

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

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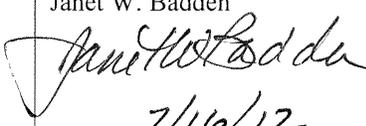
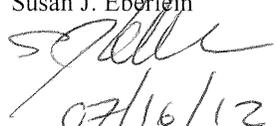
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## ABSTRACT

This plan describes the radioactive waste determination process that the U.S. Department of Energy (DOE) will use for Hanford Site Waste Management Area (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 must take to fulfill *Hanford Federal Facility Agreement and Consent Order* (HFFACO) Milestone M-045-80 (Ecology et al. 1989).

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 actions in accordance with the HFFACO and the Consent Decree in *Washington v. DOE* (Case No. CV-08-5085-FVS) (E.D.Wa. October 25, 2010). 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<sup>1</sup>.

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* 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 low-level waste.

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 determine whether 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 important 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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<sup>1</sup> Closure disposition alternatives are being evaluated under the *National Environmental Policy Act of 1969* in the Tank Closure and Waste Management Environmental Impact Statement.

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## LIST OF TERMS

### Abbreviations, Acronyms, and Initialisms

CD	Consent Decree, <i>Washington v. U.S. Department of Energy</i> Case No. 08-5085-FVS (E.D. Wa. October 25, 2010)
CERCLA	<i>Comprehensive Environmental Response, Compensation and Liability Act of 1980</i>
CFR	Code of Federal Regulations
CMS IP	Corrective Measures Study Implementation Plan
DOE	U.S. Department of Energy
FR	Federal Register
GTCC	Greater than Class C
HFFACO	<i>Hanford Federal Facility Agreement and Consent Order</i>
HLW	high-level waste
LLW	low-level waste
LTCC	Lower than Class C
NDAA	<i>Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (Public Law 108-375)</i>
NEPA	<i>National Environmental Policy Act of 1969</i>
NRC	U.S. Nuclear Regulatory Commission
ORP	Office of River Protection
PA	Performance Assessment
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
SEPA	<i>State Environmental Policy Act</i>
TC & WM EIS	<i>Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington</i>
TWRWP	Tank Waste Retrieval Work Plan
USC	U.S. Code
WIR	waste incidental to reprocessing
WMA	Waste Management Area

## 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 Milestone M-045-80 of the *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989). Milestone M-045-80 was negotiated by the HFFACO parties during the period of 2007 to 2010 while the parties were also negotiating a Consent Decree to settle a lawsuit brought by the State of Washington Department of Ecology against DOE. The HFFACO milestones (new and revised) became effective when the Consent Decree was entered by the court on October 25, 2010 (*Washington v. U.S. Department of Energy* Case No. 08-5085-FVS) (E.D.Wa. October 25, 2010) (hereinafter “CD”).

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. 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.

This document assumes that tank closure will follow retrieval in accordance with the HFFACO and the CD. Closure disposition alternatives for WMA C are being evaluated under the *National Environmental Policy Act of 1969* (NEPA), as amended, in DOE/EIS-0391, *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (TC & WM EIS). 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 are completed 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* 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 the 241-C Tank Farm (C 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:

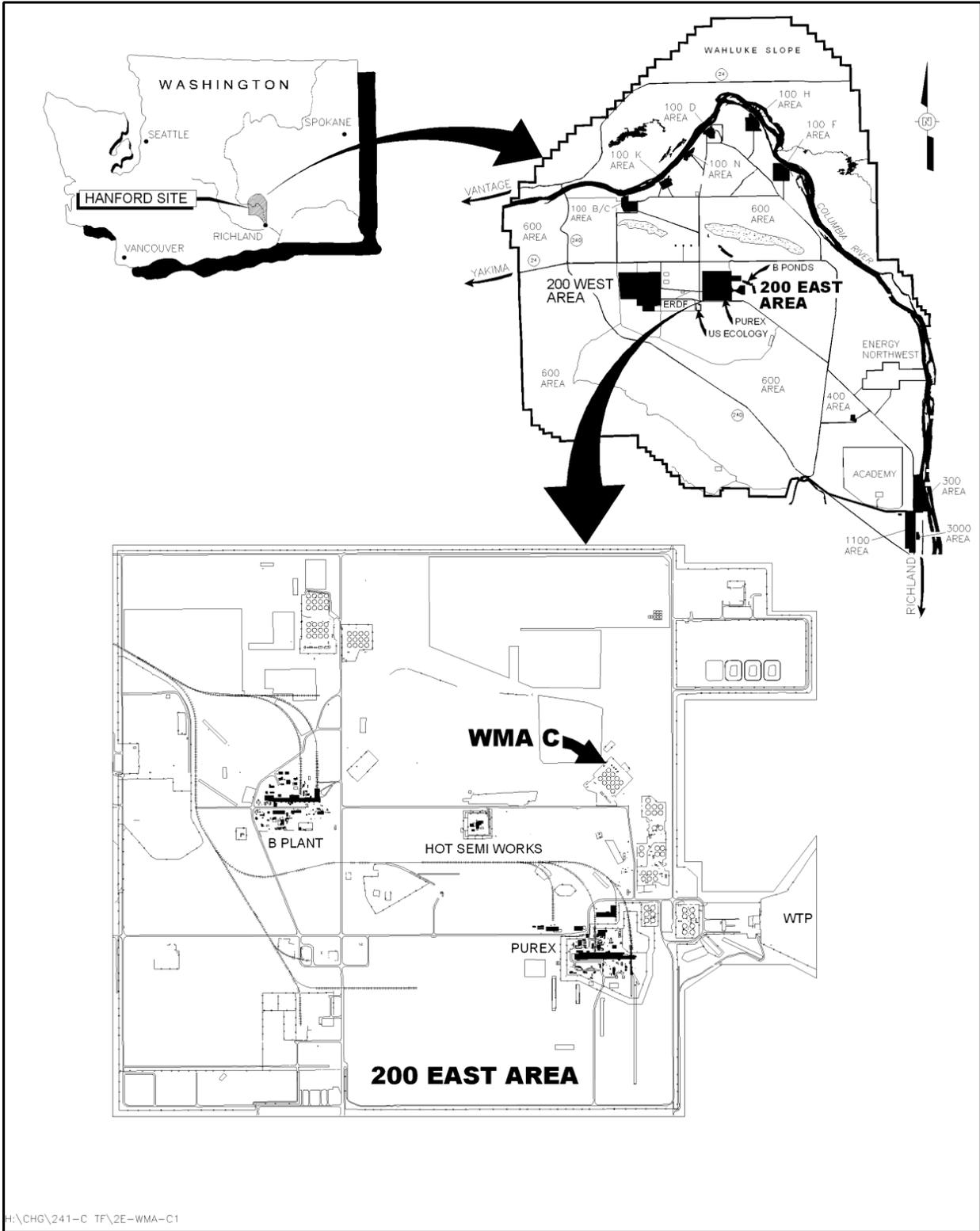
- twelve 100-series single-shell tanks, each with a 1,892,700-L (535,000-gal) operating capacity
- four 200-series single-shell tanks, each with a 208,000-L (55,000-gal) operating capacity
- waste transfer pipelines
- tank ancillary equipment, including seven diversion boxes, three valve boxes and one valve pit, the 241-C-301 catch tank, the 244-CR Vault (including four 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.

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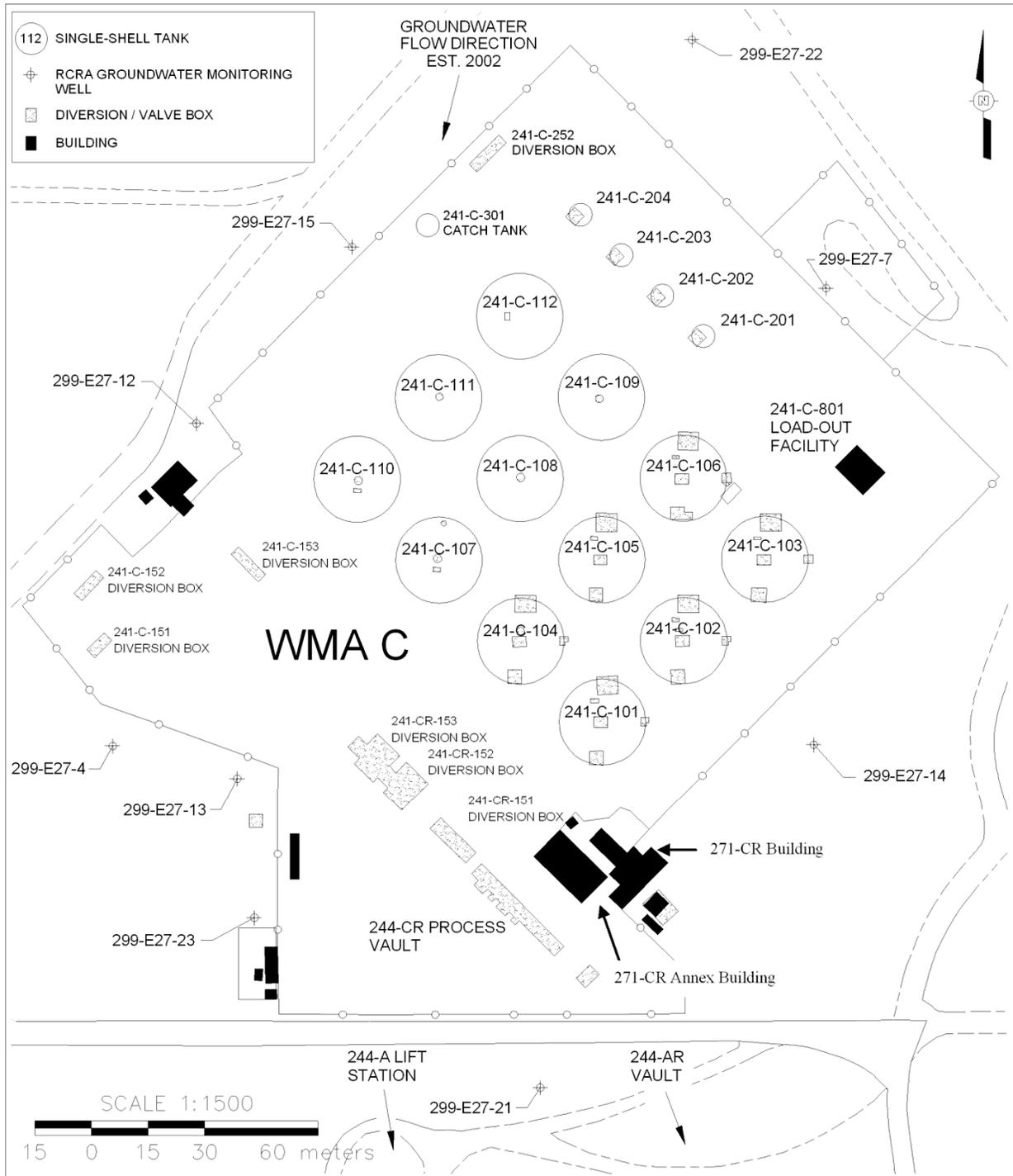
**Figure 1. Location of Waste Management Area C at the Hanford Site 200 East Area**



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Figure 2. Detail of Waste Management Area C Location



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H:\CHG\241-C TF\2E-WMA-C2A

## 1   **2.2    *ATOMIC ENERGY ACT OF 1954***

2  
3   The *Atomic Energy Act of 1954*, as amended, establishes DOE and its predecessors as the federal  
4   agencies responsible for the development and production of nuclear weapons, promotion of  
5   nuclear power, and other energy-related work. The *Energy Reorganization Act of 1974* amended  
6   the *Atomic Energy Act* to establish the Nuclear Regulatory Commission (NRC) and assigned to it  
7   regulatory responsibilities for the development and safety regulation of the civilian uses of  
8   nuclear materials.  
9

## 10   **2.3    *NUCLEAR WASTE POLICY ACT OF 1982***

11   The *Nuclear Waste Policy Act of 1982* establishes procedures for the evaluation, selection, and  
12   approval of deep geologic repositories for safe storage and/or disposal of HLW and spent nuclear  
13   fuel.  
14

15  
16   This Act provides for extensive State, Tribal, and public participation opportunities during HLW  
17   repository characterization, siting, and approval processes. If characterization of a candidate  
18   repository site indicates the site is suitable for use as a repository, Section 116 of the *Nuclear*  
19   *Waste Policy Act* allows that the Governor or legislature of the State in which such site is  
20   located, Tribal entities, and others may disapprove the site designation and submit to Congress a  
21   notice of disapproval. Any such notice is subject to Congressional review and action as specified  
22   in Section 115 of the Act.  
23

24  
25   If a candidate repository site is approved by Congress, the site is subject to NRC licensing action.  
26   Section 9 of the Act states that any repository for the disposal of high-level radioactive waste  
27   resulting from atomic energy defense activities only shall (A) be subject to licensing under  
28   Section 202 of the *Energy Reorganization Act of 1974*; and (B) comply with all requirements of  
29   the NRC for the siting, development, construction, and operation of a repository.  
30

## 31   **2.4    RADIOACTIVE WASTE CLASSIFICATION PROCESSES**

32  
33   Existing laws, regulations, and DOE Orders divide radioactive waste into three general  
34   categories, based on the radioactive content of the waste and the process history associated with  
35   the waste. These categories are HLW, transuranic waste, and low-level waste (LLW). Generally  
36   speaking, HLW is the highly radioactive material that results from the reprocessing of spent  
37   nuclear fuel. However, waste resulting from spent fuel reprocessing that is determined to be  
38   incidental to reprocessing is *not* HLW, and shall be managed as either transuranic waste or LLW.  
39   Waste resulting from the reprocessing of spent nuclear fuel that is determined not to be HLW is  
40   called waste incidental to reprocessing (WIR), and the process used to make such a  
41   determination is called the WIR process.  
42

43  
44   There are two basic frameworks for classifying waste as WIR: one provided in DOE O 435.1,  
45   and the other provided by Section 3116 of the *Ronald W. Reagan National Defense*

1 *Authorization Act for Fiscal Year 2005* (NDAA).<sup>2</sup> Under both frameworks, similar technical  
 2 evaluations and risk assessments must be used to reach waste classification decisions. However,  
 3 the frameworks differ in the level of oversight and public involvement required during the  
 4 classification process and implementation of subsequent waste management actions.

#### 6 **2.4.1 Waste Classification Under DOE O 435.1**

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

14 **2.4.1.1 Radioactive Waste Types.** The *Nuclear Waste Policy Act of 1982* and  
 15 DOE M 435.1-1, *Radioactive Waste Management Manual*, Chapter II define HLW as the highly  
 16 radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid  
 17 waste produced directly in reprocessing and any solid material derived from such liquid waste  
 18 that contains fission products in sufficient concentrations; and other highly radioactive material  
 19 that is determined, consistent with existing law, to require permanent isolation. The fission  
 20 product-bearing waste streams managed in WMA C are managed as HLW.

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

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

- 34 • HLW;
- 36 • waste that the Secretary of Energy has determined, with the concurrence of the  
 37 Administrator of the Environmental Protection Agency, does not need the degree of  
 38 isolation required by the Title 40, *Code of Federal Regulations* (CFR), Part 191,  
 39 “Environmental Radiation Protection Standards for Management and Disposal of Spent  
 40 Nuclear Fuel, High-Level and Transuranic Radioactive Wastes” disposal regulations;
- 42 • waste that the NRC has approved for disposal on a case-by-case basis in accordance with  
 43 10 CFR Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste.”

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<sup>2</sup> 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.

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

5  
6 **2.4.1.2 Waste Incidental to Reprocessing.** In accordance with authority granted under the  
7 *Atomic Energy Act of 1954*, DOE has established the WIR process for classifying certain spent  
8 fuel reprocessing waste streams as other than HLW. Such radioactive waste streams must be  
9 managed as either transuranic waste or LLW and do not require permanent isolation upon  
10 disposal.

11  
12 The WIR determination process is described in Chapter II of DOE M 435.1-1. When  
13 DOE O 435.1 is used to determine whether spent nuclear fuel reprocessing plant waste is to be  
14 managed as another waste type or as HLW, DOE uses either the WIR citation process or the  
15 WIR evaluation process.

16  
17 **2.4.1.2.1 Waste Incidental to Reprocessing Citation Process.** Waste incidental to  
18 reprocessing by citation includes some of the waste types that meet the description included in  
19 34 FR 8712, “Notice of Proposed Rulemaking” for proposed Appendix D, 10 CFR 50,  
20 “Domestic Licensing of Production and Utilization Facilities,” Paragraphs 6 and 7. Such wastes  
21 were not produced during spent nuclear fuel reprocessing, are not highly radioactive, do not  
22 contain fission products in sufficient concentrations to require permanent isolation, or are only  
23 casually (not directly) associated with spent fuel reprocessing waste. Such wastes include  
24 material that became incidentally contaminated by reprocessing wastes (e.g., laboratory items  
25 like clothing, tools, and lab equipment). Use of the WIR citation process, as opposed to the WIR  
26 evaluation process, for classification of residual waste in WMA C equipment, or of the tanks and  
27 equipment in which residuals reside, is not appropriate. However, the WIR citation process is  
28 used for other tank waste-contaminated waste streams at Hanford.

29  
30 **2.4.1.2.2 Waste Incidental to Reprocessing Evaluation Process.** Determination that any  
31 waste is incidental to reprocessing by the evaluation process requires that both the affected DOE  
32 field office and DOE Headquarters complete an in-depth evaluation of the characteristics and  
33 proposed management of the residual waste, and determine that the waste can be safely managed  
34 as either LLW or transuranic waste. Such wastes may include, but are not limited to, spent  
35 nuclear fuel reprocessing wastes that:

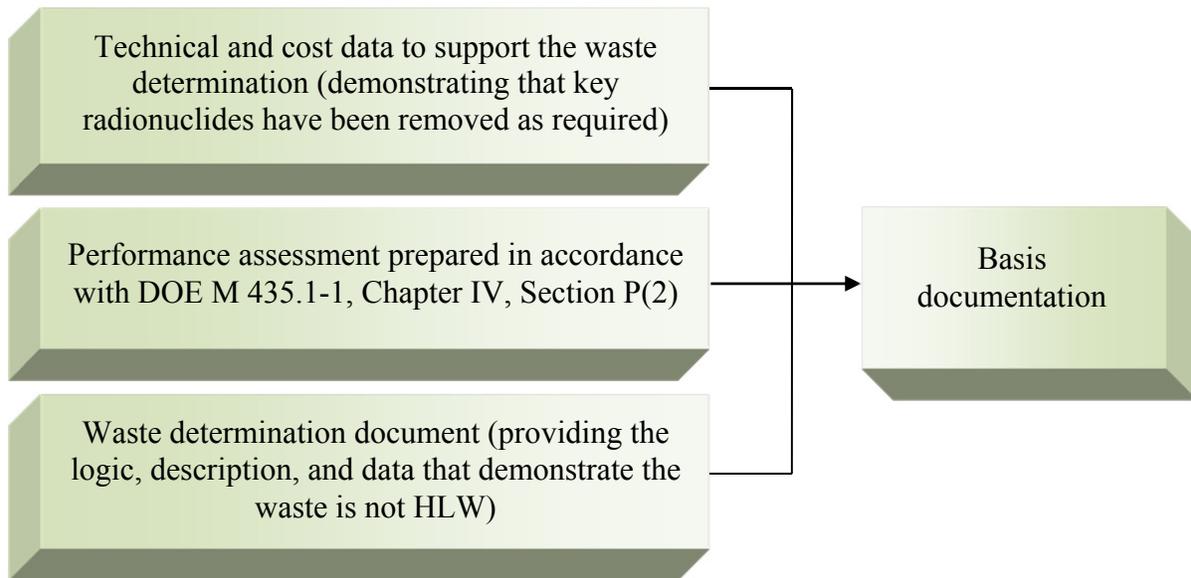
- 36  
37 a) Will be managed as LLW and meet the following criteria:
- 38 1. Have been processed, or will be processed, to remove key radionuclides to the  
39 maximum extent that is technically and economically practical; and
  - 40 2. Will be managed to meet safety requirements comparable to the performance  
41 objectives set out in 10 CFR 61, Subpart C, “Performance Objectives;” and
  - 42 3. Are to be managed, pursuant to DOE’s authority under the *Atomic Energy Act of*  
43 *1954*, as amended, and in accordance with the provisions of Chapter IV of the  
44 DOE O 435.1 implementation manual, provided the waste will be incorporated in a  
45 solid physical form at a concentration that does not exceed the applicable  
46 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 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 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**



Reference: DOE M 435.1-1, *Radioactive Waste Management Manual*.

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.

**2.4.1.2.3 Authorities.** Order DOE O 435.1 acknowledges 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 do not specifically require the formal involvement of NRC in making incidental waste determinations (and in overseeing subsequent

1 disposal of waste determined not to be HLW). However, the implementing documents also state  
2 that NRC involvement as a consultant on technical issues (and in particular in the development  
3 of the performance assessment) is recommended and strongly encouraged.  
4

#### 5 **2.4.2 Waste Classification Under Section 3116**

6

7 Subsequent to the issuance of DOE O 435.1, use of the WIR evaluation process delineated in the  
8 Order was legally challenged by the Natural Resources Defense Council in the U.S. District  
9 Court in Idaho. At issue was whether application of the DOE O 435.1 process exceeded DOE's  
10 legal authority. In 2003, the Idaho District Court decided that DOE did not have authority to  
11 classify tank waste as other than high-level (*NRDC v. Abraham*, 271 F. Supp.2d 1260). The  
12 DOE appealed the 2003 ruling, and in 2004, the U.S. Court of Appeals for the Ninth Circuit  
13 ruled that the challenge to DOE O 435.1 was not "ripe" for review (*NRDC v. Abraham*,  
14 388 F. 3d 701) because DOE had only planned to implement DOE O 435.1 to grout tanks at the  
15 Savannah River Site, but had not yet done so.  
16

17 To address the need to move forward with waste classification and tank closure actions at DOE's  
18 Idaho National Laboratory and the Savannah River Site, Congress incorporated language into the  
19 NDAA that specifically addressed the radioactive waste classification process. This language  
20 provides a statutory basis for using an evaluation process to classify waste as incidental to  
21 reprocessing.<sup>3</sup> Section 3116 of the NDAA provides that certain waste from reprocessing spent  
22 nuclear fuel is not considered HLW if the Secretary of Energy, in consultation with the NRC,  
23 determines that the waste meets the statutory criteria set forth in Section 3116(a) of the Act.  
24

25 Section 3116(a) generally reflects the waste classification requirements in DOE O 435.1, but  
26 adds requirements for NRC consultation on waste classification decisions, and both NRC and  
27 State involvement in subsequent waste disposal decisions and processes. Specifically,  
28 Section 3116(a)(3)(B)(iii) requires that disposal of waste classified as WIR must be conducted  
29 pursuant to a State-approved closure plan or State-issued permit (regulating the non-radioactive,  
30 hazardous portion of the waste), and in some cases, that the Secretary of Energy develop closure  
31 plans in consultation with the NRC. The Law also calls for the monitoring of affected disposal  
32 actions by the NRC and requires that if NRC considers that the disposal actions are not  
33 compliant with the requirements of Section 3116(a), NRC must inform the DOE, the covered  
34 State, and Congress. Notably, Section 3116 also contains specific provisions regarding judicial  
35 review of waste determinations made by the Secretary of Energy. Appendix A contains the text  
36 of Section 3116.  
37

38 It is critical to note that Section 3116 specifically limits DOE's use of the Section 3116 processes  
39 to waste that is to be disposed of only in the states of South Carolina and Idaho. The process has  
40 been successfully used to classify residual tank waste and tank system components in the State of  
41 Idaho in support of a final closure action (Appendix B). South Carolina is actively pursuing  
42 approval to classify tank waste residuals as WIR pursuant to Section 3116 (Appendix C).  
43 Section 3116 is not applicable to waste in Washington State.  
44

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<sup>3</sup> The statutory language does not affect use of the WIR citation process.

### 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 directive 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 directive addresses both the WIR citation process and the WIR evaluation process. The directive 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 directive, 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 directive 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 directive WIR evaluation process, all three criteria of the DOE M 435.1-1 evaluation process identified in requirement a) of Section 2.4.1.2.2 of this document must be met. The DOE ORP directive 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

1 performance assessment, and the waste determination itself—the document that provides, in a  
2 clear and transparent manner, the logic, description, and data required to make the determination.

3  
4 If the first two WIR classification criteria can be met, but use of an alternate concentration limit  
5 must be used to meet the third criterion (which requires that the final waste form not contain  
6 greater than Class C concentrations), the DOE ORP directive requires that NRC consultation and  
7 public comment be obtained on the waste determination documents.

#### 8 9 **2.4.4 Comparison of Waste Classification Processes**

10  
11 Both frameworks for classifying radioactive waste using an evaluative process (the DOE O 435.1  
12 WIR evaluation process and NDAA Section 3116) require detailed evaluation of waste  
13 conditions against similar criteria, as well as extensive review of those evaluations, before a  
14 waste may be classified as WIR. Both frameworks require that action be taken to remove the  
15 bulk of the high risk radionuclides from the waste before disposal and both require the  
16 development of detailed closure plans and assessments of potential long-term impacts of the  
17 closed system on human health and the environment. As noted previously, however, the  
18 frameworks differ markedly in the level of NRC oversight and public involvement required  
19 during the classification process and implementation of subsequent waste management actions.

20  
21 Section 3116 of the NDAA includes a number of provisions for review and consultation not  
22 included in DOE O 435.1. However, application of the DOE O 435.1 process at Hanford must  
23 also reflect the requirements of DOE ORP directive ESQ-EM-IP-M435.1-01, which adds certain  
24 requirements to the basic WIR evaluation process in DOE O 435.1. Tables 1 and 2 summarize  
25 the key differences between the processes.

26  
27 The DOE ORP directive guiding application of the DOE O 435.1 WIR evaluation process at  
28 Hanford modifies the WIR process to effectively mirror the requirements of NDAA  
29 Section 3116. Such modification is in keeping with informal direction from the Secretary of  
30 Energy to implement a DOE O 435.1 WIR evaluation process that meets the requirements of  
31 NDAA 3116. In practice, the clear expectation of DOE is that State involvement and NRC  
32 consultation will be components of the DOE O 435.1 WIR evaluation process at Hanford. The  
33 DOE and NRC have entered into an interagency agreement to provide for NRC consultation and  
34 review on the WMA C and single-shell tank system WIR determination. Recent modifications  
35 to the agreement can be found in Amendment of Solicitation/Modification of Contract  
36 DE-AI127-04RV14670 No. 13 which directed NRC to not incur additional costs in fiscal  
37 year 2012 due to DOE funding constraints.

38  
39 From a technical standpoint, implementation of the process pursuant to the DOE ORP directive  
40 should provide equivalency to the requirements of NDAA Section 3116.

#### 41 42 **2.5 RELATIONSHIP TO ENVIRONMENTAL IMPACT STATEMENT**

43  
44 The implementing documents for DOE O 435.1 and subsequent DOE guidance documents  
45 specify that WIR evaluation process determinations resulting in the disposal of WIR are not to be  
46 finalized until completion of appropriate evaluations under NEPA. This direction is intended to

1 prevent undue influence on the outcome of the required NEPA analyses of waste disposition  
 2 alternatives. Programmatic closure requirements for Hanford Site tank farms, including  
 3 WMA C, are evaluated in the draft TC & WM EIS.  
 4

**Table 1. Key Differences Between Waste Classification Authorities**

Area of Difference	NDAAs Section 3116	DOE O 435.1 WIR Evaluation Process	DOE O 435.1 WIR Evaluation Process as Modified by DOE ORP Directive
DOE Authority	Federal Law (NDAAs)	DOE Order, based on authority granted by <i>Atomic Energy Act of 1954</i>	DOE Order, based on authority granted by <i>Atomic Energy Act of 1954</i>
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 3 <sup>rd</sup> 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 3 <sup>rd</sup> 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  
 NDAAs = *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.

Note: it is anticipated that residuals concentrations in retrieved tanks will likely be both above and below Class C concentrations in various locations.

5  
 6

**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 Directive
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.

1

2 In this draft TC & WM EIS, DOE proposes to retrieve and treat waste from the Hanford Site  
3 single-shell tanks and ancillary equipment, and dispose of the treated waste in accordance with  
4 applicable regulatory requirements. Tank closure alternatives evaluated in the TC & WM EIS  
5 range from retrieval of 90% by volume of the contained waste and landfill closure of the system  
6 components, to complete removal of all residuals and components for ultimate disposal  
7 elsewhere. The TC & WM EIS is undergoing public review during 2010.

8

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

1 than HLW, including development of a performance assessment that demonstrates that the  
2 residues and system components can be safely disposed in situ.

3  
4 The TC & WM EIS contains a performance assessment documenting the modeled long-term  
5 impacts associated with the disposal of radioactive wastes at Hanford. Modeled scenarios  
6 include the assumed landfill closure of WMA C and other Hanford tank farms. This body of  
7 work constitutes a composite analysis of the potential long-term impacts of multiple  
8 radioactively contaminated sources on human health and the environment. Potential impacts of  
9 various WMA C closure scenarios are included as a component of the composite analysis.

10 A more detailed, WMA C-specific performance assessment also must be prepared to support the  
11 WMA C waste determination and closure action. Initial efforts to prepare a performance  
12 assessment specific to WMA C are underway as a separate effort from the TC & WM EIS  
13 process. The results of both the EIS composite analysis and WMA C performance assessment  
14 will be used in the waste determination effort that will be undertaken for WMA C tank residues  
15 and system components currently managed as HLW.

16

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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 directive ESQ-EM-IP-M435.1-1-01.

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 DOE 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.

- 1 • Ancillary equipment, pipelines, evaporators and other components that require waste  
2 determinations should be integrated into one or more planned groupings to the extent that  
3 doing so is logical and defensible.
- 4 • Groupings of tank wastes for waste determinations should not segment the demonstration  
5 that the performance objectives in 10 CFR 61.41, “Protection of the General Population  
6 from Releases of Radioactivity” can be met for groups of tank wastes contributing to the  
7 same groundwater transport path.
- 8 • Groupings of tank wastes should be consistent with applicable existing or ongoing NEPA  
9 analyses and Records of Decisions.
- 10 • Waste Determinations may be made before or after waste retrieval. For waste  
11 determinations that are based in limited part on projections made before retrieval, there  
12 must be a reasonable, logical, and defensible technical and regulatory basis for  
13 establishing final waste inventories and demonstrating that the waste determination  
14 criteria are met.

15  
16 The 2006 DOE Program Execution Plan presumes that at Hanford, initial waste determinations  
17 would be prepared for one to four single-shell tanks and would be used to establish templates for  
18 subsequent waste determinations, presumably of broader scope. As waste retrieval operations  
19 proceed at WMA C, DOE ORP is developing records for individual tanks that document the  
20 retrieval technologies used, quantify residual wastes, and evaluate residuals against performance  
21 criteria to demonstrate that HFFACO retrieval requirements have been met  
22 (e.g., RPP-RPT-35112, *Retrieval Data Report for Single-Shell Tank 241-S-112* and RPP-20658,  
23 *Basis for Exception to the Hanford Federal Facility Agreement and Consent Order Waste*  
24 *Retrieval Criteria for Single-Shell Tank 241-C-106*). However, in keeping with the  
25 considerations provided in the DOE Program Execution Plan, for WMA C DOE ORP anticipates  
26 development of a single package of evaluation process waste determination documentation that  
27 addresses the whole of WMA C. This grouping is consistent with the closure planning language  
28 in the HFFACO, the CD, the TC & WM EIS, and other documentation, as well as with  
29 operational and logistical plans for waste retrieval and closure. It is possible that the initial waste  
30 determination documentation for WMA C will be prepared before completion of retrieval  
31 actions. In this case, the documentation would contain a mixture of actual retrieval data for some  
32 of the tanks, and estimates of what is expected to be retrieved for other tanks. As retrieval  
33 operations proceed to conclusion, the waste determination documentation would then be revised  
34 and reviewed as necessary to ensure that the basis for the final waste determination is sound.

### 37 **3.2 DEVELOPMENT OF THE DOCUMENTATION**

38  
39 To complete the process of classifying tank waste to be managed as LLW using the WIR  
40 evaluation process, DOE must demonstrate that the remaining wastes will meet the criteria cited  
41 in Section 2.4.1.2(a) of this plan and summarized in Table 3. Information required to  
42 demonstrate that these criteria will be met must be prepared in accordance with the requirements  
43 of DOE ORP directive 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)
<p><b>Criterion 1:</b> Process waste to remove key radionuclides to the maximum extent technically and economically practical.</p>	<p>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.</p>
<p><b>Criterion 2:</b> Manage waste to meet requirements comparable to the performance objectives of 10 CFR 61, Subpart C.</p>	<p>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.</p>
<p><b>Criterion 3:</b> 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).</p>	<p>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 <b>OR</b> demonstrate, in consultation with NRC, that the disposal system will provide appropriate measure of protectiveness.</p>

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, Rev. 0, “Waste Incidental to Reprocessing (WIR) Determinations,” U.S. Department of Energy, Office of River Protection, Richland, Washington.

1

2 **3.2.1 Criterion 1**

3

4 Criterion 1 requires that the waste be processed to remove key radionuclides to the maximum  
5 extent technically and economically practical in order for the waste to be managed as LLW.

6 Critical to meeting this criterion will be the successful implementation of ongoing waste  
7 retrieval/removal operations in the tanks and other system components being undertaken to fulfill  
8 HFFACO commitments, and completion of necessary facility decontamination and  
9 decommissioning actions. Successful completion of these actions is expected to fulfill  
10 requirements both for classification of residuals and equipment/components as WIR, and for  
11 closure of WMA C pursuant to the HFFACO requirements.

12

13 **3.2.1.1 Requirements of DOE M 435.1-1.** The focus of Criterion 1 is on the removal of key  
14 radionuclides to the maximum extent practical. While the term “key radionuclides” is not  
15 defined by law or regulation, Chapter II of DOE M 435.1-1 states that the term applies to those  
16 radionuclides that are controlled by concentration limits in 10 CFR 61.55. Specifically, these are

1 long-lived radionuclides ( $^{14}\text{C}$ ,  $^{59}\text{Ni}$ ,  $^{94}\text{Nb}$ ,  $^{99}\text{Tc}$ ,  $^{129}\text{I}$ ,  $^{241}\text{Pu}$ ,  $^{242}\text{Cm}$ ) and alpha-emitting transuranic  
2 nuclides with half-lives greater than five years, and the short-lived radionuclides  $^3\text{H}$ ,  $^{60}\text{Co}$ ,  $^{63}\text{Ni}$ ,  
3  $^{90}\text{Sr}$ , and  $^{137}\text{Cs}$ . In addition, key radionuclides are those that are important to satisfying the  
4 performance objectives of 10 CFR 61, Subpart C (which, generally speaking, means those that  
5 contribute the highest dose consequence over time). Analysis to date at DOE sites indicates that  
6 other isotopes important to satisfying these performance objectives include  $^{79}\text{Se}$ ,  $^{126}\text{Sn}$ , and  $^{237}\text{Np}$   
7 [DOE G 435.1-1, Section II.B.(2)].  
8

9 Manual DOE M 435.1-1 clarifies that processing to remove the key radionuclides to the extent  
10 technically practical could be a chemical treatment process or a physical removal process.  
11 Selection of the chosen “technically practical process” must be evaluated to a sufficient degree  
12 through a formal, documented assessment of such factors as technical risk, incompatible physical  
13 or chemical requirements with the waste, and potential impacts to the public, the worker and the  
14 environment.  
15

16 The economically practical part of this requirement is determined by the development of total  
17 lifecycle costs for an alternative, or unit costs (e.g., cost per curie removed). Some subjectivity  
18 will be present in determining whether these costs are economically practical; however, in  
19 general, the goal should be to determine a relationship between costs and removal of the key  
20 radionuclides and identify the point in this relationship at which removal costs increase  
21 significantly and thus become impractical. An economic assessment may not be considered  
22 necessary if a technology option is not first considered to be technically practical.  
23

24 **3.2.1.2 Requirements Under the HFFACO.** Under HFFACO major Milestone M-45-00,  
25 tank closure actions will follow “retrieval of as much tank waste as technically possible, with  
26 tank waste residues not to exceed 360 cu. ft. in each of the 100 series tanks, 30 cu. ft. in each of  
27 the 200 series tanks, or the limit of waste retrieval technology capability, whichever is less.”  
28 Thus, the retrieval goal is a volumetric goal rather than one based on removal of particular  
29 radionuclides (i.e., key radionuclides) as necessary to achieve a modeled system performance  
30 goal. If retrieval to the volumetric goal levels is not possible for any given tank, under the  
31 HFFACO, DOE must submit a detailed explanation to both the U.S. Environmental Protection  
32 Agency and the Washington State Department of Ecology for approval. The retrieval process is  
33 further defined in Appendices H and I of the HFFACO Action Plan, as well as in the CD.  
34

35 Appendix H of the HFFACO Action Plan specifies that DOE must “establish an interface with  
36 NRC and reach formal agreement on the retrieval and closure actions for single shell tanks with  
37 respect to allowable waste residuals in the tank and soil column.” Based on this interface and the  
38 outcome of tank waste retrieval demonstrations, DOE is to establish formal criteria for retrieval  
39 of waste from the remaining single-shell tanks. Initial retrieval actions have been completed at  
40 several WMA C tanks, and some of the results shared with NRC for review and discussion. See  
41 as an example Letter 08-TPD-017, “Update to the Basis for Exception to the Hanford Federal  
42 Facility Agreement and Consent Order (HFFACO) Retrieval Criteria for Single-Shell Tank  
43 (SST) 241-C-106, Request for Nuclear Regulatory Commission (NRC) Review.” Feedback  
44 from the NRC (Letter NRC 2009, “Request for Additional Information on Update to the Basis  
45 for Exception to the Hanford Federal Facility Agreement and Consent Order Retrieval Criteria

1 for Single-Shell Tank 241-C-106, Request for U.S. Nuclear Regulatory Commission Review”) is  
2 being incorporated into subsequent retrieval plans and actions.

3  
4 Appendix I of the HFFACO Action Plan, Section 2.1.3, states that for any given tank or set of  
5 tanks and their associated ancillary equipment, proposed tank waste retrieval technologies and  
6 the rationale for selecting the technologies will be documented in a Tank Waste Retrieval Work  
7 Plan (TWRWP; e.g., RPP-37739, *241-C-111 Tank Waste Retrieval Work Plan*). Approved  
8 TWRWPs also contain a pre-retrieval risk assessment of potential residuals, consideration of past  
9 leaks, and potential leaks during retrieval, based on available data. After completing retrieval  
10 operations in accordance with the TWRWP, DOE prepares a retrieval data report in accordance  
11 with Section 2.1.7 of HFFACO Action Plan Appendix I (e.g., RPP-RPT-35112). Retrieval data  
12 reports include the following information:

- 13
- 14 • residual tank waste volume measurement
- 15
- 16 • results of residual tank waste characterization
- 17
- 18 • retrieval technology performance assessment
- 19
- 20 • updated post-retrieval risk assessment
- 21
- 22 • discussion of the feasibility/viability of other retrieval technologies, including cost  
23 estimates.
- 24

25 **3.2.1.3 Documentation Required to Demonstrate Compliance.** Both the DOE-driven  
26 requirements and the requirements of the HFFACO and CD mandate that the significant portion  
27 of tank residues be removed from tanks and equipment before closure in place could occur.  
28 However, the various DOE-driven requirements and the HFFACO/CD differ in how they define  
29 what constitutes the “significant portion” of the waste. Additionally, they define successful  
30 completion of waste retrieval somewhat differently.

31  
32 In preparing guidance for NRC participation in the conduct of DOE waste determinations  
33 (NUREG-1854, *NRC Staff Guidance for Activities Related to U.S. Department of Energy Waste*  
34 *Determinations – Draft Final Report for Interim Use*), NRC noted that the purpose of various  
35 criteria related to radionuclide removal is to minimize the inventory of highly radioactive  
36 radionuclides disposed of as incidental waste. The NRC states, “In many cases, the intent of  
37 requiring removal of highly radioactive radionuclides to the maximum extent practical can be  
38 satisfied by reducing the volume of residual waste in a contaminated structure (e.g., a tank, an  
39 evaporator) to the maximum extent practical. However, evaluating alternative methods of  
40 physically removing waste from a structure does not eliminate the need to consider (1) whether it  
41 would be practical to remove selected highly radioactive radionuclides from the waste (e.g., by  
42 chemical extraction) or (2) whether it would be practical to remove the contaminated structure  
43 for disposal instead of stabilizing it and disposing of it in place.”

44  
45 Although completion of retrieval actions in accordance with HFFACO-driven TWRWPs and as  
46 documented in Retrieval Data Reports does not guarantee that tank waste retrieval actions will

1 meet the DOE requirements for waste removal, DOE ORP directive ESQ-EM-IP-M435.1—01  
 2 recognizes the differences in the two sets of requirements, and sets forth specific direction  
 3 regarding how to demonstrate a given retrieval action will meet DOE M 435.1-1 WIR evaluation  
 4 process Criterion 1 (Table 4).  
 5

**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 Directive
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 <ul style="list-style-type: none"> <li>• Specific analysis of removal of key radionuclides</li> </ul>
Remove to the maximum extent technically and economically practical <ul style="list-style-type: none"> <li>• Technical risk</li> <li>• Incompatible physical or chemical requirements with the waste</li> <li>• Potential impacts to the public, the worker and the environment</li> <li>• Total lifecycle costs, or unit costs</li> </ul>	<p><b>For HFFACO governed tanks<sup>a</sup>:</b> 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).</p> <p><b>For Consent Decree governed tanks<sup>b</sup>:</b> Retrieve using initial technology to limits of technology and meet volumetric retrieval goal; if volumetric retrieval goal is not met, use second and third technology to limits of technology as necessary to meet volumetric retrieval goal, or for third technology submit a practicability demonstration.</p> <p>“Limits of technology” takes into account</p> <ul style="list-style-type: none"> <li>• Retrieval duration</li> <li>• Risk reduction</li> <li>• Facilitating tank closures</li> <li>• Costs</li> <li>• Potential for exacerbating leaks</li> <li>• Worker safety</li> <li>• Overall impact on the tank waste retrieval and treatment mission</li> </ul> <p>“Limits of Technology” in Consent Decree is defined as <i>“the recovery rate of that retrieval technology or that tank is, or has become, limited to such an extent that it extends the retrieval duration to the point at which continued operation of the retrieval technology is not practicable...”</i></p>	<ul style="list-style-type: none"> <li>• Radioactive material removal effectiveness and efficiency</li> <li>• Programmatic and technical risk</li> <li>• Possible constraints due to physical or chemical incompatibility</li> <li>• Potential impacts to the public, workers, and environment</li> </ul>

DOE = U.S. Department of Energy  
 ORP = Office of River Protection

HFFACO = Hanford Federal Facility Agreement and Consent Order  
 WIR = Waste Incidental to Reprocessing

References:

10 CFR 61.55, “Waste Classification,” *Code of Federal Regulations*, as amended.  
 Consent Decree, *Washington v. U.S. Department of Energy* Case No. 08 5085-FVS (E.D. Wa. October 25, 2010).  
 DOE O 435.1, 1999, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

<sup>a</sup> HFFACO governed tanks are: 241-C-103, 241-C-106, 241-C-201, 241-C-202, 241-C-203, and 241-C-204.

<sup>b</sup> Consent Decree governed tanks are: 241-C-101, 241-C-102, 241-C-104, 241-C-105, 241-C-107, 241-C-108, 241-C-109, 241-C-110, 241-C-111, and 241-C-112.

### 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 directive 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.

1 Demonstration that these radiation protection requirements will be met by the assumed  
2 radioactive waste disposal action at WMA C requires the development of a formal performance  
3 assessment (i.e., a computer-based simulation of the in-place disposal of residual WMA C waste  
4 and remaining decommissioned equipment/components). A scoping effort is underway to  
5 support the development of a detailed performance assessment for WMA C that is consistent  
6 with the requirements of DOE M 435.1-1, Chapter IV. The Chapter IV performance objectives  
7 [Section IV.P.(1)] are considered comparable to those at 10 CFR 61, Subpart C.  
8

9 The source term that will be used for the performance assessment will be based on the best  
10 available information, which for some tanks and soil sites within WMA C may be best estimates  
11 generated prior to completion of retrieval operations and soil site corrective actions. Information  
12 regarding tank source terms and risks will be drawn as appropriate from TWRWPs and retrieval  
13 data reports being prepared to meet HFFACO requirements. Source term data and performance  
14 assessment results will be reviewed as retrieval and corrective actions progress, and will be  
15 updated as necessary to ensure the waste determination basis document adequately assesses the  
16 expected performance of the WMA C closure action.  
17

18 In addition to the WMA C-specific performance assessment, a composite analysis has been  
19 developed to support the TC & WM EIS. This composite analysis examines the cumulative  
20 impacts of the WMA C closure action together with other actions at Hanford that will leave  
21 radioactive material permanently in place. Planned methods of waste stabilization, tank backfill,  
22 and intrusion barriers are factored into the development of both the composite analysis and the  
23 performance analysis, and these methods will be documented in the waste determination basis  
24 document. This document will also contain information necessary to demonstrate that the design  
25 of the closed facility will achieve long-term stability and will meet performance standards  
26 without implementation of ongoing maintenance during the computer-simulated post-closure  
27 period.  
28

### 29 **3.2.3 Criterion 3**

30

31 Criterion 3 requires that waste be managed in accordance with DOE M 435.1-1, Chapter IV.  
32 Chapter IV contains requirements for management of LLW (e.g., waste storage, treatment, and  
33 disposal). Additionally, waste must be incorporated into a solid physical form at a concentration  
34 not exceeding limits for Class C LLW as set out in 10 CFR 61.55, or the waste form must meet  
35 alternative requirements as authorized by DOE in consultation with NRC. Based on the  
36 expectation of less than complete mixing, it is likely that the waste form will need to meet  
37 alternative requirements.  
38

39 Generally speaking, 10 CFR 61 defines Class C (and greater-than-Class-C) waste as that which  
40 will not decay to levels that present an acceptable hazard to an intruder within 100 years after  
41 closure [10 CFR 61.7, "Concepts," subsection (b) "Waste classification and near-surface  
42 disposal," item (5)]. More specific guidance on identification of Class C waste is provided at  
43 10 CFR 55, "Operators' Licenses," which identifies a numeric evaluation process for radioactive  
44 waste classification based on the concentrations of specific radionuclides in the waste form at the  
45 time of closure. Waste that contains greater than Class C levels of certain radionuclides is  
46 generally considered unsuitable for near-surface disposal and more appropriate for disposal in a

1 geologic repository, unless it can be demonstrated that the proposed near-surface disposal system  
 2 will provide an appropriate measure of protectiveness. “Near-surface disposal facility” means a  
 3 land disposal facility in which radioactive waste is disposed of in or within the upper 30 meters  
 4 of the earth’s surface (10 CFR 61.2, “Definitions”). If final waste form radionuclide  
 5 concentrations will be present at greater than Class C concentrations, the demonstration that the  
 6 disposal system will be protective of human health is accomplished by modeling various  
 7 exposure scenarios as a part of the system performance assessment.

8  
 9 The determination regarding whether a waste can be safely disposed near the surface hinges on  
 10 how much waste will remain after retrieval, how the remaining waste will be stabilized, and the  
 11 engineered controls that will be in place to protect intruders from exposure after a presumed loss  
 12 of institutional controls 100 years after closure. Directive ESQ-EM-IP-M435.1-1-01 from  
 13 DOE ORP directs that to demonstrate compliance with WIR evaluation process Criterion 3, the  
 14 WIR determination basis documentation must address the following:

- 15  
 16 • waste stabilization method to be used, including rationale for concentration averaging,  
 17 **AND**
- 18 • calculations demonstrating that the concentrations of radionuclides remaining in the  
 19 waste will not be greater than Class C **OR**
- 20 • a demonstration (i.e., modeling results contained in the performance assessment),  
 21 prepared in consultation with NRC, that the disposal system will provide appropriate  
 22 measure of protectiveness.

23  
 24 To demonstrate that the NRC concentration limits will be met, DOE must compare, by major  
 25 radionuclide, the expected concentration after the proposed waste treatment process with the  
 26 limits as provided at 10 CFR 61.55. Dilution of a waste stream to meet the concentration limits  
 27 established in 10 CFR 61.55 is not permitted. While it is recognized that in the course of  
 28 stabilizing a waste or waste system (e.g., grouting a tank to fill void space to prevent subsequent  
 29 subsidence) some changes in waste concentration may occur, actions to dilute a waste stream to  
 30 meet Class C concentration limits are prohibited. The NRC has prepared a Branch Technical  
 31 Position on concentration averaging (Letter NRC 1995, “Issuance of Final Branch Technical  
 32 Position on Concentration Averaging and Encapsulation, Revision in Part to Waste Classification  
 33 Technical Position”) that supports the regulation at 10 CFR 61.55(a)(8), and that may be useful  
 34 in making determinations. The Branch Technical Position states that, “the concentration of a  
 35 radionuclide (in waste) may be averaged over the volume of the waste, or weight of the waste if  
 36 the units (on the values tabulated in the concentration tables) are expressed as nanocuries per  
 37 gram.” This Branch Technical Position provides specific guidance to waste generators on the  
 38 interpretation of the requirements in 10 CFR 61.55 as it applies to a variety of types and forms of  
 39 LLW. Further guidance on concentration averaging is provided by the NRC in NUREG-1854.

40  
 41 If the final waste form will not meet NRC concentration limits in 10 CFR 61.55, alternative  
 42 requirements may be approved to allow near-surface disposal of such wastes after demonstration  
 43 that the final disposal system will provide an appropriate measure of protectiveness. Similar  
 44 provisions for such demonstrations are provided in both DOE M 435.1-1, Chapter IV and in  
 45 NRC’s ruling at 10 CFR 61.58, “Alternative Requirements for Waste Classification and

1 Characteristics.” The analysis must provide reasonable expectation that after evaluation of the  
 2 specific characteristics of the waste, disposal site, and method of disposal, compliance with the  
 3 LLW performance objectives can be achieved. If required for WMA C, this analysis will be  
 4 based on the results of the performance assessment that is already under development.  
 5

#### 6 **3.2.4 Document Development Process**

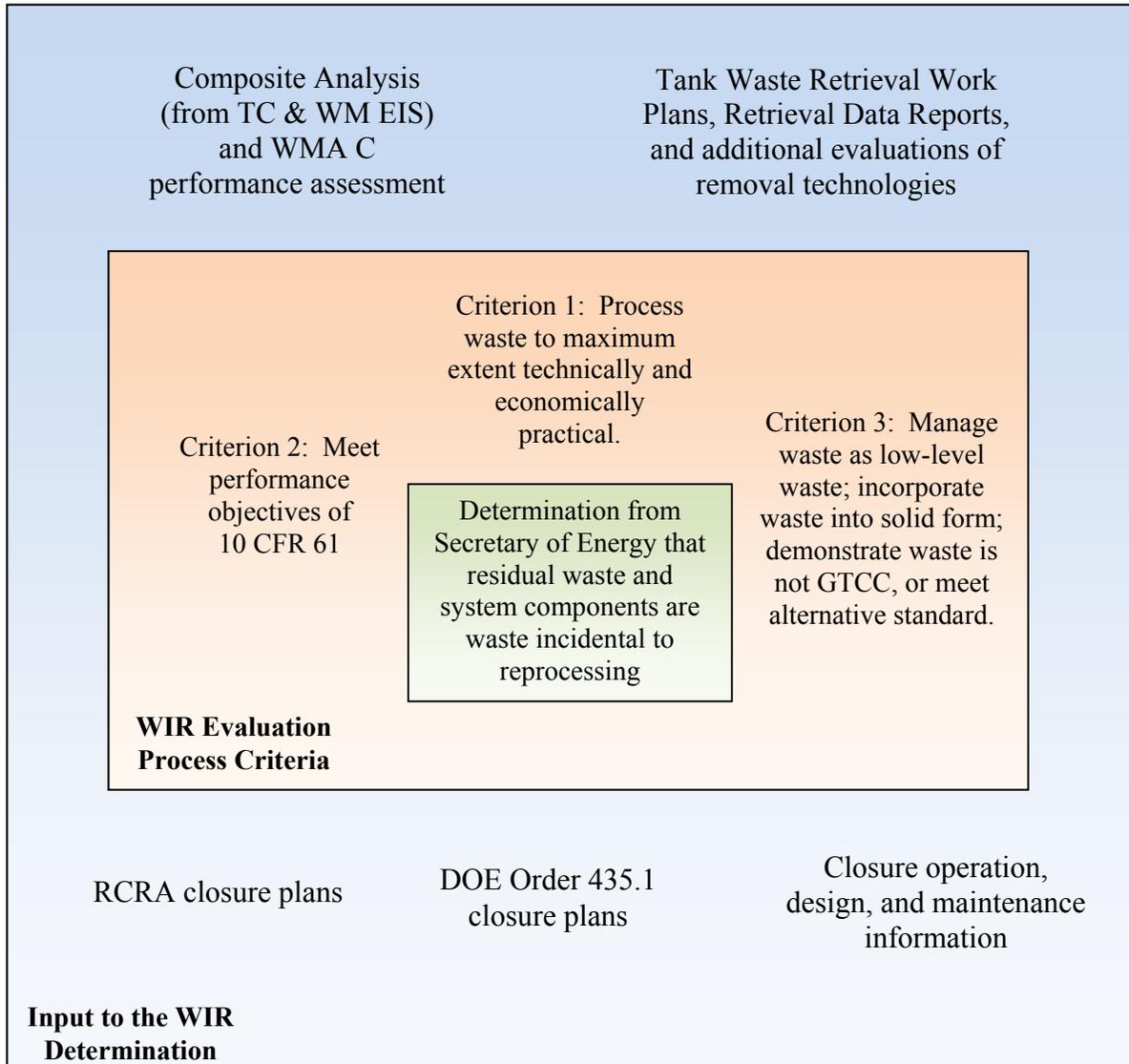
7  
 8 The WIR determination basis documentation for WMA C must include or provide by reference  
 9 all the information required to demonstrate that the waste residues and system components  
 10 subject to the determination meet the three DOE M 435.1-1 WIR evaluation process criteria.  
 11 Input required to support a WIR determination is depicted in the blue area of Figure 4.  
 12

13 Preparation of many of the documents identified in Figure 4 will begin soon or is already  
 14 underway. Successful completion of the HFFACO Milestone M-045-83 requirement to  
 15 complete closure of WMA C by June 30, 2019 requires that several of the documents be  
 16 developed and approved in parallel. For example, the WMA C performance assessment is  
 17 already under development, although a final closure decision will not be reached until the  
 18 TC & WM EIS record of decision is published and various closure plans and permits are  
 19 approved. Such challenges can be overcome with thoughtful development of the documents.  
 20 The WMA C performance assessment, for example, includes evaluation of multiple potential  
 21 closure scenarios, such that when a final closure decision is made, the appropriate information  
 22 will be available in the performance assessment to support the WIR determination.  
 23

24 To promote efficient processing of the WIR determination supporting documents, DOE is  
 25 committed to involving State and Federal agency representatives and stakeholders in the  
 26 document development process. Examples are as follows.  
 27

- 28 • Development of the TC & WM EIS (and the associated composite analysis) is complying  
 29 with NEPA requirements for public review and involvement. That document recently  
 30 underwent public review, and comments are being addressed. Additionally, the  
 31 Washington State Department of Ecology is a cooperating agency in the development of  
 32 this EIS and, as such, is actively involved in the development and review of the  
 33 document.  
 34
- 35 • The WMA C performance assessment is being developed with extensive input from  
 36 stakeholders and regulators. Input to the performance assessment is reviewed on a  
 37 regular basis in a workshop setting that includes representatives of local and regional  
 38 stakeholder groups, State and Federal regulating agencies, the NRC, and DOE  
 39 Headquarters. Additionally, briefings on the performance assessment development  
 40 process are provided periodically to a larger audience of stakeholders.  
 41
- 42 • In the future, the *Resource Conservation and Recovery Act of 1976* (RCRA) closure plans  
 43 and Phase 2 RCRA Facility Investigation/Corrective Measures Study (and resulting  
 44 decisions and permits) that are necessary to complete WMA C closure will also be  
 45 developed with input from the public and stakeholders, in keeping with RCRA and  
 46 HFFACO requirements.

1 **Figure 4. Documentation Required for Waste Incidental to Reprocessing Determination**



34 DOE = U.S. Department of Energy  
 35 GTCC = Greater than Class C  
 36 RCRA = *Resource Conservation and Recovery Act of 1976*  
 37 TC & WM EIS = *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland,*  
 38 *Washington*

WIR = Waste Incidental to Reprocessing  
 WMA = Waste Management Area

39 References:  
 40 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.  
 41 DOE Order 435.1, 1999, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

43 The DOE believes that development of these documents in an open environment will result in  
 44 the expeditious review and approval of the final draft documents and will enable DOE to achieve  
 45 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 vary somewhat from the requirements that are applicable to WMA C, as defined in the 2006 DOE Program Execution Plan and in DOE ORP directive ESQ-EM-IP-M435.1-1-01. The DOE ORP directive 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. Order 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.

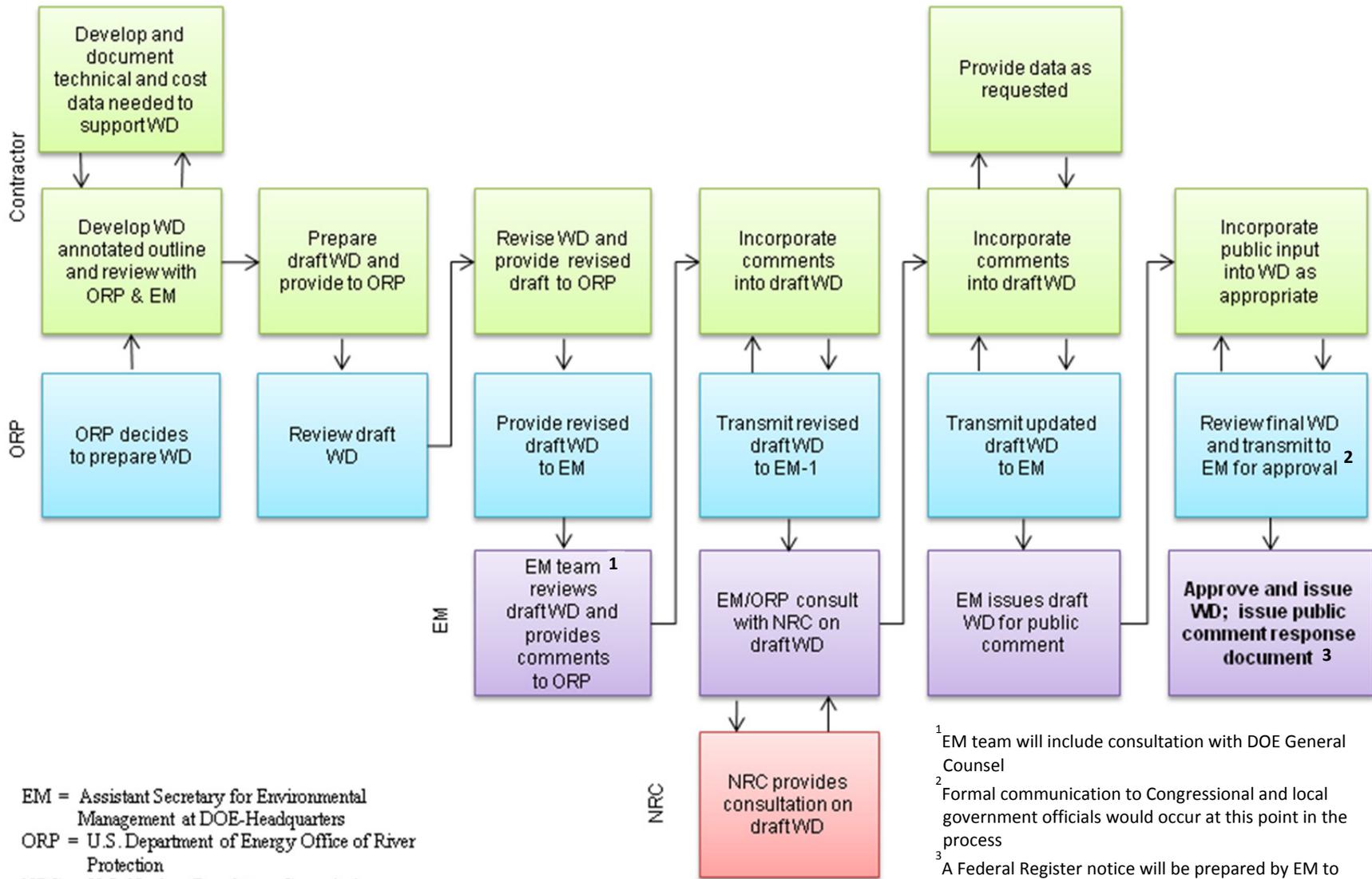
The initial closure decision for WMA C will be made as an outcome of the TC & WM EIS. The WMA C closure action will be conducted under the State-issued Hanford Sitewide RCRA permit in accordance with a State-approved closure plan. Soil remediation actions will be undertaken pursuant to a RCRA-driven 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.

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

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RPP-PLAN-47325, Rev. 1

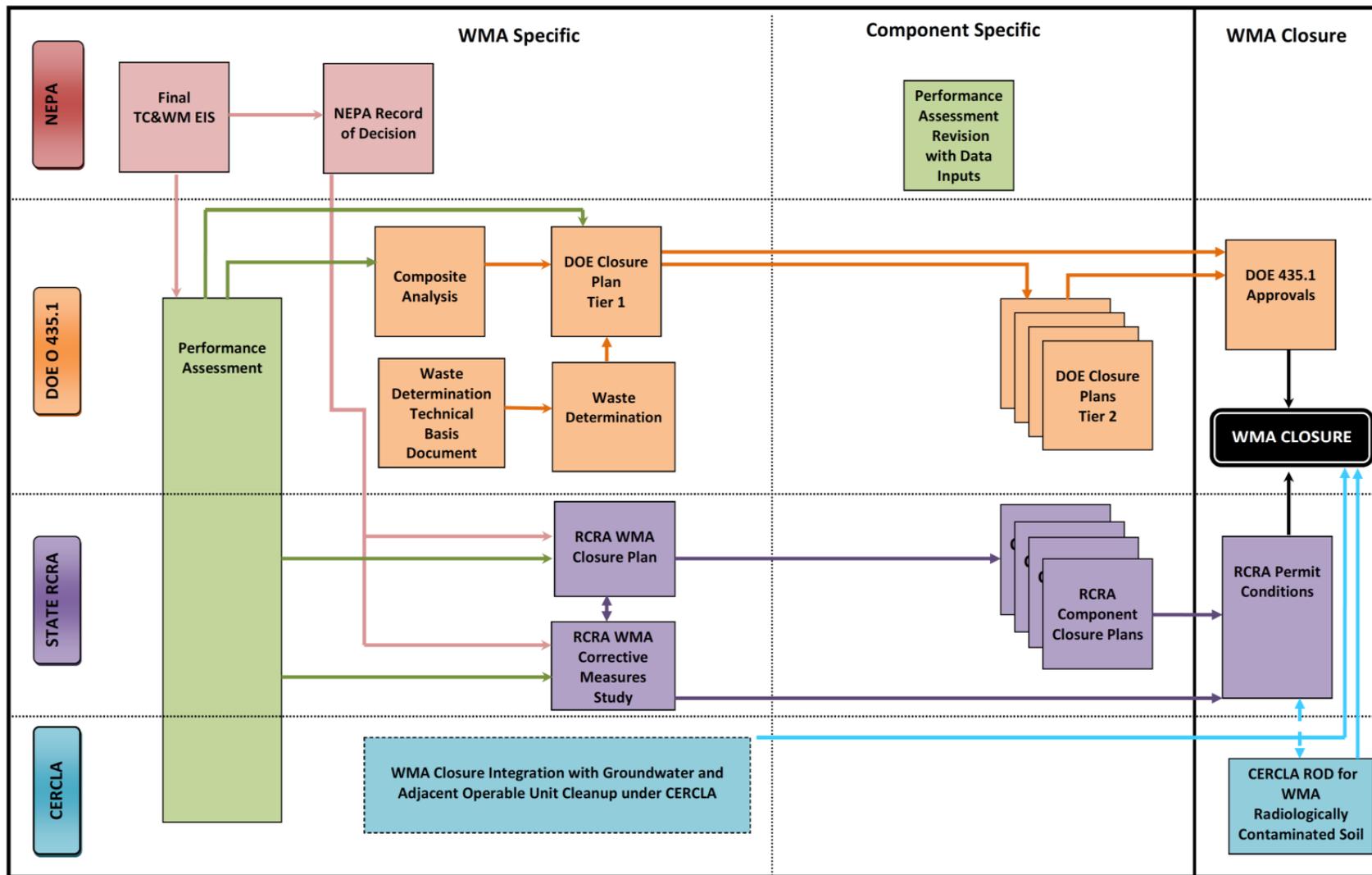
EM = Assistant Secretary for Environmental Management at DOE-Headquarters  
 ORP = U.S. Department of Energy Office of River Protection  
 NRC = U.S. Nuclear Regulatory Commission  
 WD = Waste Determination

<sup>1</sup> EM team will include consultation with DOE General Counsel  
<sup>2</sup> Formal communication to Congressional and local government officials would occur at this point in the process  
<sup>3</sup> A Federal Register notice will be prepared by EM to announce availability of the public comment response document

1  
2

Figure 6. Regulatory Framework

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RPP-PLAN-47325, Rev. 1

3  
4  
5  
6

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act of 1980

NEPA = National Environmental Policy Act of 1969

TC & WM EIS = Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington

RCRA = Resource Conservation and Recovery Act of 1976

DOE = U.S. Department of Energy

ROD = Record of Decision

WMA = Waste Management Area

1                                   **4.0     PROJECT ACTIVITIES AND DURATIONS**  
2

3     The HFFACO Milestone M-045-83 calls for completing closure of WMA C by June 30, 2019.  
4     Achievement of that goal requires numerous supporting documents and tasks to be completed.  
5     Figure 7 illustrates the various high-level actions and estimated durations to complete closure of  
6     WMA C, including those associated with the radioactive waste determination process.  
7

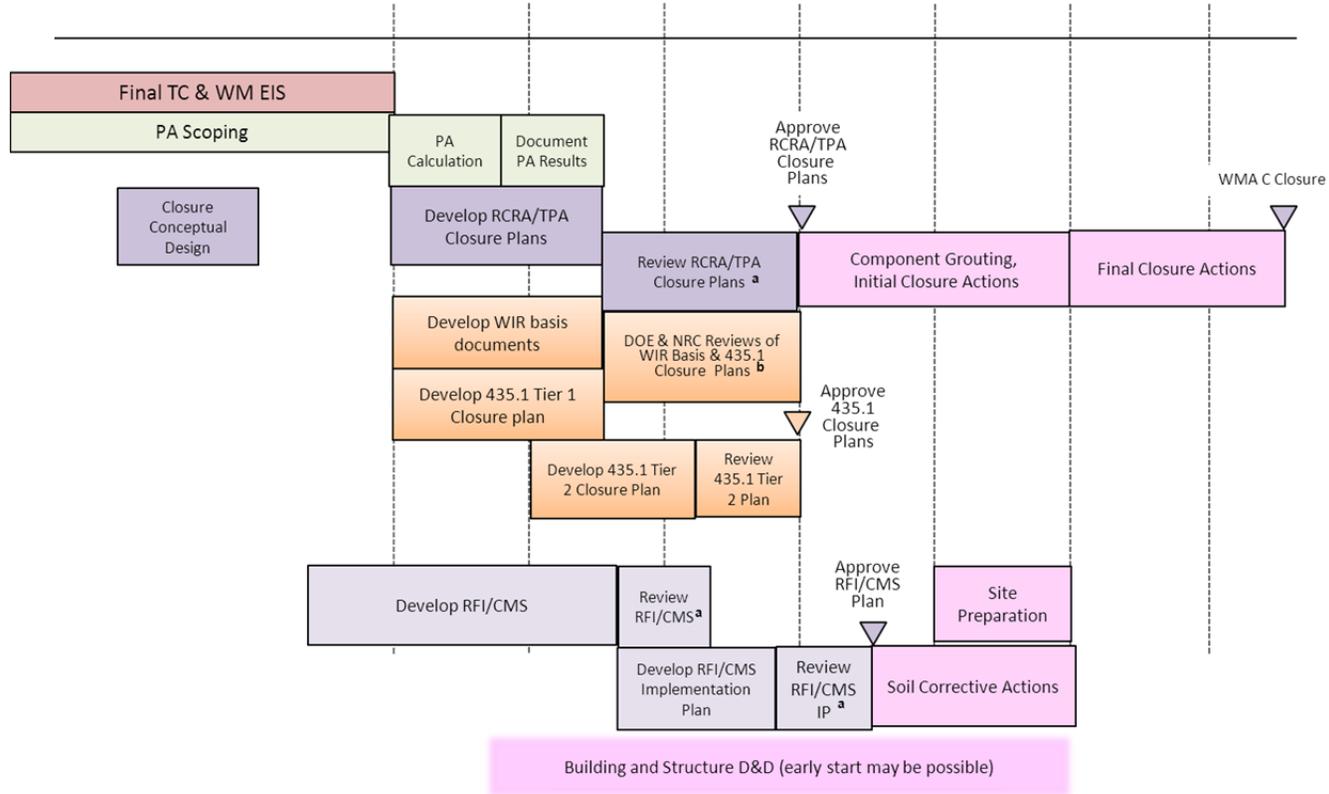
8     At a more detailed level, WMA C closure planning integrates preparation, review, and approval  
9     (as applicable) of the following documents:

- 10             •    TC & WM EIS
- 11
- 12
- 13             •    WMA C performance assessment
- 14
- 15             •    DOE O 435.1 WIR determination basis documentation
- 16
- 17             •    DOE O 435.1 Tier 1 and Tier 2 closure plans
- 18
- 19             •    Tier II (WMA C) and Tier III (component) RCRA closure plans and modification of the  
20                 Hanford Site RCRA permit
- 21
- 22             •    related soil and groundwater cleanup action documentation and decisions
- 23
- 24             •    closure design studies and documents.
- 25

26     Preparation and approval of several of the aforementioned documents are addressed in more  
27     detail in *Single-Shell Tank System Waste Retrieval and Closure Process* (HFFACO  
28     Attachment 2, Appendix I). Although not shown in Figure 7, opportunities for stakeholder  
29     reviews and involvement are associated with many of the documents required for WMA C  
30     closure, as discussed previously in this plan.  
31

1  
2

Figure 7. Proposed Waste Management Area C Activity Logic and Estimated Durations\*



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\* Vertical lines denote one year estimated minimum durations if all activities are fully funded.

<sup>a</sup> RCRA/TPA plans and State review and approvals include the RCRA Facility Investigation/Corrective Measures Study and the RFI/CMS Implementation Plan 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.

<sup>b</sup> DOE and NRC reviews of the WIR Basis and DOE O 435.1, *Radioactive Waste Management* closure plans will include State and public review as identified in DOE Directive ESQ-EM-IP-M435.1-1-01, "Waste Incidental to Reprocessing (WIR) Determinations."

CMS IP = Corrective Measures Study Implementation Plan

NRC = U.S. Nuclear Regulatory Commission

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*

TPA = *Hanford Federal Facility Agreement and Consent Order – Tri-Party Agreement*

WMA = Waste Management Area

DOE = U.S. Department of Energy

PA = performance assessment

RFI/CMS = RCRA Facility Investigation/Corrective Measures Study

WIR = Waste Incidental to Reprocessing

**5.0 REFERENCES**

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2  
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- 29 RPP-37739, 2009, *241-C-111 Tank Waste Retrieval Work Plan*, Rev. 1, Washington River  
30 Protection Solutions, LLC, Richland, Washington.
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32 *Plan for Waste Management Area C*, Rev. 1B, Washington River Protection  
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- 1 RPP-RPT-38152, 2008, *Data Quality Objectives Report Phase 2 Characterization for Waste*  
2 *Management Area C RCRA Field Investigation/Corrective Measures Study*, Rev. 0,  
3 Cenibark International, Inc., Richland, Washington.
- 4 SECY-97-083, 1997, "Classification of Hanford Low-Activity Tank Waste Fraction as  
5 Incidental" (internal letter from L. J. Callan to The Commissioners, April 14),  
6 U.S. Nuclear Regulatory Commission, Washington, D.C.
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- 8 Washington v. DOE, 2009, *State of Washington, Plaintiff, v. Steven Chu, Secretary of the United*  
9 *States Department of Energy, and the United States Department of Energy, Defendants*,  
10 No. CV-08-5085-FVS, United States District Court, Eastern District of Washington.
- 11 *West Valley Demonstration Project Act of 1980*, Public Law 96-368.

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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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1  
2                   **SEC. 3116. DEFENSE SITE ACCELERATION COMPLETION.**  
3

- 4 (a) IN GENERAL.—Notwithstanding the provisions of the Nuclear Waste Policy Act of 1982,  
5 the requirements of section 202 of the Energy Reorganization Act of 1974, and other laws  
6 that define classes of radioactive waste, with respect to material stored at a Department of  
7 Energy site at which activities are regulated by a covered State pursuant to approved closure  
8 plans or permits issued by the State, the term “high-level radioactive waste” does not include  
9 radioactive waste resulting from the reprocessing of spent nuclear fuel that the Secretary of  
10 Energy (in this section referred to as the “Secretary”), in consultation with the Nuclear  
11 Regulatory Commission (in this section referred to as the “Commission”), determines—  
12 (1) does not require permanent isolation in a deep geologic repository for spent fuel or high-  
13 level radioactive waste;  
14 (2) has had highly radioactive radionuclides removed to the maximum extent practical; and  
15 (3)(A) does not exceed concentration limits for Class C low-level waste as set out in  
16 section 61.55 of title 10, Code of Federal Regulations, and will be disposed of—  
17 (i) in compliance with the performance objectives set out in subpart C of part 61 of  
18 title 10, Code of Federal Regulations; and  
19 (ii) pursuant to a State-approved closure plan or State-issued permit, authority for the  
20 approval or issuance of which is conferred on the State outside of this section;  
21 or  
22 (B) exceeds concentration limits for Class C low-level waste as set out in section 61.55 of  
23 title 10, Code of Federal Regulations, but will be disposed of—  
24 (i) in compliance with the performance objectives set out in subpart C of part 61 of  
25 title 10, Code of Federal Regulations;  
26 (ii) pursuant to a State-approved closure plan or State-issued permit, authority for the  
27 approval or issuance of which is conferred on the State outside of this section; and  
28 (iii) pursuant to plans developed by the Secretary in consultation with the Commission.  
29
- 30 (b) MONITORING BY NUCLEAR REGULATORY COMMISSION.—  
31 (1) The Commission shall, in coordination with the covered State, monitor disposal actions  
32 taken by the Department of Energy pursuant to subparagraphs (A) and (B) of  
33 subsection (a)(3) for the purpose of assessing compliance with the performance objectives  
34 set out in subpart C of part 61 of title 10, Code of Federal Regulations.  
35 (2) If the Commission considers any disposal actions taken by the Department of Energy  
36 pursuant to those subparagraphs to be not in compliance with those performance  
37 objectives, the Commission shall, as soon as practicable after discovery of the  
38 noncompliant conditions, inform the Department of Energy, the covered State, and the  
39 following congressional committees:  
40 (A) The Committee on Armed Services, the Committee on Energy and Commerce, and  
41 the Committee on Appropriations of the House of Representatives.  
42 (B) The Committee on Armed Services, the Committee on Energy and Natural Resources,  
43 the Committee on Environment and Public Works, and the Committee on  
44 Appropriations of the Senate.  
45 (3) For fiscal year 2005, the Secretary shall, from amounts available for defense site  
46 acceleration completion, reimburse the Commission for all expenses, including salaries,

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

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

13  
14 (c) INAPPLICABILITY TO CERTAIN MATERIALS.—Subsection (a) shall not apply to any  
15 material otherwise covered by that subsection that is transported from the covered State.  
16

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

18 (1) The State of South Carolina.

19 (2) The State of Idaho.

20  
21 (e) CONSTRUCTION.—

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

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

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

31 (4) Nothing in this section shall be construed to affect in any way the obligations of the  
32 Department of Energy to comply with section 4306A of the Atomic Energy Defense Act  
33 (50 U.S.C. 2567).

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

36  
37 (f) JUDICIAL REVIEW.—Judicial review shall be available in accordance with chapter 7 of  
38 title 5, United States Code, for the following:

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

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

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**APPENDIX B**

**APPLICATION OF WASTE CLASSIFICATION PROCESS IN IDAHO**

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**LIST OF TERMS**

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- 3 DOE U.S. Department of Energy
- 4 NDAA *Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005* (Public
- 5 Law 108-375)
- 6 NRC U.S. Nuclear Regulatory Commission
- 7 TFF Tank Farm Facility
- 8
- 9

**INTRODUCTION**

10

11

12 The Idaho National Laboratory Tank Farm Facility (TFF) consists of eleven 300,000-gal

13 belowgrade stainless steel tanks in unlined concrete vaults, four 30,000-gal belowgrade stainless

14 steel tanks, and associated ancillary equipment and piping. Historically, the TFF tanks were

15 used to store various Idaho Nuclear Technology and Engineering Center wastes, including those

16 from spent nuclear fuel reprocessing (first-, second-, and third-cycle reprocessing wastes),

17 decontamination waste, laboratory waste, and contaminated liquids from other operations.

18

19 The in place disposal of these TFF wastes and the TFF system is subject to the requirements of

20 Section 3116(a) of the *Ronald W. Reagan National Defense Authorization Act for Fiscal*

21 *Year 2005* (NDAA). In November 2006, the U.S. Department of Energy (DOE) issued

22 Memorandum DOE-WD-2006-001, “Section 3116 Determination for the Idaho Nuclear

23 Technology and Engineering Center Tank Farm Facility at the Idaho National Laboratory.” In

24 this document, the Secretary of Energy determined pursuant to Section 3116(a) that the stabilized

25 residuals in the TFF and the TFF system were not high-level radioactive waste and could be

26 disposed of in place at the Idaho National Laboratory.

27

28 The information provided in this appendix draws heavily upon text in DOE/NE-ID-11226, *Basis*

29 *for Section 3116 Determination for the Idaho Nuclear Technology and Engineering Center Tank*

30 *Farm Facility*.

31

**TANK FARM FACILITY CLOSURE PROCESS**

32

33

34 The TFF is undergoing a phased closure. The closure process comprises tank system cleaning

35 and stabilization activities. As a part of the phased closure process, TFF operations include

36 consolidating the remaining tank wastes into the minimum number of tanks necessary and

37 commencing cleaning activities in the emptied tanks. As of July 2005, seven of the

38 300,000-gal tanks, the four 30,000-gal tanks, and associated ancillary equipment had been

39 cleaned. None of the remaining tanks had been cleaned as of November 2006, when the

40 determination was made that the stabilized residuals and the TFF system could be disposed in

41 place.

42

43 When cleaning operations in any given TFF component are completed, a small amount of

44 residual radioactive waste remains that cannot be removed. As cleaning operations reach a point

45 of minimal additional benefit for a given component, the component residuals are sampled and

46 analyzed to confirm that what remains will meet performance objectives for protection of the

1 public and the environment. After cleaning activities are completed for individual tanks, vaults,  
2 and other TFF components, the individual components are stabilized by filling with grout.

3  
4 The DOE plans to stabilize each of the individual TFF components by filling them with grout.  
5 Upon completion of the phased cleaning and grouting of the remaining tanks and ancillary  
6 equipment in the TFF tank system, final closure of the TFF will be accomplished.

## 7 8 **REACHING THE DETERMINATION**

9  
10 Section 3116(a) of the NDAA specifies that the term “high-level radioactive waste” does not  
11 include radioactive waste that results from reprocessing spent nuclear fuel if the Secretary of  
12 Energy determines, in consultation with the U.S. Nuclear Regulatory Commission (NRC), that  
13 the waste meets certain criteria. The criteria specify that the waste

- 14
- 15 • must not require disposal in a deep geologic repository
- 16
- 17 • must have had highly radioactive radionuclides removed to the maximum extent practical
- 18
- 19 • must meet performance objectives for low-level waste and either meet certain  
20 concentration limits or consult with the NRC regarding the disposal plan
- 21
- 22 • must be disposed of pursuant to a State-approved closure plan or State-issued permit.
- 23

24 Demonstration that the stabilized residuals in the TFF and in the TFF tank system would meet  
25 these criteria after final closure activities are completed is documented in DOE/NE-ID-11226.  
26 This 3116 Basis Document provides the basis for the Secretary of Energy’s determination that  
27 the closed TFF system wastes are not high-level waste and may be grouted and disposed of in  
28 place. For the purposes of the 3116 Basis Document, the TFF tank system comprises the eleven  
29 300,000-gal tanks, four 30,000-gal tanks, and the vaults, piping, structures, and ancillary  
30 equipment associated with these tanks.

31  
32 Historical waste management information, performance assessment results, and sampling and  
33 analysis results from the tank cleaning activities were reviewed and analyzed to demonstrate that  
34 the stabilized residuals in the TFF and in the TFF tank system will meet the Section 3116 criteria  
35 upon final closure. In addition, the residual inventory at closure was updated to reflect the  
36 results of TFF cleaning activities. Prior to cleaning and receiving sampling and analysis results  
37 of the first tank cleaning, planning documents (such as a closure plan approved by the State of  
38 Idaho) were prepared. These planning documents determined the baseline inventory and  
39 consequently established the goals for the cleaning activities to meet or exceed. The total post-  
40 decontamination inventory for each of the cleaned TFF tanks is significantly less than the total  
41 conservative post-decontamination inventory of a single tank estimated in the performance  
42 assessment, indicating that the tank cleaning operations performed better than planned.

43  
44 Pursuant to Section 3116(a) of the NDAA, DOE consulted with the NRC. To facilitate the  
45 consultative process, DOE provided NRC with a draft 3116 Determination on September 7,  
46 2005. During its review of the draft 3116 Determination, NRC requested additional information

1 from DOE. The DOE responded to the NRC request for additional information in three separate  
2 submittals. The DOE also provided other additional information as requested by the NRC, and  
3 DOE and NRC held public consultation meetings as well as several consultation telephone calls.  
4

5 On October 20, 2006, the NRC issued its *U.S. Nuclear Regulatory Commission Technical*  
6 *Evaluation Report for the U.S. Department of Energy Idaho National Laboratory Site Draft*  
7 *Section 3116 Waste Determination for Idaho Nuclear Technology and Engineering Center Tank*  
8 *Farm Facility* (NRC 2006). This report presents NRC's views and conclusions with respect to  
9 whether the stabilized residuals under DOE's disposal and closure approach can meet the  
10 applicable requirements of Section 3116(a) of the NDAA such that the Secretary may determine  
11 that the waste is not high-level waste. The executive summary of the NRC report provides the  
12 NRC conclusion that, based on the information provided by DOE, there is reasonable assurance  
13 that the applicable criteria of Section 3116 can be met for residual waste associated with the  
14 TFF.  
15

16 Section 3116(b) requires that the NRC, in coordination with the State of Idaho, monitor disposal  
17 actions taken by DOE for the purposes of assessing compliance with the performance objectives  
18 of the Title 10, *Code of Federal Regulations*, Part 61, "Licensing Requirements for Land  
19 Disposal of Radioactive Waste," Subpart C, "Performance Objectives." In their Technical  
20 Evaluation Report, NRC staff identified five "key monitoring areas" and stated that NRC will  
21 coordinate with the State of Idaho to develop a monitoring plan/approach to address those areas.  
22

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

## 31 REFERENCES

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33 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal*  
34 *Regulations*, as amended.

35 10 CFR 61, Subpart C, "Performance Objectives," *Code of Federal Regulations*, as amended.

36 70 FR 54374, 2005, "Notice of Availability of Draft Section 3116 Determination Idaho Nuclear  
37 Technology and Engineering Center Tank Farm Facility," *Federal Register*, Vol. 70,  
38 pp. 54374–54375 (September 14).

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

1 DOE-WD-2006-001, 2006, "Section 3116 Determination for the Idaho Nuclear Technology and  
2 Engineering Center Tank Farm Facility at the Idaho National Laboratory" (memorandum  
3 from S. W. Bodman, Secretary of Energy, November 11), U.S. Department of Energy,  
4 Washington, D.C.

5 NRC 2006, *U.S. Nuclear Regulatory Commission Technical Evaluation Report for the*  
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7 *Determination for Idaho Nuclear Technology and Engineering Center Tank Farm*  
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10 Law 108-375.  
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**APPENDIX C**

**APPLICATION OF WASTE CLASSIFICATION PROCESS IN SOUTH CAROLINA**

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1 **LIST OF TERMS**

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3	CFR	Code of Federal Regulations
4	DOE	U.S. Department of Energy
5	FR	Federal Register
6	HLW	high-level waste
7	NDAA	<i>Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005</i> (Public
8		Law 108-375)
9	NRC	U.S. Nuclear Regulatory Commission
10	SRS	Savannah River Site

11

12 **INTRODUCTION**

13

14

15 The high-level waste (HLW) system at the U.S. Department of Energy (DOE) Savannah River

16 Site (SRS) is a set of six different interconnected facilities. These facilities function as one large

17 treatment plant that receives, stores, and treats wastes from various generators at the SRS and

18 converts them into forms suitable for final disposal. The three major final disposal waste forms

19 are borosilicate glass, which will eventually be disposed of in a federal repository; saltstone; and

20 treated water effluent that is released to the environment. The HLW managed in this system is a

21 product of the reprocessing of spent nuclear fuel. This waste is a complex mixture of

22 radionuclides, soluble salts, and insoluble sludges. Many of these components are hazardous to

23 human health (e.g., plutonium, cadmium, chromium, and mercury) or can be serious hazards if

24 not properly managed. As of 2003, 37 million gal of waste remained in storage in 49 of the

25 HLW system's 51 tanks at the SRS F-Tank Farm and H-Tank Farm. Two of the 22 F-Tank

26 Farm tanks (Tanks 17 and 20) were closed and grouted in 1997.

27

28 Ongoing operation of the HLW system at SRS is continuing to reduce the amount of waste held

29 in the HLW tanks, and SRS is preparing for final tank closure. Closure of the HLW tanks will

30 be subject to the requirements of Section 3116(a) of the *Ronald W. Reagan National Defense*

31 *Authorization Act for Fiscal Year 2005* (NDAA). Preparation of basis documentation required to

32 demonstrate compliance with the requirements of the NDAA is underway.

33

34 **SAVANNAH RIVER SITE TANK CLOSURE PROCESS AND WASTE**

35 **DETERMINATIONS**

36

37 **F-Tank Farm Tanks 17 and 20**

38

39 The decommissioning and closure of Tanks 17 and 20 were undertaken before the issuance of

40 DOE O 435.1, *Radioactive Waste Management* or passage of the NDAA. In determining that the

41 closed tanks and stabilized residue contained within the tanks were not HLW, SRS followed the

42 guidance and methodology contained in 58 FR 12342, "Denial of Petition for Rulemaking:

43 States of Washington and Oregon," and also reflected in a 1993 letter from the U.S. Nuclear

44 Regulatory Commission (NRC) to DOE (NRC 1993, "Meeting With DOE to Review New Waste

45 Characterization Data and Current DOE Plans for Management of Tank Waste at Hanford").

46 This guidance calls upon DOE to consult with NRC on certain decisions regarding waste

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

- 5
- 6 • processed to remove key radionuclides to the maximum extent technically and  
 7 economically practical;
- 8
- 9 • incorporated in a solid physical form at a concentration that would not exceed the  
 10 applicable concentration limits for Class C low-level waste as set out in the Title 10,  
 11 *Code of Federal Regulations* (CFR), Part 61, “Licensing Requirements for Land Disposal  
 12 of Radioactive Waste,” (or would meet alternative requirements that would offer  
 13 comparable protection of human health and the environment); and
- 14
- 15 • managed, pursuant to the *Atomic Energy Act of 1954*, as amended, so that safety  
 16 requirements comparable to the performance objectives set out in 10 CFR Part 61 would  
 17 be satisfied.
- 18

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

### 26

### 27 **Remaining High-Level Waste Tanks**

28

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

- 35
- 36 • do not require disposal in a deep geologic repository
- 37
- 38 • have had highly radioactive radionuclides removed to the maximum extent practical
- 39
- 40 • will be disposed of in compliance with the performance objectives of 10 CFR 61
- 41
- 42 • will be disposed of pursuant to a State-approved closure plan or State-issued permit
- 43
- 44 • will be disposed of pursuant to plans developed by the Secretary of Energy in  
 45 consultation with the NRC, if the wastes exceed concentration limits for Class C  
 46 low-level waste (10 CFR 61.55, “Waste Classification”).

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

13  
14 The draft input packages will feed into the development of the draft Section 3116 basis  
15 document, which DOE will provide to the NRC for review, and which will be finalized after  
16 DOE has completed consultation with the NRC. Although not required by NDAA, DOE will  
17 also issue the draft Section 3116 basis document for public review and comment. Public  
18 comments and additional NRC comments may be made during the public comment period and  
19 NRC consultation process, respectively, for the draft 3116 basis document.

20  
21 At the end of the NRC consultation process, DOE expects that the NRC will issue a technical  
22 evaluation report that concludes that, based on the information provided by DOE, there is  
23 reasonable assurance that the applicable criteria of Section 3116 can be met for residual waste  
24 associated with the F-Tank Farm. The Secretary of Energy will then issue a final determination,  
25 pursuant to Section 3116(a), that the stabilized residuals in the F-Tank Farm system are not  
26 HLW and can be disposed of in place. It is presumed that a similar process will be followed in  
27 the future for the SRS H-Tank Farm.

## 28 REFERENCES

29  
30  
31 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal*  
32 *Regulations*, as amended.

33 10 CFR 61.55, "Waste Classification," *Code of Federal Regulations*, as amended.

34 58 FR 12342, 1993, "States of Washington and Oregon: Denial of Petition for Rulemaking,"  
35 *Federal Register*, Vol. 58, pp. 12342-12347 (March 4).

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37 Closure," *Federal Register*, Vol. 67, pp. 53784-53787 (August 19).

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2 *Document for F-Tank Farm at the Savannah River Site*, Rev. 0, Savannah River  
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- 4 Kane 2000, "Savannah River Site High-Level Waste Tank Closure: Classification of Residual  
5 Waste as Incidental," (letter from W. F. Kane to R. J. Schepens, DOE, June 30),  
6 U.S. Nuclear Regulatory Commission, Washington, D.C.
- 7 NRC 1993, "Meeting With DOE to Review New Waste Characterization Data and Current DOE  
8 Plans for Management of Tank Waste at Hanford" (letter from R. M. Bernero to J. Lytle,  
9 DOE, March 2), U.S. Nuclear Regulatory Commission, Washington, D.C.
- 10 *Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005*, Public  
11 Law 108-375.
- 12 SRS-REG-2007-00002, 2008, *Performance Assessment for the F-Tank Farm at the Savannah*  
13 *River Site*, Rev. 0, WSRC Site Regulatory Integration & Planning, Aiken,  
14 South Carolina.