR 61, Subpart C.	Develop performance assessment consistent with requirements of DOE M 435.1-1, Chapter IV and include summary information in the Waste Determination basis document. Include planned methods for waste stabilization, tank backfill, and intrusion barriers. Waste Determination basis document must also address requirements of 10 CFR 61.43 and 61.44.
Criterion 3: Manage waste in accordance with DOE M 435.1-1 Chapter IV. Incorporate waste into solid physical form at a concentration not exceeding limits for Class C LLW (or meet alternative requirements as authorized by DOE).	Document waste stabilization method to be used, recording rationale for concentration averaging. Document calculations demonstrating radionuclide concentrations will not be greater than Class C limits **OR** demonstrate, in consultation with NRC, that the disposal system will provide appropriate measure of protectiveness.

DOE = U.S. Department of Energy LLW = low-level waste WIR = waste incidental to reprocessing

References:

10 CFR 61, Subpart C, "Performance Objectives," *Code of Federal Regulations*, as amended.
10 CFR 61.43, "Protection of Individuals During Operations," *Code of Federal Regulations*, as amended.
10 CFR 61.44, "Stability of the Disposal Site After Closure," *Code of Federal Regulations*, as amended.
Atomic Energy Act of 1954, 42 USC 2011, et seq.
DOE M 435.1-1, 1999, *Radioactive Waste Management Manual*, U.S. Department of Energy, Washington, D.C.
DOE O 435.1, 1999, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.
ESQ-EM-IP-M435.1-1-01, 2008, *Waste Incidental to Reprocessing (WIR) Determinations*, Rev. 0, U.S. Department of Energy, Office of River Protection, Richland, Washington.

3.2.1 Criterion 1

In essence, Criterion 1 requires that every reasonable effort be made to remove radioactive material from the waste tank system (the tanks and ancillary equipment/components) before initiating final closure of the WMA C system. Critical to meeting this criterion will be the successful implementation of ongoing waste retrieval/removal operations in the tanks and other system components being undertaken to fulfill HFFACO commitments, and completion of necessary facility decontamination and decommissioning actions. Successful completion of these actions is expected to fulfill requirements for both classification of residuals and equipment/components as WIR, and for closure of WMA C pursuant to the HFFACO requirements.

3.2.1.1 Requirements of DOE M 435.1-1. The focus of Criterion 1 is on the removal of "key radionuclides" to the "maximum extent practical." While the term "key radionuclides" is not defined by law or regulation, Chapter II of DOE M 435.1-1 states that the term applies to those radionuclides that are controlled by concentration limits in 10 CFR 61.55. Specifically, these are long-lived radionuclides (^{14}C, ^{59}Ni, ^{94}Nb, ^{99}Tc, ^{129}I, ^{241}Pu, ^{242}Cm) and alpha emitting transuranic nuclides with half-lives greater than five years, and the short-lived radionuclides ^{3}H, ^{60}Co, ^{63}Ni, ^{90}Sr, and ^{137}Cs. In addition, key radionuclides are those that are important to satisfying the performance objectives of 10 CFR 61, Subpart C (which, generally speaking, means those that contribute the highest dose consequence over time). Analysis to date at DOE sites indicates other isotopes important to satisfying these performance objectives include ^{79}Se, ^{126}Sn, and ^{237}Np [DOE G 435.1-1, Section II.B.(2)].

DOE M 435.1-1 clarifies that processing to remove the key radionuclides to the extent technically practical could be a chemical treatment process or a physical removal process. Selection of the chosen "technically practical process" must be evaluated to a sufficient degree through a formal, documented assessment of such factors as technical risk, incompatible physical or chemical requirements with the waste, and potential impacts to the public, the worker and the environment.

The economically practical part of this requirement is determined by the development of total lifecycle costs for an alternative, or unit costs (e.g., cost per curie removed). Some subjectivity will be present in determining whether these costs are economically practical; however, in general, the goal should be to determine a relationship between costs and removal of the key radionuclides and identify the point in this relationship at which removal costs increase significantly and thus become impractical. An economic assessment may not be considered necessary if a technology option is not first considered to be technically practical.

3.2.1.2 Requirements Under the HFFACO. Under HFFACO major Milestone M-45-00, tank closure actions will follow "retrieval of as much tank waste as technically possible, with tank waste residues not to exceed 360 cu. ft. in each of the 100 series tanks, 30 cu. ft. in each of the 200 series tanks, or the limit of waste retrieval technology capability, whichever is less." Thus, the retrieval goal is a volumetric goal rather than one based on removal of particular radionuclides (i.e., key radionuclides) as necessary to achieve a modeled system performance goal. If retrieval to the volumetric goal levels is not possible for any given tank, under the HFFACO, DOE must submit a detailed explanation to both the U.S. Environmental Protection Agency and the Washington State Department of Ecology for approval. The retrieval process is further defined in Appendices H and I of the HFFACO Action Plan, as well as in 08-5085-FVS.

Appendix H of the HFFACO Action Plan specifies that DOE must "establish an interface with NRC and reach formal agreement on the retrieval and closure actions for single shell tanks with respect to allowable waste residuals in the tank and soil column." Based on this interface and the outcome of tank waste retrieval demonstrations, DOE is to establish formal criteria for retrieval of waste from the remaining single-shell tanks. Initial retrieval actions have been completed at several WMA C tanks, and some of the results shared with NRC for review and discussion. See as an example Letter DOE 2008, "Update to the Basis for Exception to the Hanford Federal Facility Agreement and Consent Order (HFFACO) Retrieval Criteria for Single-Shell Tank

(SST) 241-C-106, Request for Nuclear Regulatory Commission (NRC) Review." Feedback from the NRC (Letter NRC 2009, "Request for Additional Information on Update to the Basis for Exception to the Hanford Federal Facility Agreement and Consent Order Retrieval Criteria for Single-Shell Tank 241-C-106, Request for U.S. Nuclear Regulatory Commission Review") is being incorporated into subsequent retrieval plans and actions.

Appendix I of the HFFACO Action Plan, Section 2.1.3, states that for any given tank or set of tanks and their associated ancillary equipment, proposed tank waste retrieval technologies and the rationale for selecting the technologies will be documented in a Tank Waste Retrieval Work Plan (TWRWP; e.g., RPP-37739, *241-C-111 Tank Waste Retrieval Work Plan*). Approved TWRWPs also contain a pre-retrieval risk assessment of potential residuals, consideration of past leaks, and potential leaks during retrieval, based on available data. After completing retrieval operations in accordance with the TWRWP, DOE prepares a retrieval data report in accordance with Section 2.1.7 of HFFACO Action Plan Appendix I (e.g., RPP-RPT-35112). Retrieval data reports include the following information:

- residual tank waste volume measurement
- results of residual tank waste characterization
- retrieval technology performance assessment
- updated post-retrieval risk assessment
- discussion of the feasibility/viability of other retrieval technologies, including cost estimates.

3.2.1.3 Documentation Required to Demonstrate Compliance. Both the DOE-driven requirements and the requirements of the HFFACO mandate that the significant portion of tank residues be removed from tanks and equipment before closure in place can occur. However, the various DOE-driven requirements and the HFFACO differ in how they define what constitutes the significant portion of the waste. Additionally, the requirements sources define successful completion of waste removal somewhat differently.

In preparing guidance for NRC participation in the conduct of DOE waste determinations (NUREG-1854, *NRC Staff Guidance for Activities Related to U.S. Department of Energy Waste Determinations – Draft Final Report for Interim Use*), NRC noted that the purpose of various criteria related to radionuclide removal is to minimize the inventory of highly radioactive radionuclides disposed of as incidental waste. The NRC states, "In many cases, the intent of requiring removal of highly radioactive radionuclides to the maximum extent practical can be satisfied by reducing the volume of residual waste in a contaminated structure (e.g., a tank, an evaporator) to the maximum extent practical. However, evaluating alternative methods of physically removing waste from a structure does not eliminate the need to consider (1) whether it would be practical to remove selected highly radioactive radionuclides from the waste (e.g., by chemical extraction) or (2) whether it would be practical to remove the contaminated structure for disposal instead of stabilizing it and disposing of it in place."

Although completion of retrieval actions in accordance with HFFACO-driven TWRWPs and as documented in Retrieval Data Reports does not guarantee that tank waste retrieval actions will meet the DOE requirements for waste removal, DOE ORP procedure ESQ-EM-IP-M435.1—01, Rev. 0, recognizes the differences in the two sets of requirements, and sets forth specific direction regarding how to demonstrate a given retrieval action will meet DOE M 435.1-1 WIR evaluation process Criterion 1 (Table 4).

Table 4. Demonstrating Achievement of Waste Retrieval Requirements

DOE O 435.1 WIR Evaluation Process Requirement	HFFACO/Consent Decree Requirement	Documentation Required for WIR Determination Under DOE-ORP Procedure
Document removal of key radionuclides (radionuclides controlled by concentration limits in 10 CFR 61.55)	Remove tank waste to meet or surpass a volumetric retrieval goal based on tank capacity	Document waste retrieval actions, taking care to provide • Specific analysis of removal of key radionuclides • Radioactive material removal effectiveness and efficiency • Programmatic and technical risk • Possible constraints due to physical or chemical incompatibility • Potential impacts to the public, workers, and environment
Remove to the maximum extent technically and economically practical • Technical risk • Incompatible physical or chemical requirements with the waste • Potential impacts to the public, the worker and the environment • Total lifecycle costs, or unit costs	Retrieve as much tank waste as technically possible, to achieve a volumetric retrieval goal, or to the point at which the limit of the waste retrieval technology capability is reached (whichever is less). "Limits of technology" takes into account • Retrieval duration • Risk reduction • Facilitating tank closures • Costs • Potential for exacerbating leaks • Worker safety • Overall impact on the tank waste retrieval and treatment mission	

DOE = U.S. Department of Energy
HFFACO = *Hanford Federal Facility Agreement and Consent Order*
ORP = Office of River Protection
WIR = Waste Incidental to Reprocessing

References:
10 CFR 61.55, "Waste Classification," *Code of Federal Regulations*, as amended.
DOE O 435.1, 1999, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

3.2.2 Criterion 2

Criterion 2 requires that radioactive waste disposal actions be managed to meet requirements comparable to the performance objectives of 10 CFR 61, Subpart C. Subpart C requires that land disposal facilities be sited, designed, operated, closed, and controlled after closure so that reasonable assurance exists that exposures to humans are within the limits established in the following performance objectives.

- 10 CFR 61.41, "Protection of the General Population From Releases of Radioactivity": Concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants, or animals must not result in an annual

dose exceeding an equivalent of 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ of any member of the public. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable.

- 10 CFR 61.42, "Protection of Individuals from Inadvertent Intrusion": Design, operation, and closure of the land disposal facility must ensure protection of any individual inadvertently intruding into the disposal site and occupying the site or contacting the waste at any time after active institutional controls over the disposal site are removed.

- 10 CFR 61.43, "Protection of Individuals During Operations": Operations at the land disposal facility must be conducted in compliance with the standards for radiation protection set out in 10 CFR 20, "Standards for Protection Against Radiation," except for releases of radioactivity in effluents from the land disposal facility, which shall be governed by 10 CFR 61.41. Every reasonable effort shall be made to maintain radiation exposures as low as is reasonably achievable.

- 10 CFR 61.44, "Stability of the Disposal Site After Closure": The disposal facility must be sited, designed, used, operated, and closed to achieve long-term stability of the disposal site and to eliminate to the extent practicable the need for ongoing active maintenance of the disposal site following closure so that only surveillance, monitoring, or minor custodial care are required.

To address these requirements, DOE ORP procedure ESQ-EM-IP-M435.1-1-01 directs that the project

- develop a performance assessment consistent with requirements of DOE M 435.1-1, Chapter IV and include summary information in the waste determination basis document;

- include planned methods for waste stabilization, tank backfill, and intrusion barriers in the waste determination basis document; and

- address requirements of 10 CFR 61.43 and 61.44 in the waste determination basis document.

Demonstration that these radiation protection requirements will be met by the assumed radioactive waste disposal action at WMA C requires the development of a formal performance assessment (i.e., a computer-based simulation of the in-place disposal of residual WMA C waste and remaining decommissioned equipment/components). A scoping effort is underway to support the development of a detailed performance assessment for WMA C that is consistent with the requirements of DOE M 435.1-1, Chapter IV. The Chapter IV performance objectives [Section IV.P.(1)] are considered comparable to those at 10 CFR 61, Subpart C.

The source term that will be used for the performance assessment will be based on the best available information, which for some tanks and soil sites within WMA C may be best estimates generated prior to completion of retrieval operations and soil site corrective actions. Information

regarding tank source terms and risks will be drawn as appropriate from TWRWPs and retrieval data reports being prepared to meet HFFACO requirements. Source term data and performance assessment results will be reviewed as retrieval and corrective actions progress, and will be updated as necessary to ensure the waste determination basis document adequately assesses the expected performance of the WMA C closure action.

In addition to the WMA C-specific performance assessment, a composite analysis has been developed to support the TC & WM EIS. This composite analysis analyzes the cumulative impacts of the WMA C closure action together with other actions at Hanford that will leave radioactive material permanently in place. Planned methods of waste stabilization, tank backfill, and intrusion barriers are factored into the development of both the composite analysis and the performance analysis, and these methods will be documented in the waste determination basis document. This document will also contain information necessary to demonstrate that the design of the closed facility will achieve long-term stability and will meet performance standards without implementation of ongoing maintenance during the computer-simulated post-closure period.

3.2.3 Criterion 3

Criterion 3 requires that waste be managed in accordance with DOE M 435.1-1, Chapter IV. Chapter IV contains requirements for management of LLW (e.g., waste storage, treatment, and disposal). Additionally, waste must be incorporated into a solid physical form at a concentration not exceeding limits for Class C LLW as set out in 10 CFR 61.55, or the waste form must meet alternative requirements as authorized by DOE in consultation with NRC.

Generally speaking, 10 CFR 61 defines Class C (and greater-than-Class-C) waste as that which will not decay to levels that present an acceptable hazard to an intruder within 100 years after closure [10 CFR 61.7(b)(5)]. More specific guidance on identification of Class C waste is provided at 10 CFR 55, "Operators' Licenses," which identifies a numeric evaluation process for radioactive waste classification based on the concentrations of specific radionuclides in the waste form at the time of closure. Waste that contains greater than Class C levels of certain radionuclides is generally considered unsuitable for near-surface disposal and more appropriate for disposal in a geologic repository, unless it can be demonstrated that the proposed near-surface disposal system will provide an appropriate measure of protectiveness. "Near-surface disposal facility" means a land disposal facility in which radioactive waste is disposed of in or within the upper 30 meters of the earth's surface (10 CFR 61.2, "Definitions"). If final waste form radionuclide concentrations will be present at greater than Class C concentrations, the demonstration that the disposal system will be protective of human health is accomplished by modeling various exposure scenarios as a part of the system performance assessment.

The determination regarding whether a waste can be safely disposed near the surface hinges on how much waste will remain after retrieval, how the remaining waste will be stabilized, and the engineered controls that will be in place to protect intruders from exposure after a presumed loss of institutional controls 100 years after closure. DOE ORP procedure ESQ-EM-IP-M435.1-1-01 directs that to demonstrate compliance with WIR evaluation process Criterion 3, the WIR determination basis documentation must address the following:

- waste stabilization method to be used, including rationale for concentration averaging, **AND**

- calculations demonstrating that the concentrations of radionuclides remaining in the waste will not be greater than Class C **OR**

- a demonstration (i.e., modeling results contained in the performance assessment), prepared in consultation with NRC, that the disposal system will provide appropriate measure of protectiveness.

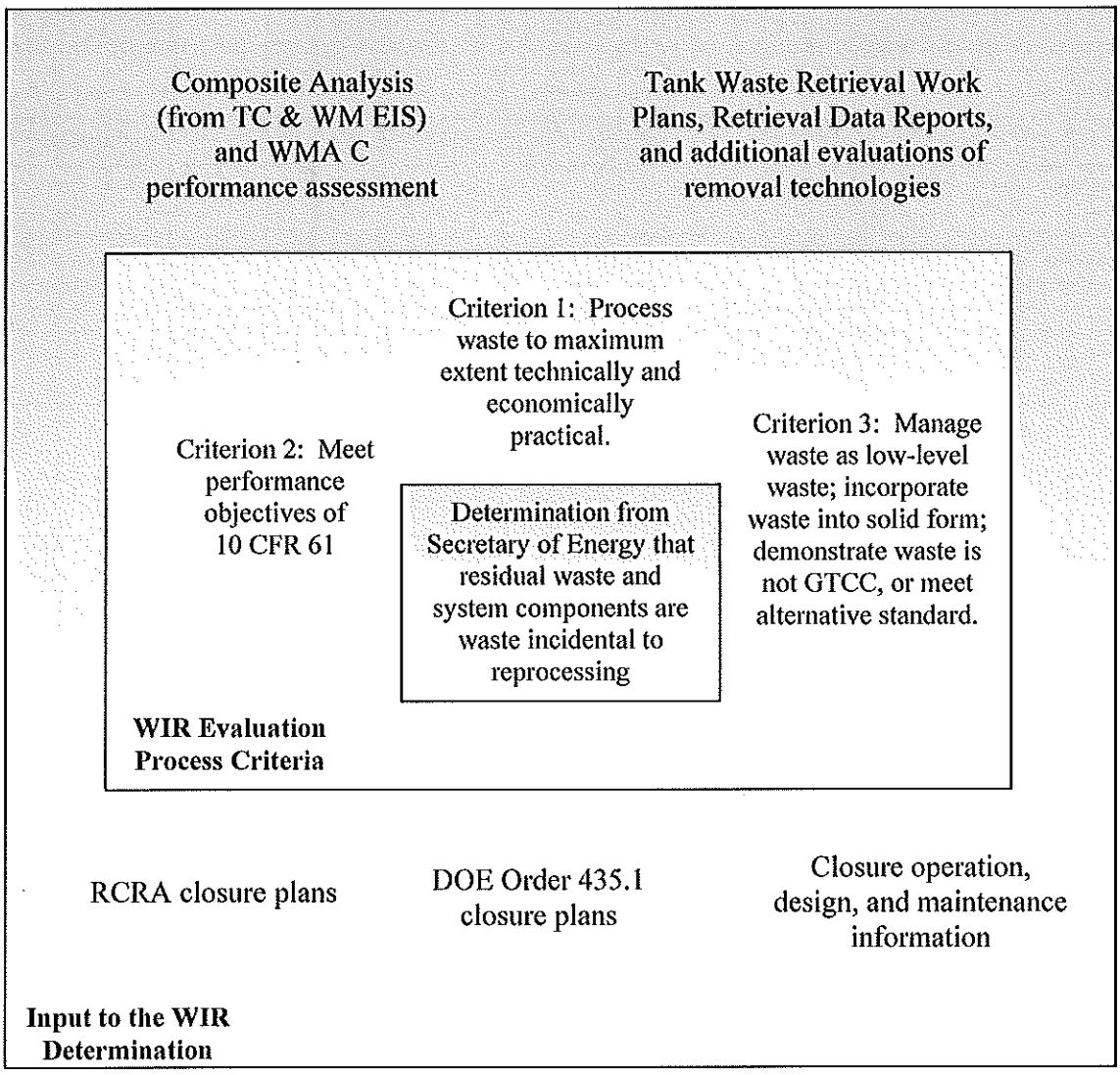
To demonstrate that the NRC concentration limits will be met, DOE must compare, by major radionuclide, the expected concentration after the proposed waste treatment process with the limits as provided at 10 CFR 61.55. Dilution of a waste stream to meet the concentration limits established in 10 CFR 61.55 is not permitted. While it is recognized that in the course of stabilizing a waste or waste system (e.g., grouting a tank to fill void space to prevent subsequent subsidence) some changes in waste concentration may occur, actions to dilute a waste stream to meet Class C concentration limits are prohibited. The NRC has prepared a Branch Technical Position on concentration averaging (Letter NRC 1995, "Issuance of Final Branch Technical Position on Concentration Averaging and Encapsulation, Revision in Part to Waste Classification Technical Position") that supports the regulation at 10 CFR 61.55(a)(8), and that may be useful in making determinations. The Branch Technical Position states that, "the concentration of a radionuclide (in waste) may be averaged over the volume of the waste, or weight of the waste if the units (on the values tabulated in the concentration tables) are expressed as nanocuries per gram." This Branch Technical Position provides specific guidance to waste generators on the interpretation of the requirements in 10 CFR 61.55 as it applies to a variety of types and forms of LLW. Further guidance on concentration averaging is provided by the NRC in NUREG-1854.

If the final waste form will not meet NRC concentration limits in 10 CFR 61.55, alternative requirements may be approved to allow near-surface disposal of such wastes after demonstration that the final disposal system will provide an appropriate measure of protectiveness. Similar provisions for such demonstrations are provided in both DOE M 435.1-1, Chapter IV and in NRC's ruling at 10 CFR 61.58, "Alternative Requirements for Waste Classification and Characteristics." The analysis must provide reasonable expectation that after evaluation of the specific characteristics of the waste, disposal site, and method of disposal, compliance with the LLW performance objectives can be achieved. If required for WMA C, this analysis will be based on the results of the performance assessment that is already under development.

3.2.4 Document Development Process

The WIR determination basis documentation for WMA C must include or provide by reference all the information required to demonstrate that the waste residues and system components subject to the determination meet the three DOE M 435.1-1 WIR evaluation process criteria. Input required to support a WIR determination is depicted in the blue area of Figure 4.

Figure 4. Documentation Required for Waste Incidental to Reprocessing Determination



DOE = U.S. Department of Energy GTCC = Greater than Class C
RCRA = *Resource Conservation and Recovery Act of 1976*
TC & WM EIS = *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* WIR = Waste Incidental to Reprocessing WMA = Waste Management Area

References:
10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.
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Preparation of many of the documents identified in Figure 4 will begin soon or is already underway. Successful completion of the HFFACO Milestone M-045-83 requirement to complete closure of WMA C by June 30, 2019 requires that several of the documents be developed and approved in parallel. For example, the WMA C performance assessment is already under development, although a final closure decision will not be reached until the TC & WM EIS record of decision is published and various closure plans and permits are approved. Such challenges can be overcome with thoughtful development of the documents. The WMA C performance assessment, for example, includes evaluation of multiple potential closure scenarios, such that when a final closure decision is made, the appropriate information will be available in the performance assessment to support the WIR determination.

To promote efficient processing of the WIR determination supporting documents, DOE is committed to involving State and Federal agency representatives and stakeholders in the document development process. Examples are as follows.

- Development of the TC & WM EIS (and the associated composite analysis) is complying with NEPA requirements for public review and involvement. That document recently underwent public review, and comments are being addressed. Additionally, the Washington State Department of Ecology is a cooperating agency in the development of this EIS and, as such, is actively involved in the development and review of the document.

- The WMA C performance assessment is being developed with extensive input from stakeholders and regulators. Input to the performance assessment is reviewed on a regular basis in a workshop setting that includes representatives of local and regional stakeholder groups, State and Federal regulating agencies, the NRC, and DOE Headquarters. Additionally, briefings on the performance assessment development process are provided periodically to a larger audience of stakeholders.

- In the future, the *Resource Conservation and Recovery Act of 1976* (RCRA) closure plans and Phase 2 RCRA Facility Investigation/Corrective Measures Study (and resulting decisions and permits) that are necessary to complete WMA C closure will also be developed with input from the public and stakeholders, in keeping with RCRA and HFFACO requirements.

The DOE believes that development of these documents in an open environment will result in the expeditious review and approval of the final draft documents and will enable DOE to achieve the aggressive goal to complete closure of WMA C on schedule, by June 30, 2019.

3.3 REVIEW OF THE BASIS DOCUMENTATION

As noted in Table 1 of this plan, the review requirements established in DOE O 435.1 for WIR determination basis documentation varies somewhat from the requirements that are applicable to WMA C, as defined in the 2006 DOE Program Execution Plan and in DOE ORP procedure ESQ-EM-IP-M435.1-1-01. The DOE ORP procedure states that State and public involvement in

waste classification determinations by the WIR evaluation process, and NRC consultation, are strongly recommended, although required only when waste cannot be demonstrated to contain less than Class C concentrations of radionuclides. In practice, however, the expectation is that NRC consultation will be sought, and State and public involvement will occur as a part of the WIR determination process. The DOE Program Execution Plan notes that the NRC will, as a part of its consultation and review process, make DOE's draft WIR determinations available to the public through their electronic public reading room, and will also announce meetings with DOE through the Public Meetings link of the NRC internet home page. In addition, DOE will make the draft determination available to the public for review and comment. The WIR basis documentation review process that will be used for WMA C, which includes participation by non-DOE entities, is depicted in Figure 5.

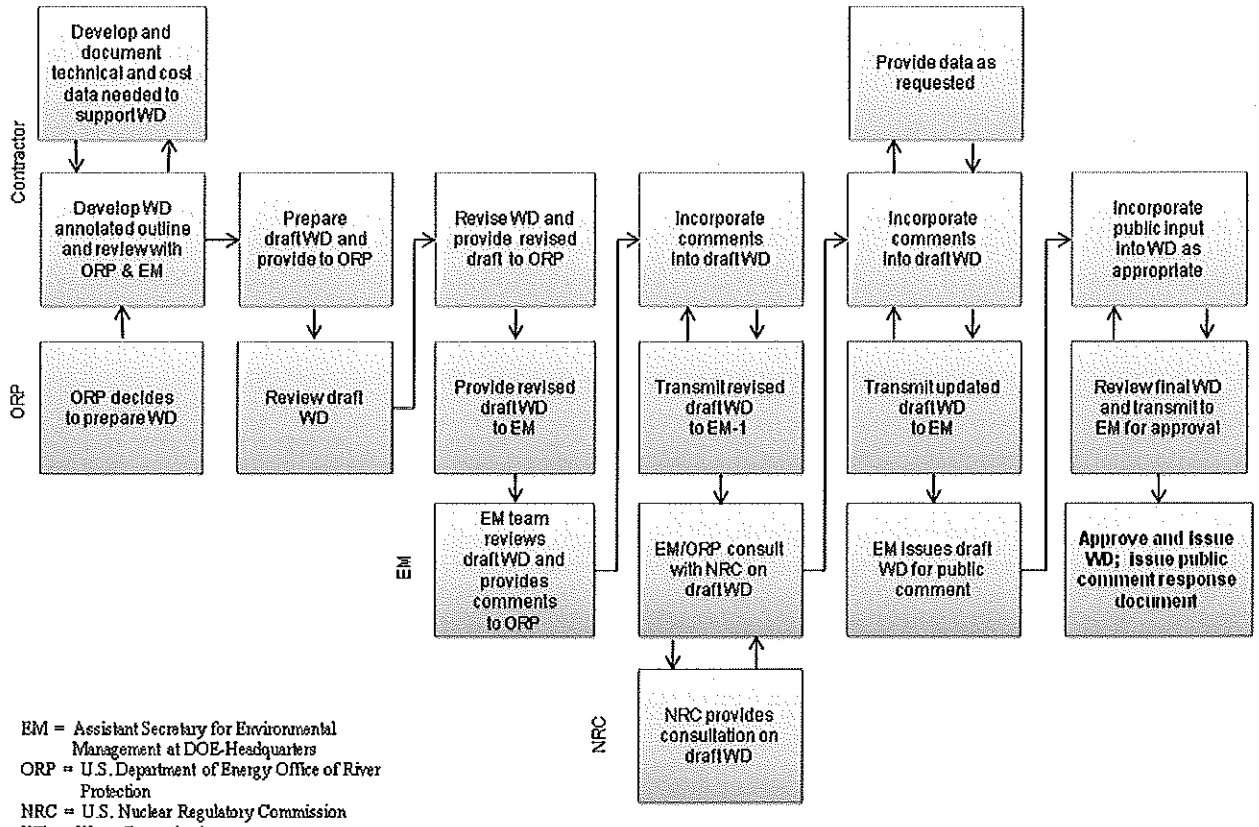
3.4 REGULATORY FRAMEWORK

This document focuses on requirements specific to classifying radioactive wastes under DOE O 435.1. However, closure planning for any Hanford Site tank farm requires consideration of many additional requirements from numerous sources. DOE O 435.1 contains many other requirements that are directly applicable to the closure planning process for Hanford Site tanks. Requirements of the HFFACO, NEPA, RCRA, *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA), and other laws and regulations also apply to the closure and remediation of WMA C and its immediate surroundings.

The initial closure decision for WMA C will be made as an outcome of the TC & WM EIS. The WMA C closure action will be conducted under the State-issued Hanford Sitewide RCRA permit in accordance with a State-approved closure plan. Soil remediation actions will be undertaken pursuant to a RCRA-driven Corrective Measures Study and in accordance with the permit. Implementation of groundwater and soil remediation actions at WMA C will be integrated with adjacent actions being undertaken pursuant to separate RCRA corrective action decisions and CERCLA records of decision. Each of these documents and remedies will be developed and implemented in accordance with the requirements of the HFFACO and governing regulations, with the involvement of the State, Tribes, and public in the decision-making process.

The efficient closure of WMA C depends on careful integration of actions being taken to satisfy the various requirements. Figure 6 depicts the relationships of some of the more notable documents and actions necessary to navigate the regulatory framework applicable to the WMA C closure action.

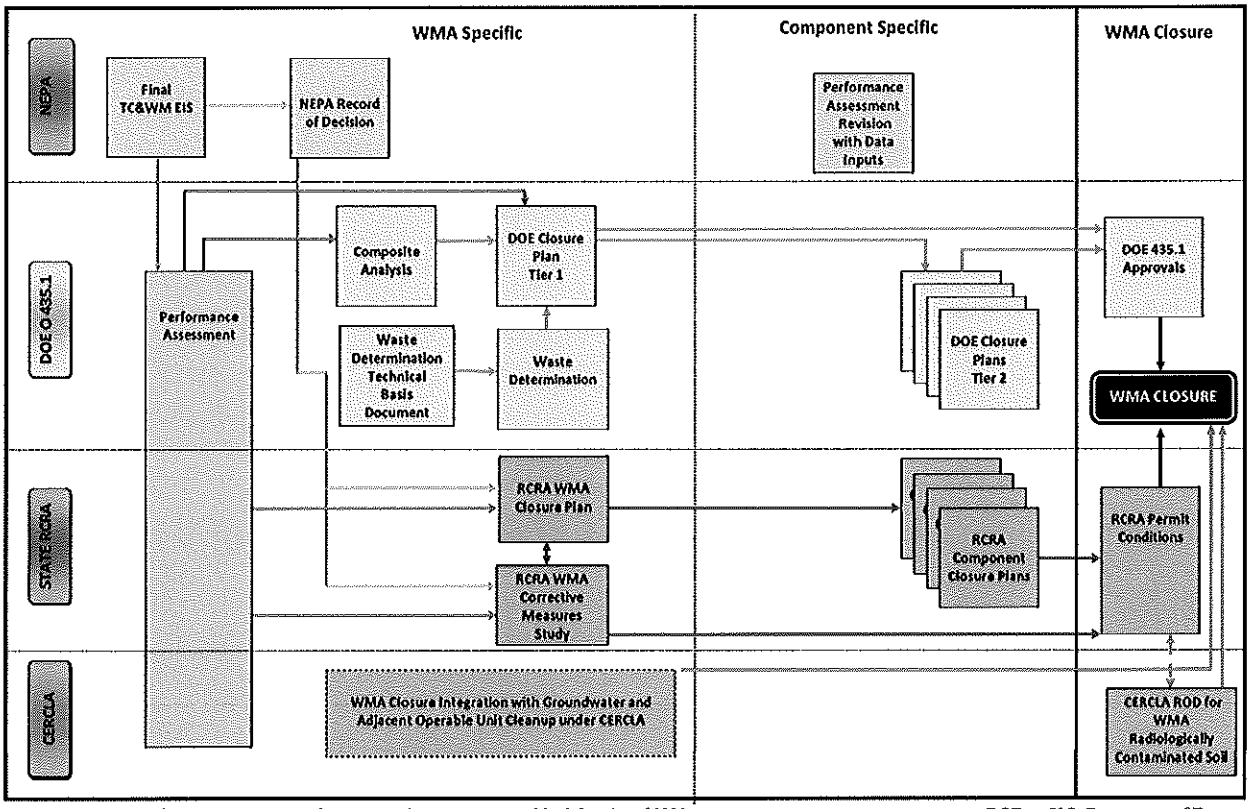
Figure 5. Waste Incidental to Reprocessing Evaluation Process Basis Documentation Review Process



EM = Assistant Secretary for Environmental Management at DOE-Headquarters
ORP = U.S. Department of Energy Office of River Protection
NRC = U.S. Nuclear Regulatory Commission
WD = Waste Determination

(Figure derived from ESQ-EM-IP-M435.1-1-01, Rev. 0)

Figure 6. Regulatory Framework



CERCLA = *Comprehensive Environmental Response, Compensation and Liability Act of 1980*
DOE = U.S. Department of Energy
NEPA = *National Environmental Policy Act of 1969*
RCRA = *Resource Conservation and Recovery Act of 1976*
ROD = Record of Decision
TC & WM EIS = *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*
WMA = Waste Management Area

4.0 PROJECT SCHEDULE

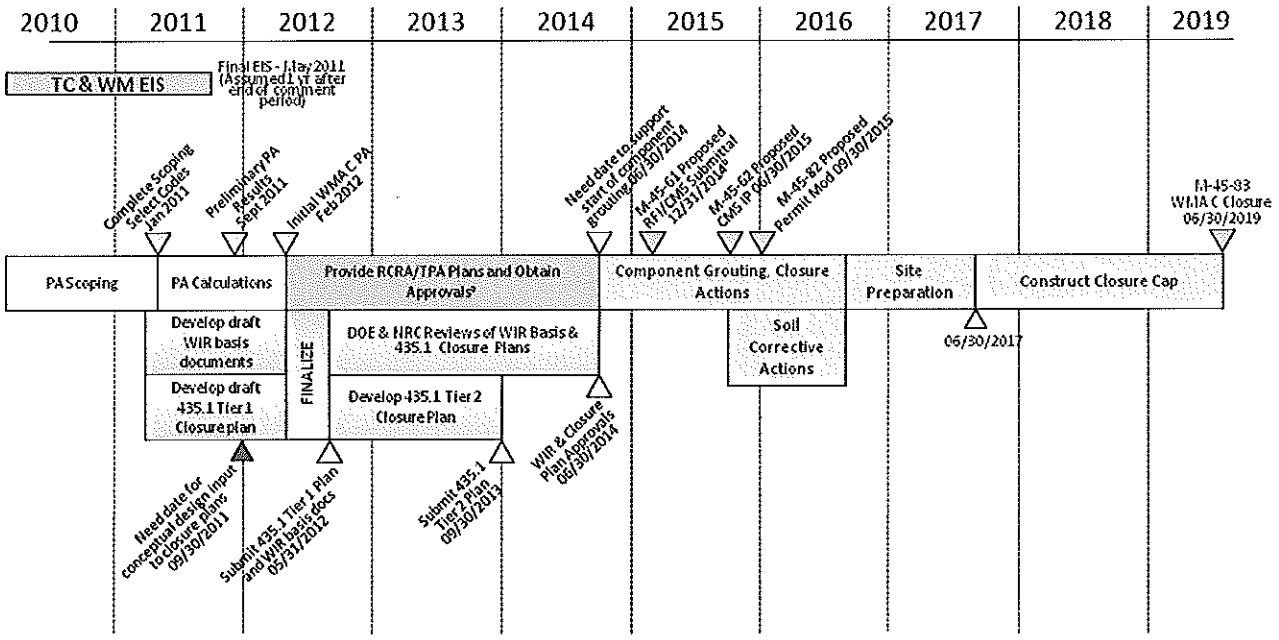
Proposed HFFACO Milestone M-045-83 calls for completing closure of WMA C by June 30, 2019. Achievement of that goal requires numerous supporting documents and tasks to be completed in the intervening years. Figure 7 illustrates when various actions must be undertaken to assure the 2019 milestone date is met.

At a more detailed level, WMA C closure planning integrates preparation, review, and approval (as applicable) of the following documents:

- TC & WM EIS
- WMA C performance assessment
- DOE O 435.1 WIR determination basis documentation
- DOE O 435.1 Tier 1 and Tier 2 closure plans
- Tier II (WMA C) and Tier III (component) RCRA closure plans and modification of the Hanford Site RCRA permit
- related soil and groundwater cleanup action documentation and decisions
- closure design studies and documents.

Preparation and approval of several of the aforementioned documents are addressed in more detail in *Single-Shell Tank System Waste Retrieval and Closure Process* (HFFACO Attachment 2, Appendix I). Although not shown in Figure 7, opportunities for stakeholder reviews and involvement are associated with many of the documents required for WMA C closure, as discussed previously in this plan.

Figure 7. Proposed Waste Management Area C Action Schedule (Fiscal Years)



[a] RCRA/TPA plans and approvals include the RCRA Facility Investigation/Corrective Measures Study for soil and closure plans for WMA C components, as well as associated public reviews, and other items identified in Figure I-1 of HFFACO Attachment 2, Appendix I.

[b] The need date for some of the RCRA/TPA plans to ensure closure completion by June 30, 2019 is earlier than the proposed milestones listed in this figure.

CMS IP = Corrective Measures Study Implementation Plan
DOE = U.S. Department of Energy
NRC = U.S. Nuclear Regulatory Commission
PA = performance assessment
RCRA = *Resource Conservation and Recovery Act of 1976*
RFI/CMS = RCRA Facility Investigation/Corrective Measures Study
TC & WM EIS = *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*
TPA = *Hanford Federal Facility Agreement and Consent Order – Tri-Party Agreement*
WIR = Waste Incidental to Reprocessing
WMA = Waste Management Area

5.0 REFERENCES

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APPENDIX A

TEXT OF SECTION 3116 OF THE RONALD W. REAGAN NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2005

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SEC. 3116. DEFENSE SITE ACCELERATION COMPLETION.

(a) IN GENERAL.—Notwithstanding the provisions of the Nuclear Waste Policy Act of 1982, the requirements of section 202 of the Energy Reorganization Act of 1974, and other laws that define classes of radioactive waste, with respect to material stored at a Department of Energy site at which activities are regulated by a covered State pursuant to approved closure plans or permits issued by the State, the term ''high-level radioactive waste'' does not include radioactive waste resulting from the reprocessing of spent nuclear fuel that the Secretary of Energy (in this section referred to as the ''Secretary''), in consultation with the Nuclear Regulatory Commission (in this section referred to as the ''Commission''), determines—

(1) does not require permanent isolation in a deep geologic repository for spent fuel or high-level radioactive waste;

(2) has had highly radioactive radionuclides removed to the maximum extent practical; and

(3)(A) does not exceed concentration limits for Class C low-level waste as set out in section 61.55 of title 10, Code of Federal Regulations, and will be disposed of—

(i) in compliance with the performance objectives set out in subpart C of part 61 of title 10, Code of Federal Regulations; and

(ii) pursuant to a State-approved closure plan or State-issued permit, authority for the approval or issuance of which is conferred on the State outside of this section;

or

(B) exceeds concentration limits for Class C low-level waste as set out in section 61.55 of title 10, Code of Federal Regulations, but will be disposed of—

(i) in compliance with the performance objectives set out in subpart C of part 61 of title 10, Code of Federal Regulations;

(ii) pursuant to a State-approved closure plan or State-issued permit, authority for the approval or issuance of which is conferred on the State outside of this section; and

(iii) pursuant to plans developed by the Secretary in consultation with the Commission.

(b) MONITORING BY NUCLEAR REGULATORY COMMISSION.—

(1) The Commission shall, in coordination with the covered State, monitor disposal actions taken by the Department of Energy pursuant to subparagraphs (A) and (B) of subsection (a)(3) for the purpose of assessing compliance with the performance objectives set out in subpart C of part 61 of title 10, Code of Federal Regulations.

(2) If the Commission considers any disposal actions taken by the Department of Energy pursuant to those subparagraphs to be not in compliance with those performance objectives, the Commission shall, as soon as practicable after discovery of the noncompliant conditions, inform the Department of Energy, the covered State, and the following congressional committees:

(A) The Committee on Armed Services, the Committee on Energy and Commerce, and the Committee on Appropriations of the House of Representatives.

(B) The Committee on Armed Services, the Committee on Energy and Natural Resources, the Committee on Environment and Public Works, and the Committee on Appropriations of the Senate.

(3) For fiscal year 2005, the Secretary shall, from amounts available for defense site acceleration completion, reimburse the Commission for all expenses, including salaries,

that the Commission incurs as a result of performance under subsection (a) and this subsection for fiscal year 2005. The Department of Energy and the Commission may enter into an interagency agreement that specifies the method of reimbursement. Amounts received by the Commission for performance under subsection (a) and this subsection may be retained and used for salaries and expenses associated with those activities, notwithstanding section 3302 of title 31, United States Code, and shall remain available until expended.

(4) For fiscal years after 2005, the Commission shall include in the budget justification materials submitted to Congress in support of the Commission budget for that fiscal year (as submitted with the budget of the President under section 1105(a) of title 31, United States Code) the amounts required, not offset by revenues, for performance under subsection (a) and this subsection.

(c) INAPPLICABILITY TO CERTAIN MATERIALS.—Subsection (a) shall not apply to any material otherwise covered by that subsection that is transported from the covered State.

(d) COVERED STATES.—For purposes of this section, the following States are covered States:

(1) The State of South Carolina.

(2) The State of Idaho.

(e) CONSTRUCTION.—

(1) Nothing in this section shall impair, alter, or modify the full implementation of any Federal Facility Agreement and Consent Order or other applicable consent decree for a Department of Energy site.

(2) Nothing in this section establishes any precedent or is binding on the State of Washington, the State of Oregon, or any other State not covered by subsection (d) for the management, storage, treatment, and disposition of radioactive and hazardous materials.

(3) Nothing in this section amends the definition of ''transuranic waste'' or regulations for repository disposal of transuranic waste pursuant to the Waste Isolation Pilot Plant Land Withdrawal Act or part 191 of title 40, Code of Federal Regulations.

(4) Nothing in this section shall be construed to affect in any way the obligations of the Department of Energy to comply with section 4306A of the Atomic Energy Defense Act (50 U.S.C. 2567).

(5) Nothing in this section amends the West Valley Demonstration Act (42 U.S.C. 2121a note).

(f) JUDICIAL REVIEW.—Judicial review shall be available in accordance with chapter 7 of title 5, United States Code, for the following:

(1) Any determination made by the Secretary or any other agency action taken by the Secretary pursuant to this section.

(2) Any failure of the Commission to carry out its responsibilities under subsection (b).

APPENDIX B

APPLICATION OF WASTE CLASSIFICATION PROCESS IN IDAHO

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LIST OF TERMS

DOE	U.S. Department of Energy
HLW	high-level waste
LLW	low-level waste
NDAA	*Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005* (Public Law 108-375)
NRC	U.S. Nuclear Regulatory Commission
TFF	Tank Farm Facility

INTRODUCTION

The Idaho National Laboratory Tank Farm Facility (TFF) TFF consists of eleven 300,000-gal belowgrade stainless steel tanks in unlined concrete vaults, four 30,000-gal belowgrade stainless steel tanks, and associated ancillary equipment and piping. Historically, the TFF tanks were used to store various Idaho Nuclear Technology and Engineering Center wastes, including those from spent nuclear fuel reprocessing (first-, second-, and third-cycle reprocessing wastes), decontamination waste, laboratory waste, and contaminated liquids from other operations.

The in place disposal of these TFF wastes and the TFF system is subject to the requirements of Section 3116(a) of the *Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005* (NDAA). In November 2006, the U.S. Department of Energy (DOE) issued DOE-WD-2006-001, *Section 3116 Determination for the Idaho Nuclear Technology and Engineering Center Tank Farm Facility at the Idaho National Laboratory.* In this document, the Secretary of Energy determined pursuant to Section 3116(a) that the stabilized residuals in the TFF and the TFF system were not high-level radioactive waste and could be disposed of in place at the Idaho National Laboratory.

The information provided in this appendix draws heavily upon text in DOE/NE-ID-11226, *Basis for Section 3116 Determination for the Idaho Nuclear Technology and Engineering Center Tank Farm Facility.*

TANK FARM FACILITY CLOSURE PROCESS

The TFF is undergoing a phased closure. The closure process comprises tank system cleaning and stabilization activities. As a part of the phased closure process, TFF operations include consolidating the remaining tank wastes into the minimum number of tanks necessary and commencing cleaning activities in the emptied tanks. As of July 2005, seven of the 300,000-gal tanks, the four 30,000-gal tanks, and associated ancillary equipment had been cleaned. None of the remaining tanks had been cleaned as of November 2006, when the determination was made that the stabilized residuals and the TFF system could be disposed in place.

When cleaning operations in any given TFF component are completed, a small amount of residual radioactive waste remains that cannot be removed. As cleaning operations reach a point

of minimal additional benefit for a given component, the component residuals are sampled and analyzed to confirm that what remains will meet performance objectives for protection of the public and the environment. After cleaning activities are completed for individual tanks, vaults, and other TFF components, the individual components are stabilized by filling with grout.

The DOE plans to stabilize each of the individual TFF components by filling them with grout. Upon completion of the phased cleaning and grouting of the remaining tanks and ancillary equipment in the TFF tank system, final closure of the TFF will be accomplished.

REACHING THE DETERMINATION

Section 3116(a) of the NDAA specifies that the term "high-level radioactive waste" does not include radioactive waste that results from reprocessing spent nuclear fuel if the Secretary of Energy determines, in consultation with the U.S. Nuclear Regulatory Commission (NRC), that the waste meets certain criteria. The criteria specify that the waste

- must not require disposal in a deep geologic repository
- must have had highly radioactive radionuclides removed to the maximum extent practical
- must meet performance objectives for low-level waste (LLW) and either meet certain concentration limits or consult with the NRC regarding the disposal plan
- must be disposed of pursuant to a State-approved closure plan or State-issued permit.

Demonstration that the stabilized residuals in the TFF and in the TFF tank system would meet these criteria after final closure activities are completed is documented in DOE/NE-ID-11226. This 3116 Basis Document provides the basis for the Secretary of Energy's determination that the closed TFF system wastes are not high-level waste (HLW) and may be grouted and disposed of in place. For the purposes of the 3116 Basis Document, the TFF tank system comprises the eleven 300,000-gal tanks, four 30,000-gal tanks, and the vaults, piping, structures, and ancillary equipment associated with these tanks.

Historical waste management information, performance assessment results, and sampling and analysis results from the tank cleaning activities were reviewed and analyzed to demonstrate that the stabilized residuals in the TFF and in the TFF tank system will meet the Section 3116 criteria upon final closure. In addition, the residual inventory at closure was updated to reflect the results of TFF cleaning activities. Prior to cleaning and receiving sampling and analysis results of the first tank cleaning, planning documents (such as a closure plan approved by the State of Idaho) were prepared. These planning documents determined the baseline inventory and consequently established the goals for the cleaning activities to meet or exceed. The total post-decontamination inventory for each of the cleaned TFF tanks is significantly less than the total conservative post-decontamination inventory of a single tank estimated in the performance assessment, indicating that the tank cleaning operations performed better than planned.

Pursuant to Section 3116(a) of the NDAA, DOE consulted with the NRC. To facilitate the consultative process, DOE provided NRC with a draft 3116 Determination on September 7, 2005. During its review of the draft 3116 Determination, NRC requested additional information from DOE. The DOE responded to the NRC request for additional information in three separate submittals. The DOE also provided other additional information as requested by the NRC, and DOE and NRC held public consultation meetings as well as several consultation telephone calls.

On October 20, 2006, the NRC issued its *U.S. Nuclear Regulatory Commission Technical Evaluation Report for the U.S. Department of Energy Idaho National Laboratory Site Draft Section 3116 Waste Determination for Idaho Nuclear Technology and Engineering Center Tank Farm Facility* (NRC 2006). This report presents NRC's views and conclusions with respect to whether the stabilized residuals under DOE's disposal and closure approach can meet the applicable requirements of Section 3116(a) of the NDAA such that the Secretary may determine that the waste is not HLW. The executive summary of the NRC report provides the NRC conclusion that, based on the information provided by DOE, there is reasonable assurance that the applicable criteria of Section 3116 can be met for residual waste associated with the TFF.

Section 3116(b) requires that the NRC, in coordination with the State of Idaho, monitor disposal actions taken by DOE for the purposes of assessing compliance with the performance objectives of the Title 10, *Code of Federal Regulations*, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart C, "Performance Objectives." In their Technical Evaluation Report, NRC staff identified five "key monitoring areas," and stated that NRC will coordinate with the State of Idaho to develop a monitoring plan/approach to address those areas.

Although not required by Section 3116, the DOE also made available the draft 3116 Determination for a 30-day public review and comment period in September 2005 (70 FR 54374, "Notice of Availability of Draft Section 3116 Determination Idaho Nuclear Technology and Engineering Center Tank Farm Facility"). No public comments were received during the comment period; however, comments were subsequently received after the comment period from the State of Idaho and the others. These comments were considered during the preparation of DOE/NE-ID-11226.

REFERENCES

10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.

10 CFR 61, Subpart C, "Performance Objectives," *Code of Federal Regulations*, as amended.

70 FR 54374, 2005, "Notice of Availability of Draft Section 3116 Determination Idaho Nuclear Technology and Engineering Center Tank Farm Facility," *Federal Register*, Vol. 70, pp. 54374–54375 (September 14).

DOE/NE-ID-11226, 2006, *Basis for Section 3116 Determination for the Idaho Nuclear Technology and Engineering Center Tank Farm Facility*, Rev. 0, U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

DOE-WD-2006-001, 2006, *Section 3116 Determination for the Idaho Nuclear Technology and Engineering Center Tank Farm Facility at the Idaho National Laboratory*, U.S. Department of Energy, Washington, D.C.

NRC 2006, *U.S. Nuclear Regulatory Commission Technical Evaluation Report for the U.S. Department of Energy Idaho National Laboratory Site Draft Section 3116 Waste Determination for Idaho Nuclear Technology and Engineering Center Tank Farm Facility*, U.S. Nuclear Regulatory Commission, Washington, D.C.

Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Public Law 108-375.

APPENDIX C

APPLICATION OF WASTE CLASSIFICATION PROCESS IN SOUTH CAROLINA

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LIST OF TERMS

CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
FR	Federal Register
HLW	high-level waste
NDAA	*Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005* (Public Law 108-375)
NRC	U.S. Nuclear Regulatory Commission
SRS	Savannah River Site

INTRODUCTION

The high-level waste (HLW) system at the U.S. Department of Energy (DOE) Savannah River Site (SRS) is a set of six different interconnected facilities. These facilities function as one large treatment plant that receives, stores, and treats wastes from various generators at the SRS and converts them into forms suitable for final disposal. The three major final disposal waste forms are borosilicate glass, which will eventually be disposed of in a federal repository; saltstone; and treated water effluent that is released to the environment. The HLW managed in this system is a product of the reprocessing of spent nuclear fuel. This waste is a complex mixture of radionuclides, soluble salts, and insoluble sludges. Many of these components are hazardous to human health (e.g., Pu, Cd, Cr, and Hg) or can be serious hazards if not properly managed. As of 2003, 37 million gallons of waste remained in storage in 49 of the HLW system's 51 tanks at the SRS F-Tank Farm and H-Tank Farm. Two of the 22 F-Tank Farm tanks (Tanks 17 and 20) were closed and grouted in 1997.

Ongoing operation of the HLW system at SRS is continuing to reduce the amount of waste held in the HLW tanks, and SRS is preparing for final tank closure. Closure of the HLW tanks will be subject to the requirements of Section 3116(a) of the *Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005* (NDAA). Preparation of basis documentation required to demonstrate compliance with the requirements of the NDAA is underway.

SAVANNAH RIVER SITE TANK CLOSURE PROCESS AND WASTE DETERMINATIONS

F-Tank Farm Tanks 17 and 20

The decommissioning and closure of Tanks 17 and 20 were undertaken before the issuance of DOE O 435.1, *Radioactive Waste Management* or passage of the NDAA. In determining that the closed tanks and stabilized residue contained within the tanks were not HLW, SRS followed the guidance and methodology contained in 58 FR 12342, "Denial of Petition for Rulemaking: States of Washington and Oregon," and also reflected in a 1993 letter from the U.S. Nuclear Regulatory Commission (NRC) to DOE (NRC 1993, "Meeting With DOE to Review New Waste Characterization Data and Current DOE Plans for Management of Tank Waste at Hanford"). This guidance calls upon DOE to consult with NRC on certain decisions regarding waste

incidental to reprocessing, and to provide NRC with relevant technical information that would enable the NRC to make its own determination in an advisory role. In keeping with the guidance, DOE consulted with the NRC on the closure of Tanks 17 and 20. The NRC staff were provided with information that demonstrated that wastes that would remain at closure would be

- processed to remove key radionuclides to the maximum extent technically and economically practical;

- incorporated in a solid physical form at a concentration that would not exceed the applicable concentration limits for Class C LLW as set out in the Title 10, *Code of Federal Regulations* (CFR), Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," (or would meet alternative requirements that would offer comparable protection of human health and the environment); and

- managed, pursuant to the *Atomic Energy Act of 1954,* as amended, so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61 would be satisfied.

Following approval by the state of South Carolina with oversight by the U.S. Environmental Protection Agency, DOE operationally closed Tank 17 and Tank 20 in December 1997 and June 1997, respectively. On June 30, 2000, the NRC issued to DOE its final technical evaluation report confirming the SRS approach and supporting a DOE determination that the residual waste in the two SRS tanks did not need to be managed as HLW and could be safely disposed in place (Letter Kane 2000, "Savannah River Site High Level Waste Tank Closure: Classification of Residual Waste as Incidental").

Remaining High-Level Waste Tanks

Closure of the remaining SRS HLW tanks will be performed in accordance with the requirements of Section 3116 of the NDAA. The DOE intends to empty the tanks to the maximum extent practical, stabilize any remaining residual contamination, and dispose of the stabilized residues and system components in place (67 FR 53784, "Record of Decision: Savannah River Site High-Level Waste Tank Closure"). This planned action is dependent on the ability of DOE and NRC to determine that the remaining wastes

- do not require disposal in a deep geologic repository

- have had highly radioactive radionuclides removed to the maximum extent practical

- will be disposed of in compliance with the performance objectives of 10 CFR 61

- will be disposed of pursuant to a State-approved closure plan or State-issued permit

- will be disposed of pursuant to plans developed by the Secretary of Energy in consultation with the NRC, if the wastes exceed concentration limits for Class C low-level waste (10 CFR 61.55, "Waste Classification").

In support of the planned F-Tank Farm closure action, DOE is preparing closure plans for State approval, as well as basis documentation to demonstrate that the remaining requirements of Section 3116 will be met. Toward that end, DOE issued SRS-REG-2007-00002, *Performance Assessment for the F-Tank Farm at the Savannah River Site* in June 2008. In addition, DOE has initiated the NRC consultation process for F-Tank Farm closure. As a part of the consultation process, DOE is developing draft basis document input packages and using a scoping process intended to expedite the identification of issues and assess the reasonability of DOE's approach in addressing the NDAA Section 3116 criteria. The process being used is documented in FTF-WDIP-001, *General Information Input Package for the Section 3116 Draft Basis Document for F-Tank Farm at the Savannah River Site*. This process is intended to promote a more informed and efficient consultation process with the NRC, and the preparation of a more informed draft basis document for comment.

The draft input packages will feed into the development of the draft Section 3116 basis document, which DOE will provide to the NRC for review, and which will be finalized after DOE has completed consultation with the NRC. Although not required by NDAA, DOE will also issue the draft Section 3116 basis document for public review and comment. Public comments and additional NRC comments may be made during the public comment period and NRC consultation process, respectively, for the draft 3116 basis document.

At the end of the NRC consultation process, DOE expects that the NRC will issue a technical evaluation report that concludes that, based on the information provided by DOE, there is reasonable assurance that the applicable criteria of Section 3116 can be met for residual waste associated with the F-Tank Farm. The Secretary of Energy will then issue a final determination, pursuant to Section 3116(a), that the stabilized residuals in the F-Tank Farm system are not HLW and can be disposed of in place. It is presumed that a similar process will be followed in the future for the SRS H-Tank Farm.

REFERENCES

10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.

10 CFR 61.55, "Waste Classification," *Code of Federal Regulations*, as amended.

58 FR 12342, 1993, "States of Washington and Oregon: Denial of Petition for Rulemaking," *Federal Register*, Vol. 58, pp. 12342-12347 (March 4).

67 FR 53784, 2002, "Record of Decision: Savannah River Site High-Level Waste Tank Closure," *Federal Register*, Vol. 67, pp. 53784-53787 (August 19).

Atomic Energy Act of 1954, 42 USC 2011, et seq.

DOE O 435.1, 1999, *Radioactive Waste Management*, Rev 0, U.S. Department of Energy, Washington, D.C.

FTF-WDIP-001, 2010, *General Information Input Package for the Section 3116 Draft Basis Document for F-Tank Farm at the Savannah River Site*, Rev. 0, Savannah River Remediation, LLC, Aiken, South Carolina.

Kane 2000, "Savannah River Site High Level Waste Tank Closure: Classification of Residual Waste as Incidental," (letter from W. F. Kane [NRC] to R. J. Schepens [DOE], June 30), U.S. Nuclear Regulatory Commission, Washington, D.C.

NRC 1993, "Meeting With DOE to Review New Waste Characterization Data and Current DOE Plans for Management of Tank Waste at Hanford" (letter from R. M. Bernero [NRC] to J. Lytle [DOE], March 2), U.S. Nuclear Regulatory Commission, Washington, D.C.

Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Public Law 108-375.

SRS-REG-2007-00002, 2008, *Performance Assessment for the F-Tank Farm at the Savannah River Site*, Rev. 0, WSRC Site Regulatory Integration & Planning, Aiken, South Carolina.