ENCLOSURE 4

West Valley Demonstration Project

WVDP-267, Rev. 0 (2nd Draft)
Waste Tank Farm Transition End Points

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ACRONYMS

ALARA	As Low as Reasonably Achievable
EIS	Environmental Impact Statement
ROD	Record Of Decision
DEIS	Draft Environmental Impact Statement
DOE	Department of Energy
HLW	High Level Waste
LLW	Low Level Waste
mR	millirem
NRC	Nuclear Regulatory Commission
NYSDEC	New York State Department of Environmental Conservation
SRS	Savannah River Site
STS	Supernatant Treatment System
TRU	Transuranic
WNYNSC	Western New York Nuclear Service Center
WVDP	West Valley Demonstration Project
WTF	Waste Tank Farm

1.0 Introduction

1.1 Objective

The campaign to vitrify blended high-level wastes (HLW) at the West Valley Demonstration Project (WVDP) waste tank farm (WTF) began in June of 1996. Transition activities for the HLW tanks at the WVDP are those waste removal activities which prepare the tanks for closure. These begin when the vitrification campaign is over and end when the tanks are ready for closure. In order to determine the point at which vitrification of the residual wastes in the tanks is no longer necessary, and the residual wastes at the WTF can be classified and treated as low-level waste (LLW), a set of conditions or end points need to be identified. This document provides these end points to be utilized by WVDP engineers and craft personnel in support of transition project goals and objectives.

1.2 Background

This document focuses on tasks and activities that are related to the transition phase of the WVDP and involve HLW in the tanks at the WTF (i.e., 8D-1, 8D-2, and 8D-4). The contents of tanks 8D-1, 8D-2, and 8D-4 have been classified as HLW and are currently being solidified using vitrification. Although the tank 8D-3 does not contain HLW it is being used in the current vitrification effort. Therefore, end points for this tank have been included here. Potential end points that are specific to classification of residual tank wastes have been developed to the point that information available to date allows. Specific end points discussed in this document may not be defined quantitatively because the data and trends that will exist at the end of the current vitrification campaign are not firmly established, and are therefore subject to change. Also the closure activities involving these tanks are not addressed in this document. Transition activities that involve other WTF equipment and systems are to be evaluated at a later point in the transition end point development process.

WTF performance assessments of closure options (References 4a, 4b, and 4c) are used to support classification of residual tank waste as LLW. The draft transition end points discussed in this document have been developed from available technical and economic feasibility evaluations, performance assessments, and analyses of WTF transition. Future revisions of this document will be issued as needed upon completion of technical and economic feasibility evaluations and performance assessment for the preferred closure option for the draft EIS (Reference 5).

The transition end points listed here are expected to provide guidance for the sizing and selection of waste processing equipment and processes; help identify funding needs and

planning for engineering activities, and in general raise the awareness of this important aspect of the transition projects. A final version of the end points document is proposed to include criteria and activities which must be accomplished in a verifiable manner to end the HLW vitrification and eventually prepare the tanks for closure as per the ROD.

1.3 Transition End Points Approach

Various processes can be used to develop end points to verify that jobs, tasks, or activities are complete. The approach that is being used to develop transition end points for the WTF is based on guidance presented in the Office of Nuclear Material and Facility Stabilization (EM-60) Facility Deactivation End Points Handbook (Reference 1a) which has been recently reissued as Facility Deactivation Guide Methods and Practices Handbook (Reference 1b). The requirements of the latter document are essentially the same as of the earlier draft.

The steps needed to develop end points as per the EM-60 guidance document (Reference 1a) can be summarized as follows:

1. Identification of primary objectives.

2. Identification of task types for meeting primary objectives.

3. Classification of spaces as internal or external, and further categorization of internal spaces based on anticipated frequency of access. Similar classification of systems and equipment based on anticipated future status or use (i.e., continuing operation, mothballing, shutdown in place, or removal).

4. Definition of criteria (i.e., conditions that must be attained) for applicable tasks.

5. Development of end points for each of the criteria.

Section 2.0 provides details of these steps as they pertain to the development of transition end points for the WTF.

1.4 Limitations

1. Several uncertainties such as inventory of the key nuclides in the tank heel at the end of current vitrification campaign, site closure option, technology selection and its performance results, tank farm shutdown strategy and other analyses in progress will influence the final end points. This data, particularly radionuclide inventory of the residue in the tanks, is not expected to be available until late in the

process.

2. End points for several systems and components, such as STS and pumps, in the WTF are not included here but are proposed to be developed in the future as needed. The focus of this document has been the four tanks (8D-1, 8D-2, 8D-3 and 8D-4) in the waste tank farm.

3. The end points listed in this document are for the activities within the transition phase only and do not preclude any of the EIS options.

4. The significant criteria and end points for the four tanks are defined within a time frame such that the melter can be utilized to vitrify the HLW in these tanks.

2.0 Transition End Points Development

The end point program at WVDP was initiated using the guidance from a similar program at the DOE Hanford site. Based on the program at Hanford, a draft guidance document (Reference 1a) was developed by DOE EM-60. Even though the accomplishment of the final objectives at Hanford and WVDP appear to be similar, the detailed consideration of WVDP transition indicated several important differences. Specifically, the size and type of the projects and the goals of the activity are different. The tank farm at WVDP is a small area versus a large number of industrial and radioactive facilities at Hanford. The WVDP tanks are HLW storage tanks and need to be cleaned to the extent feasible in support of Project completion while the Hanford facilities needed to be placed in safe condition to minimize the surveillance and maintenance cost for an indefinite period. It was realized during the preliminary work on end point tables at WVDP that due to the small number of the facilities (four HLW tanks) involved and similarity of the structures and cleanup activities for these tanks, a one-on-one cross-reference to Objectives, Criteria, Spaces and Systems, and End Points, need not be specifically carried out as was done at Hanford in accordance with Reference 1a. For WVDP, though the primary objectives played a major role in defining the boundaries for this task and determining the end points, they were intentionally omitted from the tables to reduce blank cells and to make the report easier to follow.

The following subsections describe how various steps were completed and used to develop WTF draft transition end points. The variations from the guidance document (Reference 1a), as applicable, are also noted.

2.1 Primary Objectives

The primary objectives for the end points development as per the guidance document should be the "upper tier" objectives, i.e. same as the objectives for the overall WVDP transition activities. All the end points related activities must be driven by these primary objectives. Primary objectives for the waste tank farm transition end points program were adopted from the Transition Regulatory Strategy (Reference 3a and 3b). Reference 3b is a supplement to Reference 3a for the WVDP HLW tanks. These references listed the objectives for the overall WVDP transition activities. A review of these objectives confirmed their relevance and appropriateness for the development of the tank farm transition end points. These objectives are:

1. Make progress toward Project completion;

2. Prepare facilities for implementation of the ROD for closure, or long term management of the Western New York Nuclear Service Center (WNYNSC);

3. Reduce risks;

4. Reduce annual operating costs; and

5. Use available waste treatment systems and the existing, experienced work force.

Specific objective within the framework of primary objectives for the tank farm transition involve removal of the high level waste from the nks to the maximum extent so that the remaining waste can be classified as incidental waste (LLW) suitable for near surface disposal per 10 CFR 61 Subpart D (Reference 3c) and NRC Rule (Reference 3d). This will permit the shutdown of the melter at WVDP or declare the end of vitrification for the purpose of solidifying the HLW.

2.2 Task Types

The end point program at the DOE Hanford site uses a matrix approach in which task types are a generic series of tasks for meeting primary objectives. These task types are identified in the guidance provided in the Office of Nuclear Material and Facility Stabilization (EM-60) Facility Deactivation End Points Handbook (Reference 1a Sec. 4.1.2, Step 2).

In accordance with the EM-60 guidance document, a generic series of tasks covering a wide range of activities was adopted. Since some of the task types overlap an activity may fall under more than one task type. Redundancies have been minimized. However, it needs to be noted that when defining the criteria and associated end points, the activities for the transition phase only have been identified. For example, only characterization of the waste, which is one of the critical pre-requisites for planning for the removal or disposal of the waste has been included, and no disposal activities are listed in the criteria or end points which may be in the EIS-ROD domain. End points for tank closure or decommissioning will be developed later, based on the EIS-ROD.

A description of . types and their relationship to the primary objectives follows:

TT -01: .. *uce Non-nuclear Hazards* - Eliminating or reducing non-nuclear hazards to achieve safe working condtions at the facility. This task type (TT-01) supports objectives 3 and 4.

TT-02: *Reduce Radioactive Material Related Hazards* - Eliminating, shielding or isolating radiation fields to support as low as reasonably achievable (ALARA) performance goals, and protect workers. Associated activities include the proper radiological posting of remaining radiation fields. This task type (TT-02) supports objectives 3 and 4.

TT-03: *Reduce Radiological Contamination* - Removing, reducing, isolating, or containing radioactive contamination to prevent its spread. This task type (TT-03) supports objectives 3, 4, and 5.

TT-04: *Removal and Disposal of Radioactive or Hazardous Waste* - Complying with regulations and requirements related to removal and disposal of radioactive, hazardous and mixed waste. Associated activities include waste removal, flushing, decontamination, and disposal. Disposal activities shall not be included during transtion. This task type (TT-04) supports objectives 1 through 5.

TT-05: *Isolate and Contain Contamination* - Isolating and containing remaining hazardous materials or conditions. Associated activities include blanking, plugging, covering, removing, screening, and sealing of doors, windows, pipe penetrations, holes, drains, etc. This task type (TT-05) supports objectives 3 and 4.

TT-06: *Ensure Ability to Monitor and Control Radiologically Contaminated Areas* - Providing the capability for on-going facility monitoring and control needed to minimize cost, risk and hazards. Examples include providing instrumentation, windows in ancillary buildings, and surveillance lighting. This task type (TT-06) supports objectives 2, 3, and 4.

TT-07: *Refurbish, Install or Protect Equipment Required for Future Work* - Additional facility modification or refurbishment to support future work. Associated activities include structural repairs, roof sealing and modification of the facility ventilation system. This task type (TT-07) supports objectives 1, 3, 4, and 5.

TT-08: *Documentation and Label* - Associated activities include specific space or system documentation and labeling. This task type (TT-08) supports objectives 1, 2, 3, and 5.

2.3 Classification of Spaces and Systems

The DOE end point approach classifies a facility into 6 categories on the basis of the physical characteristics and future access needs. The spaces are divided into "Internal" and "External" spaces, and the facility contents as "Systems/equipment." The internal spaces are subdivided into those which require routine manned access and those for which access is not expected. The systems/equipment are subdivided into those which must be kept operational, those that are to be mothballed, and those that may be abandoned in place. However, the focus of this document is the development of transition end points for the HLW tanks and their contents only, all of which are internal spaces for which routine manned access is not expected. As a consequence, the classification of spaces and systems for the WTF tanks is not pursued for the development of WTF transition end points and not indicated in the tables for the end points.

2.4 Criteria Development

Once task types are identified, they are evaluated against requirements that need to be met to successfully complete WTF transition activities. For example, NRC regulations, DOE Orders, New York State Department of Environmental Conservation (NYSDEC) regulations and guidelines may impact WTF transition activities. These requirements are reviewed for applicability to the task types to set criteria for conducting work. Examples of transition end point criteria include removal of fixed or contained source material to mitigate contamination migration using reasonable and most appropriate techniques, and removing of radioactive, hazardous, and mixed wastes in accordance with approved waste handling procedures.

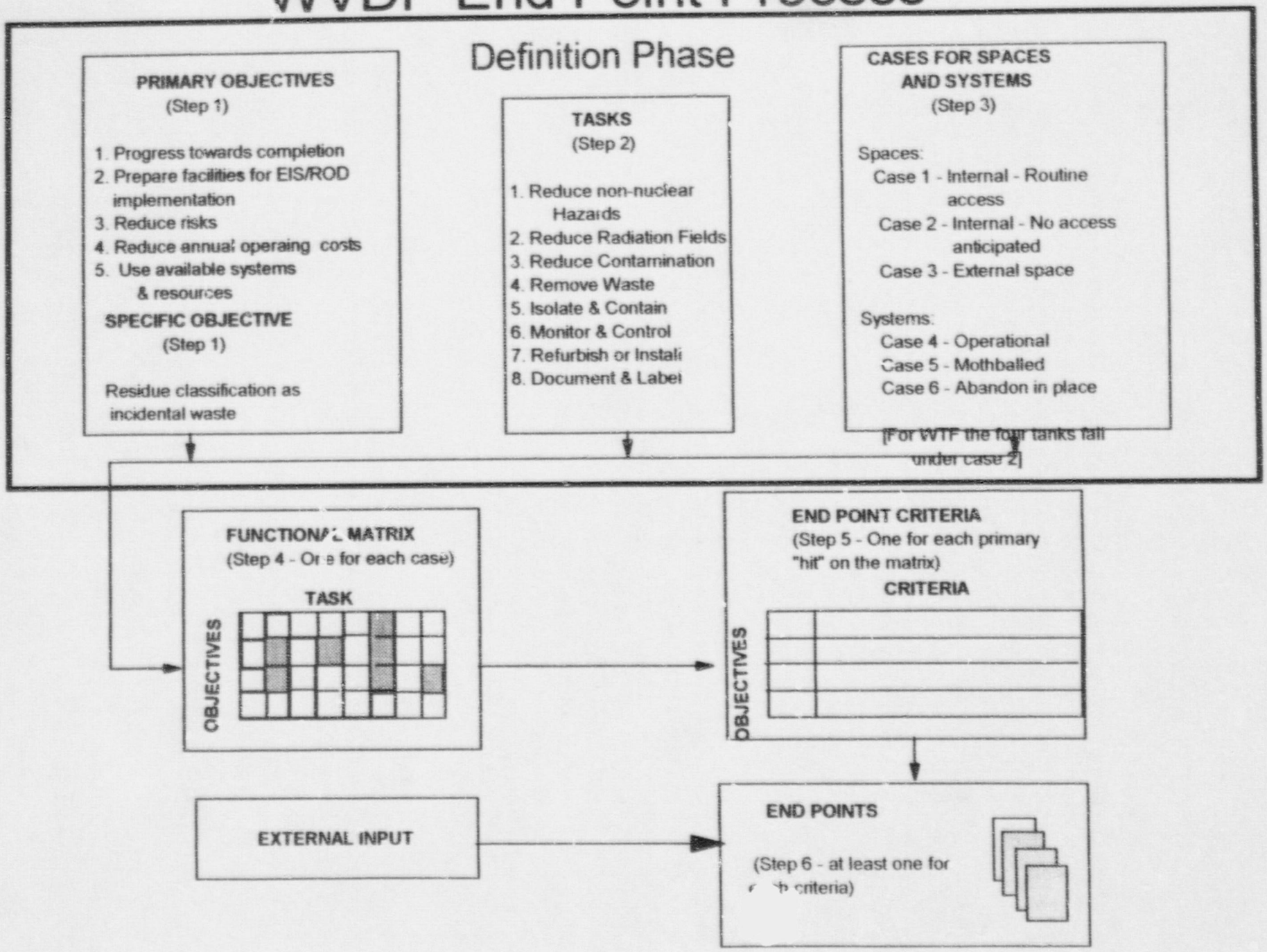
2.5 Transition End Points Development

After criteria are developed, they are reviewed to establish the point at which all criteria are satisfied. These points are the *"end points"* that identify when the activities are completed. Objectives, task types, and criteria are parts of the approach that provide justification for the end points. (*They answer the question "Why is the end point necessary?"*)

Figure 2.1 is a summary of various steps for the WVDP End Point Process.

Figure 2.1

WVDP End Point Process



3.0 Transition End Points Verification and Completion Methodology

Once WTF transition end points are established, methods will be specified that can be used to verify end point completion. These methods may include but are not limited to:

- Visual Verification: Performing walkthroughs or visual inspections of systems or spaces to verify removal or installation of a component, sign posting, and field conditions (i.e., presence or absence of certain materials, housekeeping, etc.) Videotapes and photographs also may be used to verify end points. This is particularly suited for the spaces where personnel access is prohibited because of ALARA concerns. The spatial distribution of the waste may be established by remote visual inspection of the tank bottom. Certain design features of the tanks can be used as a reference for estimating the volume of the solid and liquid waste remaining in the tanks. For tanks 8D-1 and 8D-2, the 1" or 3/4" thick plates connected to the stay bolts and welded to the tank floor may provide a good reference height for remote video measurements.

- Radiological Surveys: Specific radiological surveys may be used to document end point conditions. For example, a survey performed to document that no contamination exists in a specific area may be used to verify that a contamination migration point has been mitigated.

- Residual Waste Sampling: Radiological and chemical analysis of the residual waste samples may be used to verify the inventory of certain nuclides and chemical elements.

- Other Measurements: Specific quantitative measurements may be used for certain end point conditions. Other measurements may include volume of certain materials either directly or by linear dimensions, weight, density, viscosity, flow rates, etc.

- Process Knowledge: Subsequent to the removal of most of the residue, the amount and concentration of the contaminants remaining in the tanks may be established using the process knowledge and reactor fuel reprocessing records (Reference 6) for radioactive inventory. These estimates may be supplemented by residue analysis.

- Work Orders: A documented completion of end points is an integral part of the end point program. Signed copies or applicable sections of work orders that are part of the WVNS Work Order Control System (WVNS EP-5-002) may be used to verify and document end point completion.

4.0 Waste Tank Farm End Points

The WTF consists of four underground tanks: 8D-1, 8D-2, 8D-3 and 8D-4. Two of these tanks (8D-2 and 8D-4) were originally used during spent nuclear fuel reprocessing operations and the other two served as backup tanks. All four of these tanks are currently in use. Tank 8D-2 currently functions as the primary feed tank for the vitrification process. Tank 8D-1 holds in-tank components of the Supernatant Treatment System (STS) and excess liquid decanted from tank 8D-2 to maintain the process waste concentration for vitrification feed. Tank 8D-3 is used as a receiving tank for condensate from the vitrification off-gas treatment system and is not a HLW tank. Tank 8D-4 is used to receive liquids from the vitrification cell waste header and contains some residues from the THOREX waste. Contents of these four tanks are the focus of the end points for WTF transition.

The end points for the tanks 8D-1, 8D-2, 8D-3 and 8D-4 in the WTF are included in Tables 4.3.1, 4.3.2, 4.3.3, and 4.3.4 that follow. Each table, one for each of the four tanks, lists eight task types. For each task type, one or more criteria for transition are identified. One or more end points which ensure completion of the activity are listed for each criterion.

Each table gives the following information:

Task Types - The eight tasks are prefixed with TT (i.e., task type) followed by 2 digits from 01 to 08. The eight task types are same for each of the tank.

Criteria - Criteria are identified by six characters. The first two characters "CR" (i.e., criteria), are followed by two digits. These two digits are used to accommodate the objective number, if needed in future, per EM--60 guidance. The first digit following the period is the task type which is followed by a letter code (e.g., A, B, C etc.) that defines one or more of the applicable criteria number. Although the task types are the same for each tank, the criteria differ because the tank contents and configuration differ.

End Points - End points are represented by eight characters. The first two characters "EP" (i.e., end point) represent the end point followed by two digits. These two digits are used to accommodate the objective number, if needed in future, per EM-60 guidance. Two characters following the period relate to the criteria for which the end point applies. The final two digits keep count for the end point numbers.

Comments/References - The comments are listed at the end of the table and are identified as C-1, C-2, etc. The references are listed in Section 7.0 of the report.

Table 4.3.1
Transition End Points for Tank 8D-1

Transition End Points for Tank 8D-1			
Task Type	Criteria	End points	Comments/ References
TT-01: Reduce Non-nuclear Hazards	CR01.1A Identify protection measures against hazards, such as chemical, RCRA, fire, empty tank floatation, flooding etc.	EP01.1A.01: Engineered systems and/or administrative controls are in place to mitigate non-nuclear hazards.	C-4
TT-02: Reduce Radioactive Material Related Hazards	CR01.2A: Radioactive material remaining in the tank is less than the performance assessment based limits.	EP01.2A.01: An evaluation of the residue in Tank 8D-1 has been made relative to the sum-of-fractions radionuclide limits. The evaluation confirms that the 8D-1 residue, combined with the expected residue from the remainder of the tanks, shall meet the sum-of-fractions limits.	See Section 5.1 C-3, C-8
	CR01.2B: Radioactive material which may require vitrification is transferred to Tank 8D-2 or to the vitrification facility to the extent technically and economically feasible.	EP01.2B.01: Zeolite transfer from tank 8D-1 to 8D-2 using current transfer system (transfer and mobilization pumps) is no longer effective (amount of zeolite in a batch transfer < [10%] of the average of all previous zeolite batch transfers from tank 8D-1).	C-1
		EP01.2B.02: New heel transfer system capable of transferring [99%] of zeolite and lowering the residual liquid heel level in the tank < [6"] at the lowest point in the tank has been implemented.	C-1, C-2
		EP01.2B.03: 8D-1 heel has been transferred to 8D-2 to the maximum effective capability of the transfer system.	
	CR01.2C: The residue in Tank 8D-1 can be classified as LLW as per NRC review.	EP01.2C.01: An evaluation of the residue in tank 8D-1 has been performed to verify that the residue can be classified as LLW.	C-5

Transition End Points for Tank 8D-1			
Task Type	Criteria	End points	Comments/ References
TT-03: Reduce Radiological Contamination	CR01.3A: Minimize potential for spread of contamination by air.	EP01.3A.01: The tank farm exhaust ventilation system for contamination control is maintained operational.	
		EP01.3A.02: Engineered barriers/seals are in place to prevent migration of contamination to the environment.	
	CR01.3B: Minimize potential for contamination spread by liquid leakage from the tank.	EP01.3B.01 An engineered system to control and manage potential leakage from the tanks is in place.	
TT-04: Removal and Disposal of Radioactive or Hazardous Waste	CR01.4A: Residual radioactive and hazardous waste (LLW, Mixed, TRU etc.) in Tank 8D-1 is characterized.	EP01.4A.01: Residual waste in Tank 8D-1 has been characterized.	C-8
	CR01.4B: Remove radioactive and hazardous waste (LLW, Mixed, TRU etc.) from Tank 8D-1.	EP.4B.01: Radioactive and hazardous waste from the tank 8D-1 is removed and stored safely in accordance with established procedures and guidelines.	C-7
TT-05: Isolate and Contain Contamination	CR01.5A: Controls for personnel access are in place.	EP01.5A.01: Appropriate access control signs and barriers to prevent unintentional/ unauthorized access are in place per Radiological Controls Manual.	WVDP-010
	CR01.5B: No in-flow to or out-flow from Tank 8D-1.	EP01.5B.01: Pipes to and from the tank are rerouted and/or isolated.	C-6
		EP01.5B.02: The tank farm exhaust ventilation system has been optimized (consolidated/segregated).	
TT-06: Ensure Ability to Monitor & Control Radiologically Contaminated Areas	CR01.6A: Provide a safe physical environment for the performance of surveillance.	EP01.6A.01: Remote instruments, visual aids such as video cameras have been installed as per surveillance needs.	
		EP01.6A.02: Post transition surveillance and maintenance are reduced to those essential to meet the regulatory requirements.	

Transition End Points for Tank 8D-1			
Task Type	Criteria	End points	Comments/ References
TT-07: Refurbish, Install, or Protect Equipment Required for Future Work	CR01.7A: Cost effective refurbishment of any equipment shall support future activities.	EP01.7A.01: Necessary equipment (pumps, motors, mechanical arms etc.) has been protected and secured.	
TT-08: Document & Label	CR01.8A: Activities are as per applicable WVDP procedures and the implementation is documented as per end point verification requirements.	EP01.8A.01: End point verification documentation requirements have been identified and documentation is complete.	

COMMENTS on Table 4.3.1 (Transition End Points for Tank 8D-1) :

C-1 The numerical limits stated are current engineering judgement. These limits are subject to change as additional information becomes available. Quantitative limits indicated within [ ] are preliminary.

C-2 The decision to replace or end the residue transfer operation will be based on technical and economic feasibility.

C-3 Revisions to these end points and definition of additional end points for tank mechanical, and chemical cleaning (if necessary), will result as the performance assessment and the technical and economic feasibility information becomes available during operation of the solids removal systems.

C-4 Applicable controls shall be identified by written procedures and included in the end points supporting documents.

C-5 Verification methodology for establishing the residual radionuclides and the curies shall be identified as part of the residue evaluation process.

C-6 The sequence for cutoff shall be in accordance with the WVDP WTF Cutoff Strategy (Reference 12) which identifies the approach to severing ties between the main plant, vitrification facility, and the tank farm.

C-7 Disposal of radioactive and hazardous waste (LLW, Mixed, TRU etc.) shall be in accordance with the EIS ROD for which the end points will be developed later.

C-8 At the end of transition the tank residue shall be characterized. This information shall form the basis for initial inventory during decommissioning as per ROD.

Table 4.3.2
Transition End Points for Tank 8D-2

Transition End Points for Tank 8D-2			
Task Type	Criteria	End points	Comments/ References
TT-01: Reduce Non-nuclear Hazards	CR01.1A: Identify protection measures against hazards, such as chemical, RCRA, fire, empty tank floatation, flooding etc.	EP01.1A.01: Engineered systems and/or administrative controls are in place to mitigate non-nuclear hazards.	C-4
TT-02: Reduce Radioactive Material Related Hazards	CR01.2A: Radioactive material remaining in the tank is less than the performance assessment based limits.	EP01.2A.01: An evaluation of the residue in Tank 8D-2 has been made relative to the sum-of-fractions radionuclide limits. The evaluation confirms that the 8D-2 residue, combined with the expected residue from the remainder of the tanks, shall meet the sum-of-fractions limits.	See Section 5.1 C-3, C-8
	CR01.2B: Radioactive material which may require vitrification is transferred to the vitrification facility to the extent technically and economically feasible.	EP01.2B.01: Heel transfer from tank 8D-2 using current transfer system (transfer and mobilization pumps) is no longer effective (amount of Curies transferred in the batch [< 10%] of the average of all previous sludge transfers from tank 8D-2).	C-1
		EP01.2B.02: New heel transfer system capable of transferring [99.9%] of solids and lowering the residual liquid heel level in the tank to < [3"] at the lowest point in the tank has been implemented.	C-1, C-2
		EP01.2B.03: 8D-2 heel has been transferred for vitrification to the maximum effective capability of the transfer system.	
	CR01.2C: The residue in Tank 8D-2 can be classified as LLW as per NRC review.	EP01.2C.01: An evaluation of the residue in tank 8D-2 has been performed to verify that the residue can be classified as LLW.	C-5

Transition End Points for Tank 8D-2			
Task Type	Criteria	End points	Comments/ References
TT-03: Reduce Radiological Contamination.	CR01.3A: Minimize potential for spread of contamination by air.	EP01.3A.01 The tank farm exhaust ventilation system for contamination control is maintained operational.	
		EP01.3A.02 Engineered barriers/seals are in place to prevent migration of contamination to the environment.	
	CR01.3B: Minimize potential for contamination spread by liquid leakage from the tank.	EP01.3B.01: An engineered system to control and manage potential leakage from the tanks is in place.	
TT-04: Removal and Disposal of Radioactive and Hazardous Waste	CR01.4A: Residual radioactive and Hazardous waste (LLW, Mixed, TRU etc.) in tank 8D-2 is characterized.	EP01.4A.01: Residual waste in tank 8D-2 has been characterized.	C-8
	CR01.4B: Remove radioactive and hazardous waste (LLW, Mixed, TRU etc.) from Tank 8D-2.	EP.4B.01: Radioactive and hazardous waste from the tank 8D-2 is removed and stored safely in accordance with established procedures and guidelines.	C-7
TT-05: Isolate and Contain Contamination	CR01.5A: Controls for personnel access are in place.	EP01.5A.01: Appropriate access control signs and barriers to prevent unintentional/ unauthorized access are in place per Radiological Controls Manual.	WVDP-010
	CR01.5B: No in-flow to or out-flow from the waste tank 8D-2.	EP01.5B.01: Pipes to and from the tank are rerouted and/or isolated.	C-6
		EP01.5B.02: The tank farm exhaust ventilation system has been optimized (consolidated/segregated).	
TT-06: Ensure Ability to Monitor & Control Radiologically Contaminated Areas	CR01.6A: Provide a safe physical environment for the performance of surveillance.	EP01.6A.01: Remote instruments, visual aids such as video cameras have been installed as per surveillance needs	
		EP01.6A.02: Post transition surveillance and maintenance are reduced to those essential to meet the regulatory requirements.	

Transition End Points for Tank 8D-2			
Task Type	Criteria	End points	Comments/ References
TT-07: Refurbish, Install, or Protect Equipment Required for Future Work	CR01.7A: Refurbishment of any equipment is cost effective and shall support future activities.	EP01.7A.01: Necessary equipment (Pumps, motors, mechanical arms, etc.) has been protected and secured.	
TT-08: Document & Label	CR01.8A: Activities are as per applicable WVDP procedures and the implementation is documented as per end point verification requirements.	EP01.8A.01: End point verification documentation requirements have been identified and documentation is complete.	

COMMENTS on Table 4.3.2 (Transition End Points for Tank 8D-2):

C-1 The numerical limits stated are current engineering judgement. These limits are subject to change as additional information becomes available. Quantitative limits indicated within [ ] are preliminary.

C-2 The decision to replace or end the residue transfer operation will be based on technical and economic feasibility.

C-3 Revisions to these end points and definition of additional end points for tank mechanical, and chemical cleaning (if necessary) will result as the performance assessment and the technical and economic feasibility information becomes available during operation of the solids removal systems.

C-4 Applicable controls shall be identified by written procedures and included in the end points supporting documents.

C-5 Verification methodology for establishing the residual radionuclides and the curies shall be identified as part of the residue evaluation process.

C-6 The sequence for cutoff shall be in accordance with the WVDP WTF Cutoff Strategy (Reference 12) which identifies the approach to severing ties between the main plant, vitrification facility, and the tank farm.

C-7 Disposal of radioactive and hazardous waste (LLW, Mixed, TRU etc.) shall be in accordance with the EIS ROD for which the end points will be developed later.

C-8 At the end of transition the tank residue shall be characterized. This information shall form the basis for initial inventory during decommissioning as per ROD.

Table 4.3.3
Transition End points for Tank 8D-3

Transition End points for Tank 8D-3			
Task Type	Criteria	End points	Comments/ References
TT-01: Reduce Non-nuclear Hazards	CR01.1A: Identify protection measures against hazards, such as chemical, RCRA, fire, etc.	EP01.1A.01: Engineered systems and/or administrative controls are in place to mitigate non-nuclear hazards.	C-4
TT-02: Reduce Radioactive Material Related Hazards	CR01.2A: Liquid waste in the tank 8D-3 are at the minimum level technically and economically achievable.	EP01.2A.01 : Condensate transfer from tank 8D-3 to LWTS is no longer feasible using the present pump.	
		EP01.2A.02: Heel removal system capable of lowering the residual liquid heel level in the tank to < [3"] at the lowest point in the tank has been implemented.	C-1
		EP01.2A.03: 8D-3 heel has been removed to the maximum effective capability of the heel removal system.	
	CR01.2B: The residue in Tank 8D-3 remains classified as LLW.	EP01.2B.01: The residue from the tank 8D-3 meets the short lived and long lived radionuclide concentration limits of the 10CFR 61.55 Tables 1 and 2 .	10CFR61.55 C-3
		EP01.2B.02: If a known upset event has resulted in placing HLW radionuclides in the tank 8D-3, confirm radiation levels and residue quantity are below the performance assessment limits.	C-2

Transition End points for Tank 8D-3			
Task Type	Criteria	End points	Comments/ References
TT-03: Reduce Radiological Contamination.	CR01.3A: Minimize spread of contamination by air.	EP01.3A.01: The tank farm exhaust ventilation system for contamination control is maintained operational.	
		EP01.3A.02: Engineered barriers/seals are in place to prevent migration of contamination to the environment.	
TT-04: Removal and Disposal of Radioactive and Hazardous Waste	CR01.4A: Residual radioactive and hazardous waste (LLW, Mixed, TRU etc.) in tank 8D-3 is characterized.	EP01.4A.01: Residual waste in Tank 8D-3 has been characterized.	C-5
TT-05: Isolate and Contain Contamination	CR01.5A: Control of personnel access is in place.	EP01.5A.01: Appropriate access control signs and barriers to prevent unintentional/ unauthorized access are in place per Radiological Controls Manual.	WVDP-010
	CR01.5B: No in-flow to or out-flow from tank 8D-3.	EP01.5B.01: Pipes to and from the tank are rerouted and/or isolated.	
		EP01.5B.02: The tank farm exhaust ventilation system has been optimized (consolidated/segregated).	
TT-06: Ensure Ability to Monitor & Control Radiologically Contaminated Areas	CR01.6A: Provide a safe physical environment for the performance of surveillance.	EP01.6A.01: Remote instruments, visual aids such as video cameras have been installed as per surveillance needs.	
		EP01.6A.02: Post transition surveillance and maintenance are reduced to those essential to meet the regulatory requirements.	
TT-07: Refurbish, Install, or Protect Equipment Required for Future Work	CR01.7A: Cost effective refurbishment of any equipment shall support future activities.	EP01.7A.01: Necessary equipment (Camera, sampling systems, manipulators etc.) is protected and secured.	

Transition End points for Tank 8D-3			
Task Type	Criteria	End points	Comments/ References
TT-08: Document & Label	CR01.8A: Activities are as per applicable WVDP procedures and the implementation is documented as per end point verification requirements.	EP01.8A.01: End point verification documentation requirements have been identified and documentation is complete.	

COMMENTS on Table 4.3.3 (Transition End Points for Tank 8D-3)

C-1 After the tanks 8D-1 and Tank 8D-2 are sufficiently clean and the residual heel in these tanks can be classified as LLW, tank 8D-3 will not be used for any LWTS concentrates. Decision to reuse the tank in future may impact the end points defined here.

C-2 Tank 8D-3 is currently not a high level waste tank and contains no waste requiring vitrification. Unless an upset event contaminates the tank with HLW, the need is to minimize the radioactive waste and liquids in the tank.

C-3 10 CFR 61.55 limits are significantly lower than the performance assessment derived limits. The lower limits of 10 CFR 61.55 are more likely to be achieved for the tanks 8D-3 and 8D-4 due to their smaller size and simpler internal structure (i.e., a technically achievable condition).

C-4 Applicable controls shall be identified by written procedures and included in the end points supporting documents.

C-5 At the end of transition the tank residue shall be characterized. This information shall form the basis for initial inventory during decommissioning as per ROD.

Table 4.3.4
Transition End Points for Tank 8D-4

Transition End Points for Tank 8D-4			
Task Type	Criteria	End points	Comments/ References
TT-01: Reduce Non-nuclear Hazards	CR01.1A: Identify protection measures against hazards, such as chemical, RCRA, fire, etc.	EP01.1A.01: Engineered systems or administrative controls are in place to mitigate non-nuclear hazards.	C-4
TT-02: Reduce Radioactive Material Related Hazards	CR01.2A: Radioactive material remaining in the tank is less than the performance assessment limits.	EP01.2A.01: The tank 8D-4 residue meets the short- lived and long-lived radionuclide concentration limits of the 10CFR 61.55 Tables 1 and 2.	10 CFR 61.55
		EP01.2A.02: If end point EP01.2B.01 can not be achieved, an evaluation of the residue in Tank 8D-4 has been made relative to the "sum of fractions" radionuclide limits. The evaluation confirms that the 8D-4 residue, combined with the expected residue from the remainder of the tanks, shall meet the "sum of fractions" limits.	Section 5.1
	CR01.2B: Radioactive material which may require vitrification is transferred to 8D-2 or to the vitrification facility.	EP01.2B.01: Heel transfer from tank 8D-4 to 8D-2 or vitrification facility is no longer feasible using the present pump.	
		EP01.2B.02: Heel transfer system capable of lowering the residual liquid heel level in the tank to < [3"] at the lowest point in the tank has been implemented.	C-1, C-2
		EP01.2B.03: 8D-4 heel has been transferred for vitrification to the maximum effective capability of the transfer system.	
	CR01.2C: The residue in Tank 8D-4 can be classified as LLW as per NRC review.	EP01.2C.01: An evaluation of the residue in tank 8D-4 has been performed to verify that the residue can be classified as LLW.	C-5

Transition End Points for Tank 8D-4			
Task Type	Criteria	End points	Comments/ References
TT-03: Reduce Radiological Contamination.	CR01.3A: Minimize spread of contamination by air.	EP01.3A.01 The tank farm exhaust ventilation system for contamination control is maintained operational.	
		EP01.3A.02: Engineered barriers/seals are in place to prevent migration of contamination to the environment.	
TT-04: Removal and Disposal of Radioactive or Hazardous Waste	CR01.4A: Residual radioactive and hazardous waste (LLW, Mixed, TRU etc.) in tank 8D-3 is characterized.	EP01.4A.01: Residual waste in tank 8D-4 has been characterized.	C-3
TT-05: Isolate and Contain Contamination	CR01.5A: Control of personnel access is in place.	EP01.5A.01: Appropriate access control signs and barriers to prevent unintentional/ unauthorized access are in place per Radiological Controls Manual.	WVDP-010
	CR01.5B: No in-flow to or out-flow from tank 8D-4.	EP01.5B.01: Pipes to and from the tank are rerouted and/or isolated.	
		EP01.5B.02: The tank farm exhaust ventilation system has been optimized (consolidated/segregated).	
TT-06: Ensure Ability to Monitor & Control Radiologically Contaminated Areas	CR01.6A: Provide a safe physical environment for the performance of surveillance.	EP01.6A.01: Remote instruments, visual aids such as video cameras have been installed as per surveillance needs.	C-6
		EP01.6A.02: Post transition surveillance and maintenance are reduced to those essential to meet the regulatory requirements.	
TT-07: Refurbish, Install, or Protect Equipment Required for Future Work	CR01.7A: Refurbishment of any equipment is cost effective and supports future activities.	EP01.7A.01: Necessary equipment (camera, sampling systems, manipulators etc.) is protected and secured.	

Transition End Points for Tank 8D-4			
Task Type	Criteria	End points	Comments/ References
TT-08: Document & Label	CR01.8A: Activities are as per applicable WVDP procedures and implementation of end points is documented as per end point verification requirements.	EP01.8A.01: End point verification documentation requirements have been identified and documentation is complete.	

COMMENTS on Table 4.3.4 (Transition End Points for Tank 8D-4)

C-1 The numerical limits stated are current engineering judgement. These limits are subject to change as additional information becomes available. Quantitative limits indicated within [ ] are preliminary.

C-2 The decision to replace or end the residue transfer operation will be based on technical and economic feasibility..

C-3 At the end of transition the tank residue shall be characterized. This information shall form the basis for initial inventory during decommissioning as per ROD.

C-4 Applicable controls shall be identified by written procedures and included in the end points supporting documents.

C-5 Verification methodology for establishing the residual radionuclides and the curies shall be identified as part of the residue evaluation process.

C-6 The sequence for cutoff shall be in accordance with the WVDP WTF Cutoff Strategy (Reference 12) which identifies the approach to severing ties between the main plant, vitrification facility, and the tank farm.

5.0 Process for Obtaining Regulator Concurrence on Residue Classification

As stated in the introduction, this document identifies the end points for the transition activities related to the waste tank farm such that the vitrification of the residual waste in the tanks is no longer necessary, and the residual wastes can be classified and treated as LLW. This section provides supporting information for development of end points which will reach this goal. The primary interface for this regulatory aspect will be the NRC. The process for obtaining NRC concurrence that residual tank farm wastes can be classified as low-level radioactive or mixed waste (i.e., incidental waste) is an integral part of the on-going regulatory processes for Project completion. Other regulators such as the New York State Department of Environmental Conservation (NYSDEC) need to be kept informed about waste removal and decontamination activities which will facilitate agency interactions during future closure planning and approval processes.

The definition of transition end point for the Waste Tank Farm (WTF) will evolve as additional technical information becomes available and input from the DOE and NRC is received. Regulator involvement and end point interface logic is illustrated in Figure 5.1.

The rationale that the NRC will likely use to determine if the tank residuals can be considered low-level waste (i.e., incidental waste) can be based on their regulatory position embodied in 10CFR 61 (Reference 3c) which establishes a waste classification system and recently issued final rule on radiological criteria for license termination (Reference 3d). As discussed in these documents, classification of the tank residuals as incidental waste can be accomplished as long as the following conditions are met:

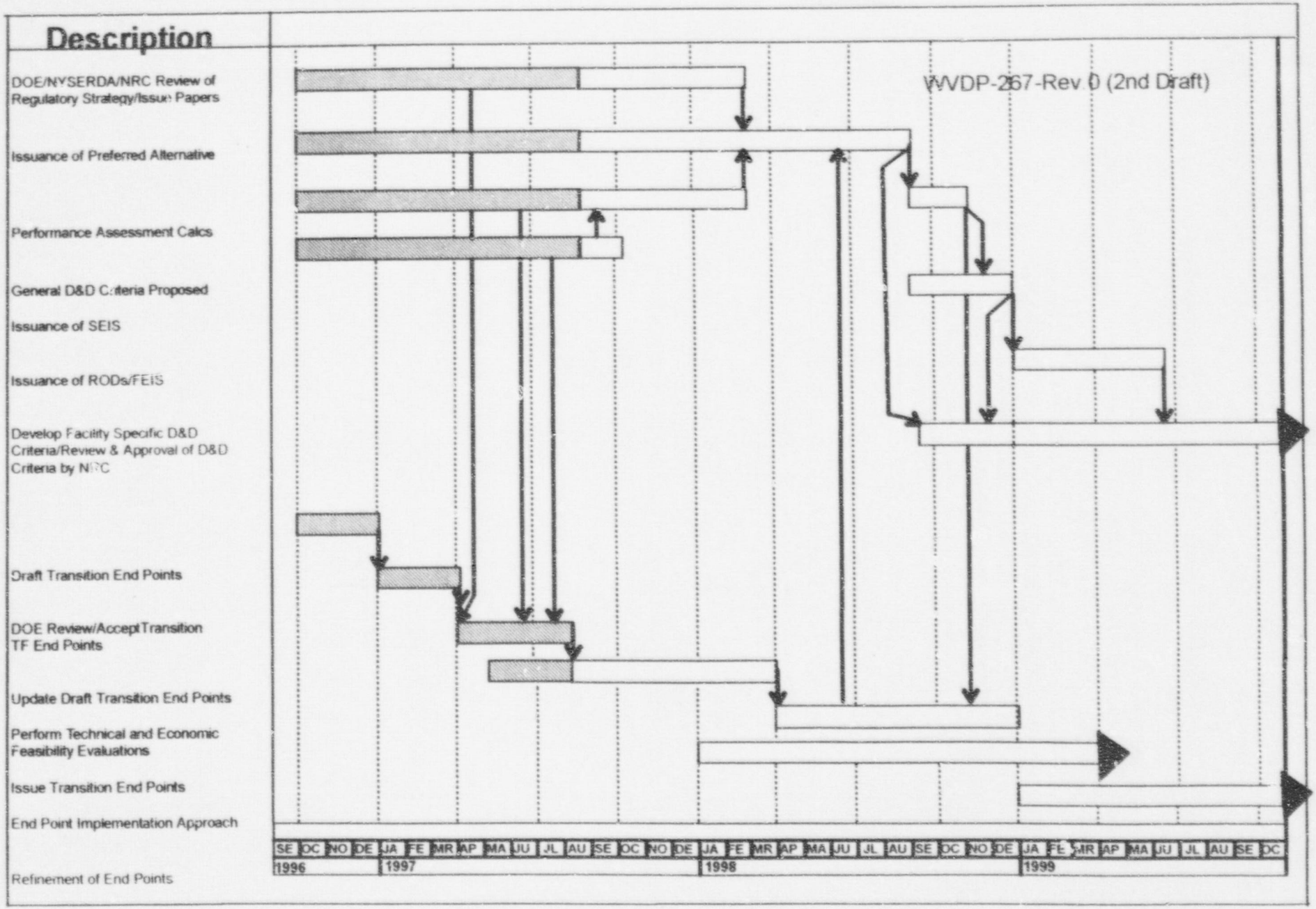
- The wastes are managed, pursuant to the Atomic Energy Act, so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61 or the NRC final rule on radiological criteria for license termination are satisfied. The intent is to investigate limits from both these requirements and aim at meeting the more stringent of the two, if feasible; and

- The wastes have been processed to remove key radionuclides to the maximum extent that is technically and economically practical.

These two conditions are being used in the formulation of ~~draft~~ tank farm transition end points and are discussed in Sections 5.1 and 5.2 respectively.

Figure 5.1

REGULATOR INVOLVEMENT AND END POINT INTERFACE LOGIC



5.1 Development of Tank Farm Transition End Points Based on Performance Objectives

Proposed end points for classification of WTF residual waste as LLW are derived from the performance assessment work (Reference 4a, 4b, and 4c) all of which used 10 CFR 61 Subpart D as the basis. Most recent of these, Reference 4c by SAIC, uses an integrated release/transport/dose estimation approach and assumes an enhanced engineering barrier scheme consisting of grout and clay layers inside the tank, between the tank and the vault, and outside the tank vault. This performance assessment assumes the remaining curies for the WTF being located in tank 8D-2. Most of the residual curies are expected to be in tanks 8D-2 and 8D-1 which are located in adjacent vaults. The other two tanks 8D-3 and 8D-4 are much smaller in size and are simpler to clean and therefore, will have very small amount of residual curies. Moreover, tanks 8D-3 and 8D-4 are also located close to the tanks 8D-1 and 8D-2. Thus with all the tanks being located in the close proximity to each other and having the common pathways, the performance assessment results based on total residual curies being located in tank 8D-2 as source are sufficiently representative for the WVDP tank farm.

The long term performance assessment by SAIC (Reference 4c) calculates HLW inventories which would lead to annual doses of 500 mR/yr and 25 mR/yr for onsite and offsite receptors, respectively. The results from the SAIC analysis are reported in Table 5 of Reference 4c. These results assumed presence of a single radionuclide in the waste forms. Limiting curies of any one nuclide (when no other contributors are present) are reported in Table 5.1.1 here. When implementing the limit for each nuclide in a mixture of nuclides, the sum-of-fractions rule (Reference 4b) was applied:

> The sum of the fractions of the curies of radionuclide i (Si) remaining in the WTF, divided by the proposed limiting curies for the nuclide i (Gi) is not greater than unity, or:
>
> $$\sum \frac{Si}{Gi} \leq 1$$

In this case, the summation result from the sum-of-fractions rule from the total inventory located in tank 8D-2 will be limited to 0.9 to allow for non-dominant nuclides and the remaining residual waste in the WTF. The remaining residual waste in the WTF includes minor contributors such as tanks 8D-3 and 8D-4, STS, and other structures and components in the tank farm which have not been included in the performance assessment.

Calculation of allowable residual radionuclide limits using sum-of-fractions rule:

The radionuclides of concern are as per Table 1 and Table 2 of 10 CFR 61.55 (Reference 3c) for the long-lived and short-lived radionuclides respectively. The distribution of the residual radionuclides in each tank is not yet known. However, it is anticipated that most of the residual waste will be in tanks 8D-1 and 8D-2 due to their large size, configuration, corroding material, and past usage. In any case, limits on the total radionuclide inventory limit will bound the maximum curies in any individual tank. For the projected waste inventory and mixture of radionuclides listed in Table 5.1.1, the sum-of-fractions rule has been applied and the results are included in the Table 5.1.1. The tank residue limits based on a receptor dose limit of 100 mR/yr for restricted use as per the NRC rule (Reference 3d) are also calculated in the table. The residue limits may be further reduced using the technical and economic considerations to the extent feasible.

TABLE 5.1.1 [4]

Proposed Limiting Curies Based on Mixture of Nuclides in Tanks 8D-1 and 8D-2 [5]

Isotope (Ref. 3c - 10 CFR 61.55)	Total Curies (Ref. 7 - Table 4)	Curie Limit based on Dose Limit of 500 mR/yr (Ref. 4c - SAIC) Gi	Curies for Residue (3%) [1] and their contribution to Fraction-sum		Allowable Residue for Fraction-sum of 0.90 and Dose Limit of 100 mR/yr =		
					Curie Limit Gi	1.65%	
			Si	Fraction		Si	Fraction
C-14	1.37e+02	2.75e+02	4.11e+00	1.49e-02	5.50e+01	2.26e+00	4.11e-02
Sr-90	5.81e+06	2.20e+14 [3]	**1.74e+05**	7.92e-10	4.40e+13	**9.58e+04**	2.18e-09
Tc-99	1.70e+03	3.50e+02	5.10e+01	1.46e-01	7.00e+01	2.80e+01	4.00e-01
Cs-137	6.29e+06	1.90e+29 [3]	**1.89e+05**	9.93e-25	3.80e+28	**1.04e+05**	2.73e-24
Np-237	2.35e+01	4.40e+00	7.05e-01	1.60e-01	8.80e-01	3.87e-01	4.40e-01
Pu-238	8.04e+03	6.30e+22 [3]	2.41e+02	3.83e-21	1.26e+22	1.33e+02	1.05e-20
Pu-239	1.65e+03	7.40e+03	4.95e+01	6.69e-03	1.48e+03	2.72e+01	1.84e-02
Am-241	5.35e+04	6.70e+30 [3]	1.61e+03	2.40e-28	1.34e+30	8.82e+02	6.58e-28
SUM	1.22e+07		3.65e+05	**3.28e-01**		2.01e+05	**9.00e-01**
Allowable Sr-90 for a sum fraction of 0.90 [2]			**1.74e+05**			**9.58e+04**	
Allowable Cs-137 for a sum fraction of 0.90 [2]			**1.89e+05**			**1.04e+05**	

NOTES ON TABLE 5.1.1:

[1] The radionuclide inventory assumes a homogeneous mixing and uniform transfer of the radionuclides. The effect of decay with time on the scaling factors for radionuclide, estimation errors in the nuclide inventory, or variations in each transfer are not accounted.

[2] Although it may be noted from the table that Cs-137 and Sr-90 have negligible contribution to the sum of fractions the inventory for these radionuclides are reported here since they account for the largest percentage of curies in the tanks, and since they are being tracked as reference radionuclides for calculating the scaling factors (Table 6, Reference 7).

[3] Curie Limit data is from SAIC fax dated 5/16/97. The SAIC performance assessment (Reference 4c) noted that for these radionuclides inventory to reach dose criteria is unreasonably large; and receptor dose is effectively zero.

[4] The Table 5.1.1 lists radionuclides present in the tank farm from 10 CFR 61.55 Table 1 and Table 2. The performance assessment (Reference 4c) evaluated the dose estimates using a screened list of important radionuclides (Reference 5 Appendix E). Contribution to the total sum of the fractions of the remaining radionuclides as reported in Table 5 of Reference 4c is very small (less than 0.01). This is well within the margin allowed by using the limit on sum of the fractions as 0.9 in stead of 1.0 allowed.

[5] Estimated contribution to the total fraction due to the residual curies in tanks 8D-3 and 8D-4 is negligible as verified in the following:

The tank 8D-3 is not a high level waste tank and no inventory of governing nuclides is assigned to the tank in the performance assessment. Therefore, there is no contribution to the sum of fractions from tank 8D-3.

The radionuclide inventory in tank 8D-4 heel (per Table 3.25 of WVDP-EIS-017, Reference 8) is as follows:

Am-241	8.16	Pu-238	1.32
C-14	0.021	Pu-239	None
Np-237	0.00357	Tc-99	0.261

$$= (8.16/6.70E30) + (0.021/275) + (0.00357/4.4) + (1.32/6.3E22) + (0.261/350)$$

$$= 0.0000 + 0.000076 + 0.00081 + 0.0000 + .00076 = 0.0016$$

The nuclide inventory in the residue for tank 8D-4, at the end of transition, is expected to be a small fraction of the current heel inventory, therefore, the contribution to the sum of fractions rule from these tanks will be further reduced. Combining this with the fraction 0.9 used for the total inventory located in tank 8D-2, the sum is well within the allowable value of 1.0.

5.2 Technical and Economic Feasibility Considerations

In addition to the curie limits in the tanks based on the receptor dose, considerations associated with technical and economic feasibility need to be evaluated for achieving the objective of classification of the WTF residue as LLW (incidental waste).

The issue of feasibility for a one-of-a-kind project such as the WVDP involves various decision processes and building credibility of the cleanup effort. This feasibility can be best evaluated from performance records of the technologies under similar field conditions. Due to unique requirements and constraints at the WVDP, such past experience from the technologies is not available. A systematic approach consisting of multiple stages to achieve the tank cleanup, to the extent feasible, provides a credible approach. Towards this goal, current efforts include:

a) Evaluating and planning the use of various technologies
b) Developing projections of residue based on WTF specific parameters
c) Pursue experience from the other tank cleanup efforts in the DOE complex
d) Developing decision analysis as a tool for future selection of technologies and associated end points

a) Evaluating and planning the use of various technologies

Available technologies within the time constraints of the melter life are being evaluated. A consideration of these technologies has resulted in the formulation of a "Stepped Approach." The current status for this stepped approach has been documented in References 5a and 5b. The basic concept of the stepped approach is to utilize progressively more sophisticated (and complex) technologies to achieve the cleanup goals. Implicit in the stepped approach are the cost considerations for each step. Prior to deployment of the next level of technology, the current status of the cleanup, incremental cost of next step and anticipated results shall be evaluated to support the technical and economic feasibility of subsequent step.

b) Developing projections of residue based on WTF specific parameters

A set of achievable residue limits will be developed using the tank specific parameters such as the tank size, material, internal configuration, access limitations, transfer and

mobilization experience. These limits can provide a target amount of residue and radionuclide inventory.

c) Pursue experience from the other tank cleanup efforts in the DOE complex

At various DOE sites, tank cleanup is currently being pursued at various stages. At Savannah River Site (SRS) a tank closure effort is in progress. Even though there may be differences in the site specific conditions and regulatory authorities involved at local and state level, valuable insight into the success oriented approach can be gained. Contacts have been made with SRS and will be pursued throughout the development of the transition end points for the WVDP tanks.

d) Developing decision analysis as a tool for future selection of technologies and associated end points

At this time a large amount of uncertainties remain in both the expected performance of the technologies to be deployed as well as in the expected cost of such deployment. Using the information from knowledgable personnel about the cost and performance, along with the associated range of uncertainties, a decision analysis is being pursued. A decision criteria to be used in choosing a candidate end point definition is being developed.

6.0 Summary

This document presents end points for WTF transition activities that are related to determining the point at which vitrification of the residual wastes in the tanks is no longer necessary, and the residual wastes at the WTF can be classified and treated as low-level radioactive or mixed w[illegible]

The proposed transition end points have been developed using the performance analysis completed in support of the WVDP site closure EIS. The performance analysis used a receptor dose limit of 500 mR/yr. These limits may be revised downwards as per recently issued NRC rule for permanent closure of sites. The potential impact of the NRC rule has been reflected using dose limits of 100 mR/yr for restricted use. Since it may be possible to remove waste beyond the dose based limits, the technical and economic feasibility based limits are currently being developed. Tank farm transition end points will reflect impact of the technical and economic feasibility evaluations in future revisions. Since the establishment of the feasibility based limits always involve uncertainty, a decision process and decision criteria will be developed to facilitate the determination of end points.

The next phase in WTF transition end point development will be to update dose based limits using the performance assessment for the preferred alternative and to include the results of the technical and economic feasibility evaluat[illegible]

7.0 References

GUIDANCE DOCUMENTS

1a. U. S. Department of Energy, Office of Nuclear Material and Facility Stabilization (EM-60), "Facility Deactivation End Points Handbook, 3rd Draft -for Use and for Comment," November 16, 1995.

1b. DOE/EM-0318, U. S. Department of Energy, Office of Nuclear Material and Facility Stabilization (EM-60), "Facility Deactivation Guide Methods and Practices Handbook, Revision 0, December, 1996.

WVDP TRANSITION END POINTS

2a. Letter WD:96:0971 J. M. Gramling to T. J. Rowland, "WVDP-267 (Draft) - Waste Tank Farm Transition End Points," dated December 20, 1996.

2b. Letter DW:97:0121 (2071:96:10) B. A. Mazurowski to W. G. Poulson "Comments on the Waste Tank Farm Transition End Points," dated February 11, 1997.

2c. Letter WD:97:0184 J. M. Gramling to T. J. Rowland, "Response to Comments on the Waste Tank Farm Transition End Points", dated March 7, 1997.

REGULATIONS

3a. West Valley Demonstration Project, "Transition Regulatory Strategy," BB:96:0020, August 1996.

3b. West Valley Demonstration Project, "Transition Regulatory Strategy, Chapter 3.0, Waste Tank Farm Transition Regulatory Strategy," BB:96:0022, September, 1996.

3c. 10 CFR Part 61 Subpart D, "Licensing Requirements for Land Disposal of Radioactive Wastes, Subpart D- Technical Requirements for Land Disposal Facilities," U.S. Code of Federal Regulations, Nuclear Energy Commission,

3d. "NRC Approves Maximum Permissible Radiation Levels for License Termination", US Nuclear Regulatory Commission Office of Public Affairs, Release No. 97-083 Dated Wednesday, May 21, 1997.

PERFORMANCE ASSESSMENT

4a "High Level Waste Tank Post-Stabilization Preliminary Waste Classification," Report Prepared byYankee Atomic Electric Company for WVNS Co. Inc., dated August 16, 1996.

4b. "Derivation of Residual Radionuclide Inventory Guidelines for the WNYNSC High-Level Waste Tanks," [MG:27:010.WV], Dames & Moore, August 1, 1996.

4c. "Analysis of High Level Waste Tank 8D-2 and Process Building Radioactive Waste Isolation Capability," fax from James E. Hammelman (SAIC) to Dan Sullivan (DOE), dated 2-21-97 and fax from Joe Price (SAIC) to S. Kumar (WVNS), dated 5-16-97.

WVDP DOCUMENTS

5. DOE/EIS-0226-D, Draft Environmental Impact Statement for Completion of the West Valley Demonstration Project and Closure or Long-Term Management of Facilities at the Western New York Nuclear Services Center, U.S. Department Of Energy and New York State Energy Research and Development Authority, January 1996.

6. WVDP-EIS-014, Rev. 0, Characterization of Reactor Fuel Reprocessed at West Valley (Gives derivation of inventory based on amount of fuel processed)

7. WVDP-186, WQR-1.2, "WVDP Waste Form Qualification Report - Canistered Waste Form Specifications," Rev. 1, Dated 08/13/96

8. WVDP EIS-017, "High Level Waste Storage Area and Vitrification Facility Waste Characterization Report," Rev. 1, Dated 09-28-95

9. Not used

STEPPED APPROACH - NEAR TERM / LONG TERM WASTE REMOVAL

10. Letter WD:97:0177, J. P. Hurst to T. J. Rowland, "Stepped Approach for Waste Removal from Tanks 8D-1 and 8D-2," dated March 6, 1997.

11. Letter WD:97:0565, J. P. Hurst to T. J. Rowland, "Incorporation of Comments on the WVNS Stepped Approach for Waste Removal from Tanks 8D-1 and 8D-2," dated June 30, 1997.

CUTOFF STRATEGY

12. WVNS Memo # CB:97:0002, Dated February 21, 1997, Cut-off Strategy for the Waste Tanks and Process Vessels.