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Hanford Tanks Initiative Alternatives Generation and Analysis Plan for AX Tank Farm Closure Basis

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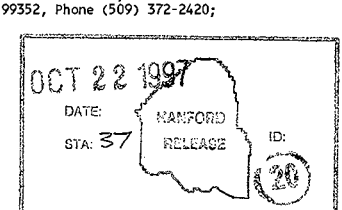
Abstract: The purpose of this document is: (1) to review the HTI Mission Analysis and related documents to determine their suitability for use in developing performance measures for AX Tank Farm closure, (2) to determine the completeness and representativeness of selected alternative closure scenarios, (3) to determine the completeness of current plans for development of tank end-state criteria, and (4) to analyze the activities that are necessary and sufficient to recommend the end-state criteria and performance measures for the AX Tank Farm and recommend activities not currently planned to support establishment of its end-state criteria.



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HANFORD TANKS INITIATIVE ALTERNATIVES GENERATION AND ANALYSIS PLAN FOR AX TANK FARM CLOSURE BASIS

October 1997

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AGA	Alternatives Generation and Analysis
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFR	Code of Federal Regulations
CWP	Closure Work Plan
DOE	U.S. Department of Energy
DQO	Data Quality Objective
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FY	Fiscal Year
HTI	Hanford Tanks Initiative
JEG	Jacobs Engineering Group, Inc.
MA	Mission Analysis
MOU	Memorandum of Understanding
NEPA	*National Environmental Policy Act*
NRC	U.S. Nuclear Regulatory Commission
OCRWM	Office of Civilian Radioactive Waste Management
PHMC	Project Hanford Management Contractor
RCRA	*Resource Conservation and Recovery Act of 1976*
RPECA	Retrieval Performance Evaluation Criteria Assessment
SST	Single-shell tank
SSSTRS	Supplementary single-shell tank retrieval system
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TWRS	Tank Waste Remediation System
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company

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HANFORD TANKS INITIATIVE ALTERNATIVES GENERATION AND ANALYSIS PLAN FOR AX TANK FARM CLOSURE BASIS

1.0 INTRODUCTION AND BACKGROUND

The Hanford Tanks Initiative (HTI) supports the Hanford Site Single-Shell Tank (SST) Waste Retrieval Program in its commitment to remove waste from the SSTs for treatment and final closure of tanks. A complete understanding of the HTI, its background, and its mission is provided in the *Hanford Tanks Initiative Plan*, WHC-SD-WM-PMP-022 (WHC 1996a), the *Mission Analysis Report for the Hanford Tanks Initiative*, WHC-SD-WM-MAR-012 (WHC 1996b), and the *Path Forward for Developing Retrieval Performance Evaluation Criteria* working paper (FDH 1997). The HTI project will accomplish the following:

- Retrieve the hard-heel waste in SST 241-C-106 and demonstrate alternative technologies to remove waste types from other SSTs.
- Define the process, criteria, and technology to achieve an acceptable end-state for a representative SST Tank Farm (AX Farm).
- Provide a basis, through technology applications, performance assessments, and risk analyses, for establishing an acceptable approach and defining an end-state condition for tank farm closure.
- Conduct residual waste characterization to the extent necessary to support the basis for decisions on retrieval of waste and closure readiness for SST 241-AX-104.
- Obtain the acceptance of regulatory agencies and stakeholders for methods and processes to define completion of tank waste retrieval.
- Develop reliable cost information for various levels of retrieval to support program and regulatory decisions.

The HTI project began in fiscal year (FY) 1996. The HTI will be completed before FY 2002, at which time the preparation of the request for proposals for Phase II privatization (tank retrieval) will be completed.

The products of this plan are as follows:

1. Review the HTI Plan Mission Analysis (MA) and related documents to determine their suitability for use in development of performance measures for AX Tank Farm closure.

2. Determine completeness and representativeness of selected alternative closure scenarios.

3. Determine completeness of current plans for development of tank end-state criteria.

4. Perform an analysis of the activities that are necessary and sufficient to recommend the end-state criteria and performance measures for a representative SST farm (AX Tank Farm) and recommend activities not currently planned to support establishment of end-state criteria for AX Tank Farm.

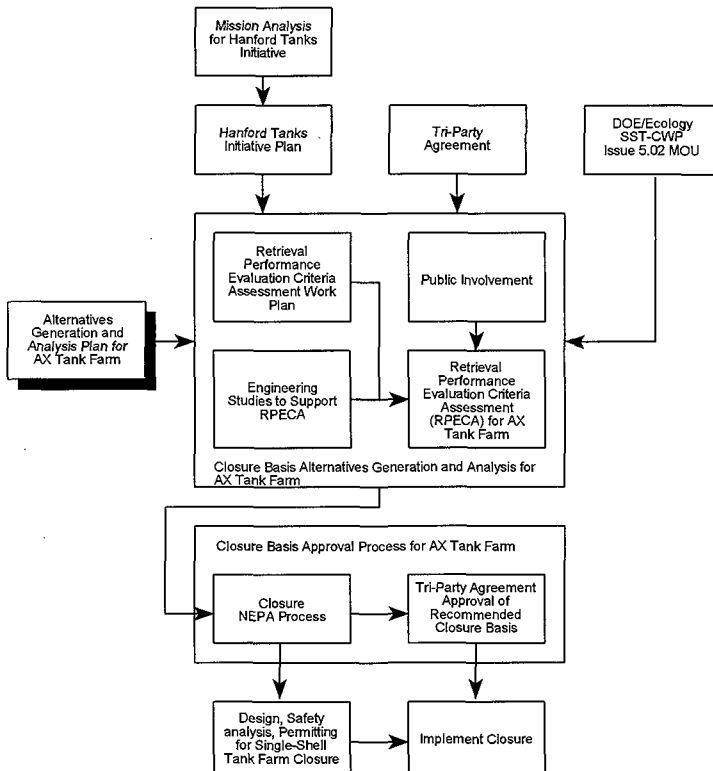
The closure basis for AX Tank Farm will evaluate end-state alternatives for tanks, surrounding soil, ancillary equipment and surface barriers. The process developed in recommending a closure basis for AX Tank Farm may be a prototype for closure of future tank farms.

The *Hanford Federal Facility Agreement and Consent Order* (also known as the Tri-Party Agreement) (Ecology et al. 1994) Milestone M-45 states, "Final closure of the operable units (Tank Farms) shall be defined as regulatory approval of completion of closure actions and commencement of post-closure actions. For the purposes of this agreement, all units located within the boundary of each tank farm will be closed in accordance with WAC 173-303-610. This includes contaminated soil and ancillary equipment that were previously designated as *Resource Conservation and Recovery Act of 1976* (RCRA) Past-Practice Units." The Washington State Department of Ecology (Ecology) is the lead regulatory agency for tank farm operable unit closure.

This document provides the planning to ensure all information will be available to support a recommendation on AX Tank Farm closure basis. Figure 1 depicts how the Alternatives Generation and Analysis (AGA) process interfaces with HTI. Where information is unknown, trade studies are recommended to develop that information.

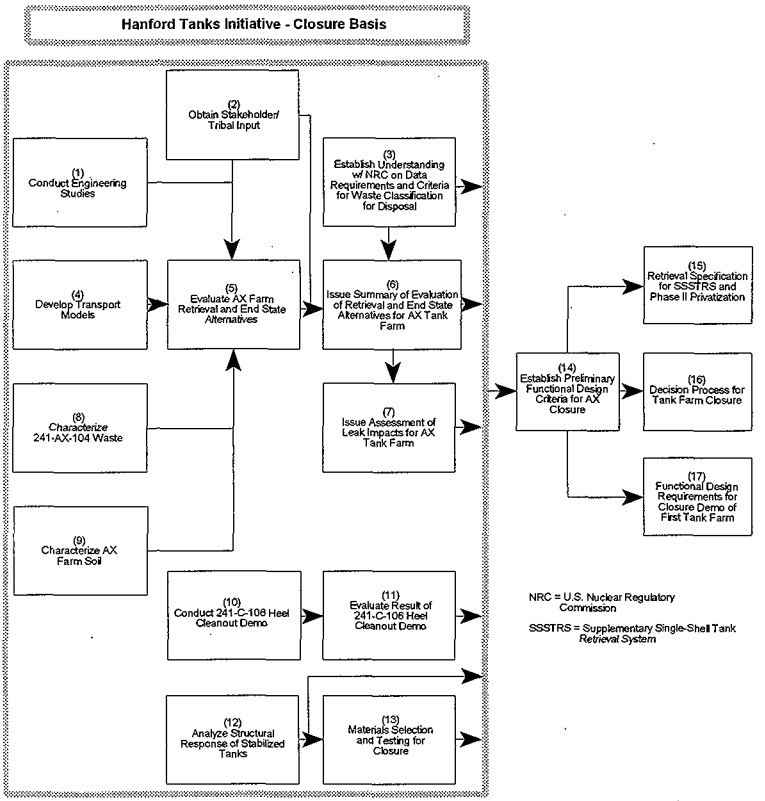
Figure 2 depicts the key activities involved in recommending a closure basis for AX Tank Farm and the interfaces between HTI and TWRS retrieval and closure activities.

Figure 1. Alternatives Generation and Analysis Process as Part of the Hanford Tanks Initiative.



CWP = Closure Work Plan
DOE = U.S. Department of Energy
MOU = Memorandum of Understanding
NEPA = *National Environmental Policy Act of 1969*
SST = Single-shell tank.

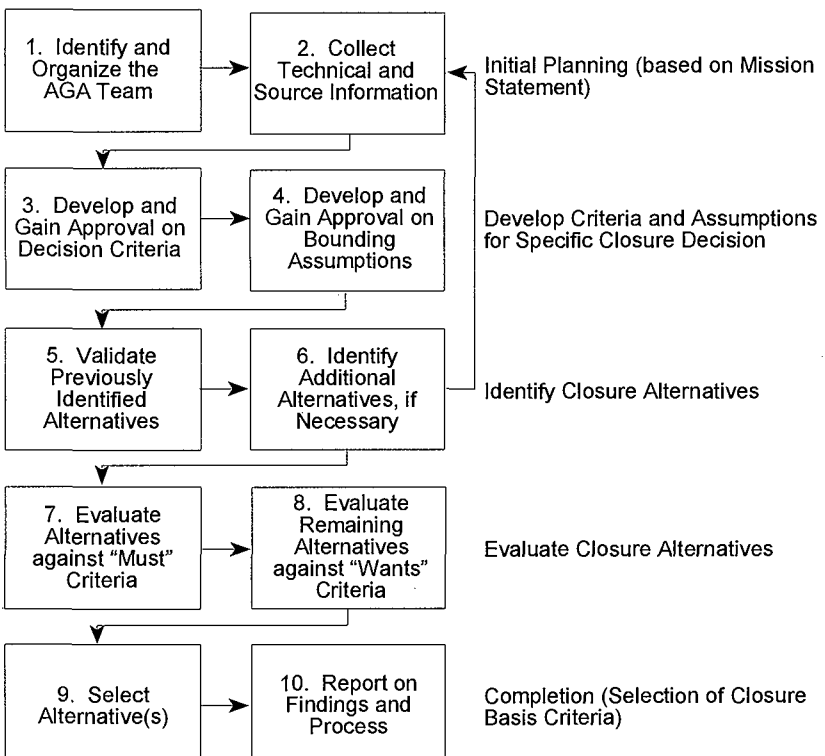
Figure 2. Hanford Tanks Initiative Activities to Establish Closure Basis.



2.0 DECISION ANALYSIS SUMMARY

Figure 3 illustrates the AGA process as it will be applied to the development of the AX Tank Farm closure basis. The AGA process is described in the *TWRS Systems Engineering Manual*, WHC-IP-1231, Section 3.0, "Alternatives Generation and Analysis" (WHC 1996c).

Figure 3. Alternatives Generation and Analysis Process.



The process used to determine the AGA studies necessary and sufficient to establish the closure basis is documented in Appendix A, Comparison of Information Needs, and Appendix B, Evaluation of Information Needs. The process is summarized in the following items.

1. The HTI mission was analyzed to determine the Closure Basis Decisions that must be made to establish a recommendation for the AX Tank Farm closure basis. The Closure Basis Decisions that have been developed are as follows:

    - What amount and classification of residual waste is allowed to remain?
    - What amount of waste leakage is allowable during retrieval?
    - What type of treatment is needed for residual waste, if any?
    - Is retrieval of SST shell and structural material necessary?
    - Is ancillary equipment retrieval and treatment necessary; if so, what treatment will be performed?
    - Is in-tank equipment removal and treatment necessary; if so, what treatment will be performed?
    - What type of soil remediation will be performed, if any?
    - What type of vadose zone remediation will be performed, if any?
    - What surface barriers will be used, if any?
    - What subsurface barriers will be used, if any?
    - What in-tank subsidence prevention will be used, if any?
    - How do treatment process system effects affect the other Closure Basis Decisions?

2. For each Closure Basis Decision, Decision Criteria were developed, based on internal and external requirements that will influence the Closure Basis Decisions. The Decision Criteria that apply to each Closure Basis Decision are indicated in Table 1. The Decision Criteria formulated are as follows:

    - Does it meet Tri-Party Agreement requirements?
    - Does it meet regulatory requirements?

- Does residual meet U.S. Nuclear Regulatory Commission (NRC) requirements as incidental waste or must the radioactive constituents in the residual waste be disposed of as high-level waste?
- Does it satisfy public concerns and values?
- Does it provides for public safety?
- Does it provide for worker safety?
- Does it protect the environment?

3. For each Closure Basis Decision, the information to satisfy the Decision Criteria was developed. From this process, information development activities could be linked to each Closure Basis Decision.

4. All similar information development activities were grouped into information gathering activities in Appendix B. The necessary information gathering activities were compared to planned and existing studies to determine the information needs that are not being satisfied under current plans. The scope of planned studies was compared to the necessary information development activities to determine if any planned work was not necessary to establish the closure basis.

Table 1. Decision Criteria Matrix.

Closure Basis Decisions	Decision Criteria						
	Does it meet Tri-Party Agreement requirements	Complies with regulatory requirements?	Does residual meet NRC requirements as incidental waste?	Satisfies public concerns and values	Provides for public safety	Provides for worker safety?	Protects the environment?
Amount and classification of residual waste allowed to remain	X	X	X	X	X	X	X
Amount of waste leakage allowable during retrieval	X	X		X	X	X	X
Treatment of residual waste		X	X	X	X	X	X
Retrieval of single-shell tank shell and structural material		X		X	X	X	X
Ancillary equipment retrieval and treatment		X	X	X	X	X	X
In-tank equipment removal and treatment		X		X	X	X	X
Soil remediation		X	X	X	X	X	X
Vadose zone remediation		X		X	X	X	X
Surface barriers		X		X	X	X	X
Subsurface barriers		X		X	X	X	X
Subsidence prevention		X		X	X	X	X
Treatment process system effects		X		X	X	X	X

NRC = U.S. Nuclear Regulatory Commission.

3.0 PROBLEM STATEMENT

An AGA provides a logical and systematic process for developing a conclusion based on available and developed technical information. This AGA plan describes both AGA studies and technical background development activities necessary to address all aspects of the closure basis for the AX Tank Farm.

The AX Tank Farm consists of many components, as illustrated in Figure 4. Decisions regarding the final condition of each component will be the result of the systematic AGA process, based on decision criteria.

Figure 4. Single-Shell Tank Components.

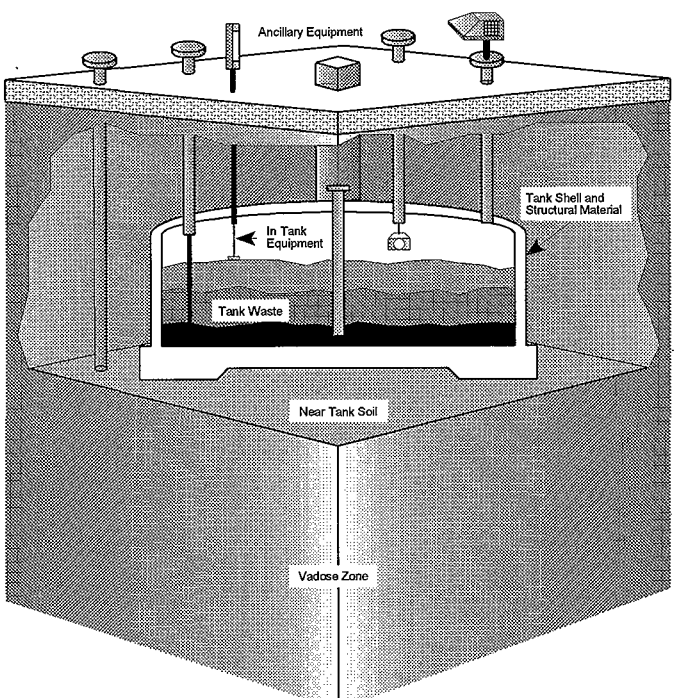
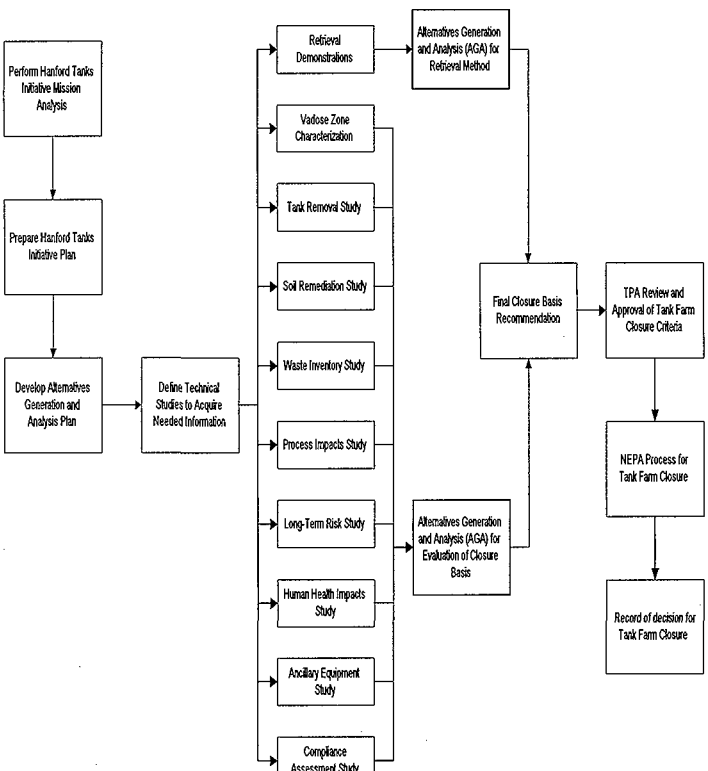


Figure 5 indicates that most of the work to be accomplished by HTI is information development, evaluation, and analyses to support public/stakeholder involvement and development of recommendations for final performance measures (criteria) for closure basis.

Figure 5. Process for Developing Performance Measure for Closing AX Tank Farm.



NEPA = *National Environmental Policy Act of 1969.*

3.1 OBJECTIVES

The objective of this AGA plan is to identify a process to develop recommendations for end-state criteria for the closure basis for the AX Tank Farm in a manner that is safe for workers and the public, environmentally sound, and cost effective. The closure basis must be acceptable to the parties of the Tri-Party Agreement, the public, and other stakeholders. To achieve the desired product, a thorough assessment of risks to human health and the environment and cost will be completed for each alternative examined.

An alternative for closing the AX Tank Farm is a scenario that describes the combined end-states of each tank farm "component" and the process for achieving that end-state, as described in Section 2.0.

3.2 ISSUES OF CONCERN

The key issues of concern addressed in this plan are as follows:

1. The processes and costs of acquiring necessary and sufficient data for setting acceptable performance measures for a first-of-a-kind operation

2. Conducting, in a timely manner, an adequate public/stakeholder involvement program to achieve acceptance of recommended measures

3. Selecting and analyzing sufficient alternatives to bound all viable closure alternatives

4. Obtaining a finding from NRC that residual tank wastes can be classified as "incidental" wastes, and therefore, to be disposed of under DOE regulation

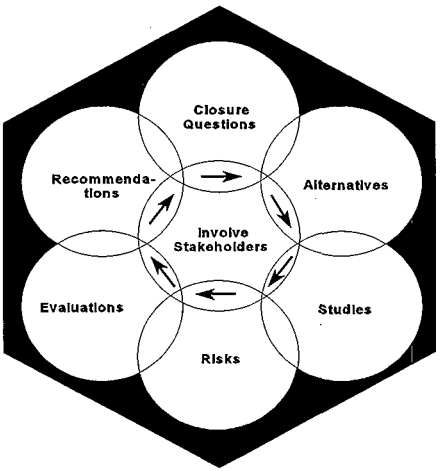
5. Limits of technical capability for waste retrieval.

3.3 SCOPE AND LIMITS OF THE PROBLEM

The scope of this plan is to identify those activities required to obtain the necessary and sufficient information to develop recommendations of end-state criteria for closing AX Tank Farm. No other tank farm is being addressed by this plan, although the results of the AGAs discussed in this plan may provide input into decisions regarding other tank farms.

A comprehensive and continuous public/stakeholder involvement process is a major component of this plan and is a major factor in the Tri-Party Agreement decision process (JEG 1997a and DOE et al. 1996). This planning portion of the scope and the interplay of the public/stakeholder involvement process is shown in Figure 6.

Figure 6. Public Involvement and Risk Management.



3.4 PERFORMANCE MEASURES

Performance measures (criteria) will be quantitative expressions that answer key closure basis questions (decisions). This plan delineates the information needs, the decision criteria, the studies that will develop the information, and the AGAs that will lead to recommendations for the end-state for AX Tank Farm. The closure basis criteria and related decision criteria and information needs are provided in Appendices A and B.

4.0 CONSTRAINTS AND ASSUMPTIONS

Achieving agreement on the set of end-state performance measure (criterion) recommendations of AX Tank Farm will be a systematic and interactive process involving multiple internal and external interfaces. The process will involve the Project Hanford Management Contractor (PHMC), subcontractors, U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), Ecology, the public, and stakeholders in an on-going, open-involvement process. This plan summarizes the need for, and development of, technical information to be used in this process. The technical information needs were defined through the process illustrated in Figure 5 (see Section 3.3). The constraints and assumptions guiding and limiting the overall process of establishing a closure basis for AX Tank Farm are delineated in the following sections.

4.1 EXTERNAL CONSTRAINTS

External constraints on closure of the AX Tank Farm are those constraints imposed by other than PHMC and DOE as shown in Table 2.

Table 2. External Constraints.

Item	External constraint source	Description
1	Tri-Party Agreement	M-45-00 Milestone requirements. Schedule Requirements Remaining Tank Waste Volume Technical Achievability May Consider Cost Factors and Worker Exposure Public/Stakeholder Involvement - Must develop and implement an approved plan. Interface with other related milestones.
2	Ecology	Washington State Environmental Requirements, WAC 173 and State Environmental Policy Act requirements.
3	Washington State Department of Health	Radiation Air Emissions Program, WAC 246-247
4	Nuclear Regulatory Commission	Regulatory Requirements - Classification of Residual Wastes.
5	Council on Environmental Quality	National Environmental Policy Act (NEPA), 40 CFR 1500-1508
6	EPA	National Emission Standards for Hazardous Air Pollutants, 40 CFR 61; National Pollutant Discharge Elimination System, 40 CFR 122-136; and Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 40 CFR 191

CFR = Code of Federal Regulations
Ecology = Washington State Department of Ecology
EPA = U.S. Environmental Protection Agency
RCRA = *Resource Conservation and Recovery Act of 1976.*
WAC = Washington Administrative Code.

4.2 INTERNAL CONSTRAINTS

Internal constraints and assumption are those imposed by DOE or the PHMC contractors and are shown in the following Table 3.

Table 3. Internal Constraints.

Item	Internal constraints	Description
1	DOE Waste Management Requirements	DOE Order 5820.2A Waste management
2	DOE Worker Exposure Control Requirements	10 CFR 835 Occupational Radiation Protection
3	DOE Environmental Protection Requirements	DOE Order 5400 Environmental Protection.
4	DOE Public Protection Requirements	DOE Order 5400.5 Radiation Protection of the Public.
5	DOE National Environmental Policy Act Requirements	10 CFR 1021 NEPA Implementation.
6	Quality Management	10 CFR 830.120 Nuclear Quality Management
7	Life-Cycle Management	10 CFR 430.1 Life-Cycle Asset Management

CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
NEPA = *National Environmental Policy Act of 1969.*

4.3 LIMITING ASSUMPTIONS

The problem statement is so large for this AGA plan that initial screening and aggregation of the alternatives were required to select a reasonable number of alternatives to represent the possibilities in the early stage of recommendation making.

4.3.1 Alternatives Screening Assumptions

Several assumptions were made to allow for the alternatives screening process. Testing of these assumptions will continue at the alternatives recommendation points of the various planned studies. Testing must ensure that the selections are viable under the assumptions and that further screening, aggregation, evaluation, and recommendations can continue for the next step. Assumptions used for the initial screening for representative alternatives are provided in Table 4.

Table 4. Alternative Screening Assumptions.

Item	Alternatives Screening Action	Assumptions
1	Identify all alternatives within the limits of the Tank Waste Remediation Systems Environmental Impact Statement Record of Decision	a. Some level of retrieval required. b. Surface barriers required except for clean closure (55 alternatives identified).
2	Develop Base Case Alternatives	a. Eliminate alternatives that leave all waste in the tank farm. b. Develop base case alternatives using best-estimate calculations and commonly accepted mitigation measures (five identified).
3	Identify Alternative Component Variable Cases	Assumed variables considered: -Retrieval Waste Leakage -Surface Barrier, temporary barrier. -Soil Remediation -Residual Waste Allowed to Remain -Tank Shell and Structure Removal

The result of this screening process was the selection of five base-case alternative closure scenarios. These five scenarios were evaluated against the closure basis decisions, as shown in Table 5 (JEG 1997b,c). Table 5 shows that the base case scenarios are complete and representative for the range of variables considered. The other variables; treatment of residual waste, ancillary equipment treatment and retrieval, in-tank equipment removal and treatment, Vadose zone remediation, and treatment process system effects are being studied separately so that the results can be applied to all base case alternatives.

4.3.2 Stakeholder Involvement

Stakeholder involvement will be included in all steps of the AGA process. The key to the success of this process is to ensure that all public and stakeholder values are considered and expressed quantitatively in the derived performance measures (criteria). The process assumed for this plan is shown in Figure 6 (see Section 3.3).

Table 5. Representativeness of the Five Base-Case Alternatives.

Closure Base-Case Alternatives	Closure Basis Decisions										
	Amount and classification of residual waste allowed to remain	Amount of waste leakage allowed during retrieval	Treatment of residual waste	Retrieval of shell and structural material	Ancillary equipment retrieval and treatment	In-tank equipment removal and treatment	Soil remediation	Vadose zone remediation	Surface barriers	Subsidence prevention	Treatment process system effects
1	36, 360 and 3,600 ft^3	8,000 and 40,000 gal	note 1	no	note 1	note 1	none	note 1	Temp. Asphalt, RCRA Cap, or Hanford Barrier	note 2	note 1
2	360 ft^3	8,000 and 40,000 gal	note 1	no	note 1	note 1	in situ	note 1	RCRA Cap	note 2	note 1
3	360 ft^3	0 and 8,000 gal	NA	yes	note 1	note 1	excavate	note 1	none	n/a	note 1
4	360 ft^3	0 and 8,000 gal	NA	yes	note 1	note 1	in situ	note 1	none	n/a	note 1
5	360 ft^3	8,000 gal	NA	yes	note 1	note 1	none	note 1	RCRA Cap	n/a	note 1

RCRA = *Resource Conservation and Recovery Act of 1976*

Notes: 1. Not specifically addressed in the base case alternatives.

2. For all cases where the tanks are left in the ground (landfill cases) subsidance prevention is included in the alternative.

Alternative 1 Retrieve waste to the Tri-Party Agreement limit (360 ft^3), and close the tank farm as a landfill with no tank removal or soil remediation, a nominal amount of retrieval leakage (8,000 gal), stabilize tanks, and construct a RCRA equivalent cap.

Sub Alternatives:

a) Maximum retrieval leakage of 40,000 gal

b) Residual waste volumes of 36 ft^3 and 3,600 ft^3

c) Temporary surface barrier prior to retrieval

d) Hanford surface barrier instead of RCRA equivalent cap after retrieval.

Alternative 2 Retrieve waste to the Tri-Party Agreement limit and close the tank farm as a landfill with no tank removal, but with in-place soil remediation, a nominal amount of retrieval leakage (8,000 and 40,000 gal), in situ soil remediation, stabilize tanks, and construct a RCRA equivalent cap.

Alternative 3 Retrieve waste to the Tri-Party Agreement limit, remove tanks, nominal leakage during retrieval, excavate contaminated soil and dispose of contaminated soil in an onsite engineered disposal facility, and do not use a surface barrier.

Alternative 4 Retrieve waste to the Tri-Party Agreement limit, remove tanks, nominal leakage during retrieval, in situ soil remediation, no surface barrier.

Alternative 5 Retrieve waste to the Tri-Party Agreement limit, remove tanks, nominal leakage during retrieval, no soil remediation, install RCRA equivalent barrier.

4.3.3 Subsurface Barrier

Based on recent evaluations and recommendations, it has been decided that a barrier under the AX Tanks will not be considered because of poor cost/benefit (WHC 1995 and Ecology et al. 1995).

4.4 SIMPLIFYING ASSUMPTIONS

Simplifying assumptions have been employed, where deemed appropriate, to maintain the AX Tank Farm Closure Basis development on a cost-effective footing. These assumptions are being used to design and conduct studies for base-case alternatives to minimize the number of studies and quantity of information necessary to evaluate alternatives and create quality performance measure recommendations. Current simplifying assumptions used in the process are listed in Table 6.

Table 6. Simplifying Assumptions.

Item	Process action	Current simplifying assumption
1	Residual Waste Category	U.S. Nuclear Regulatory Commission will designate as incidental waste.
2	Soil Excavation	Will be acceptable for onsite disposal.
3	Surface Barrier	A RCRA equivalent surface barrier will be sufficient.
4	Retrieval Evaluations	Will meet the minimum standard stated in the Tri-Party Agreement.

RCRA = *Resource Conservation and Recovery Act of 1976.*

5.0 ANALYSIS OF PLAN CONTENTS

This plan has been evaluated for consistency with the HTI Project and related plans and documents to determine if the planned and on-going studies will provide the necessary and sufficient information to develop recommendations for end-state performance measures for AX Tank Farm. Planned and ongoing studies were determined from the *Single-Shell Tank Closure Work Plan* (DOE-RL 1996), and the *Retrieval Performance Evaluation Criteria Assessment Work Plan* (JEG 1997d). Sections 5.1 through 5.4 provide the evaluation of the four key purposes for developing this plan. Section 5.5 provides the continuing AGA process.

5.1 REVIEW OF HANFORD TANKS INITIATIVE PLAN AND RELATED DOCUMENTS

The HTI Mission Analysis, HTI Plan, Draft SST Closure Plan, and other documents describing the scopes and status of various planned and ongoing studies were reviewed. These related documents define the decisions to be made and the information necessary and sufficient to make those decisions so that AX Tank Farm can be placed in an end-state condition in a safe and environmentally acceptable manner. This process was described in Figure 5 (see Section 3.3).

The documents reviewed provided the information necessary to evaluate the plans and process for developing recommendations for performance measures for AX Tank Farm end-state condition.

5.2 COMPLETENESS OF ALTERNATIVES

The method for selecting the five alternative scenarios for analyzing risks of closing AX Tank Farm was evaluated and described in Section 4.3. This method was deemed to be adequate in that all information needed to address the decision criteria are addressed as shown in Table 5 (see Section 4.3.1).

5.3 COMPLETENESS OF TANK CLOSURE CRITERIA

The closure criteria, as listed in the first column of the tables in Appendix B, have been reviewed and determined to be necessary and sufficient for developing performance measures for closing AX Tank Farm. As shown in Appendix B, the closure basis criteria, decision criteria, information needs, and planned studies demonstrate a complete system of elements that address all of the safety and environmental issues associated with the tanks and their environs, including the processing and management of waste, tank components, ancillary equipment, and soils around and below the tanks.

5.4 INFORMATION NEEDS

The 12 closure basis decisions are each analyzed on an individual table in Appendix A. A detailed gap analysis was performed and the results are provided in Appendix B. There are 16 tables in Appendix B, one for each required information-gathering activity. Tables 7 and 8 provide a summary of the evaluation in Appendix B. Studies that require a re-examination of scope (Categories 2, 3, and 4) are listed in Table 8.

Table 7. Summary of Analysis Provided in Appendix B.

Category	Category description	Number
1	Currently Planned, no change in scope, no comments	12
2	Currently Planned, no change in scope, comments	1
3	Currently planned, scope needs modifying	1
4	Not currently planned, new scope, no comments	1

Table 8. Evaluation Summary of Information Needs.

Study	Category	Scope changes needed
Process Impacts Study	3	This study should be expanded to analyze the impacts of Vadose zone treatment, ancillary equipment removal, and in-tank equipment removal. The Process Impacts Study to be completed in FY 1998 will be expanded to include this scope.
Subsurface Barrier Study	2	A study analyzing the alternatives for subsurface barriers has already been completed (WHC 1995). A decision has been made not to use subsurface barriers because due to "poor cost/benefit" (Ecology et al. 1995). This decision may have to be revisited once source term and transport model calculations are available.
Immobilization of Residual Waste Study/ Demonstrations	4	A study analyzing the alternatives for immobilization of the waste left in the tank after retrieval is necessary to provide information to the transport studies. Sandia Labs has proposed to study the alternatives for residual waste immobilization.

5.5 CONTINUING ALTERNATIVES GENERATION AND ANALYSIS PROCESS

The AGA process for the HTI is a complex, yet systematic process addressing all actions and decisions. This requires a comprehensive planning process that is tracked, expanded, and updated as necessary in the Draft SST Tank Closure Plan. The overall HTI AGA process is illustrated in Figure 5 and discussed in Section 3.0. As shown in Figures 2 and 6, many related and dependent studies are planned to support the development of closure criteria, the recommendation of these criteria to the Tri-Party Agreement, public, and stakeholders, and the final decision process through the *National Environmental Policy Act* (NEPA).

This plan has collected and evaluated the plans and information generated in the past, provided an evaluation of need, necessity and sufficiency of new information needed, and a description of the path to final approval of end-state criteria for AX Tank Farm.

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6.0 REFERENCES

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10 CFR 830.120, "Nuclear Quality Management", *Code of Federal Regulations*, as amended.

10 CFR 835, "Occupational Radiation Protection", *Code of Federal Regulations*, as amended.

10 CFR 1021, "NEPA Implementation", *Code of Federal Regulations*, as amended.

40 CFR 61, "National Emissions Standard for Hazardous Air Pollutants Program," *Code of Federal Regulations*, as amended.

40 CFR 122-136, "National Pollutant Discharge Elimination System", *Code of Federal Regulations*, as amended.

40 CFR 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes", *Code of Federal Regulations*, as amended.

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APPENDIX A

COMPARISON OF INFORMATION NEEDS

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Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Subsidence Prevention - Fill "empty" tank with grout - Fill "empty" tank with fill material - Fill "empty" tank with treated waste - Leave tank without fill	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Technical practicability - Previously demonstrated? - Potential worker exposure to radiation - Schedule requirements **Does it meet Regulatory Requirements?**	**#16) Subsidence Prevention Summary** - Cost vs. benefit for each alternative **#6) Compliance Assessment** - What regulatory requirements mandate filling the tanks after retrieval of waste? - Is subsidence prevention driven by the performance assessment only?	**Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - Stakeholder comments will be solicited before the final decision is made.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport - Process system impacts **Provides for Worker Safety?** - During placement of fill material - During monitoring activities **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling may be significantly different if the tank structure fails. - Performed for each alternative - Environmental consequences - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each alternative **#7) Waste Inventory Study**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decision	Decision Criteria	Information Needs	Studies Planned
Amount and Classification of Residual Waste Allowed to Remain - Decontaminate to bare metal - Retrieve to w/i TPA minimum requirement (Retrieve to 99%) - Best any technology can perform - Do not retrieve anything - Curies and radionuclides in residual	**Does it meet TPA Requirements?** - As much as technically possible - <360 cu. ft. in each 100 series tank - <30 cu. ft. in each 200 series tank - i.a.w. WAC 173-303-610 - Cost - Technical practicability - Previously demonstrated? - Potential worker exposure to radiation - Schedule requirements **Does it meet Regulatory Requirements?** **Does Residual Meet NRC Requirements as Incidental Waste?** - Incidental waste therefore DOE / EPA / WDOE regulates - HLW therefore NRC regulates	**#1) Retrieval Demonstrations** - Cost vs. waste retrieved - Maximum achievable - Worker exposure for each alternative - Production rates - This study must span the spectrum of available, plausible technologies to gain stakeholder and regulator support for the final recommendation. **#6) Compliance Assessment** - Assess the impacts on regulatory compliance with each regulatory agency of various levels of retrieval - Determine at what level NRC allows remaining waste to be considered incidental.	**Retrieval Demonstrations** **Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - After technical information is developed, the public should be involved in the final decision of how much waste should be retrieved.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport - Process system impacts **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities - Radiation exposure considered **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling - Requires waste characterization and inventory - Environmental consequences - This study will determine how remaining waste will effect the public and the environment. - All transport paths will be studied for various levels of remaining waste. - Worker safety from all stages of waste management. - Risk to public during and after retrieval - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for varying levels of waste allowed to remain **#3) Process System Impacts** **#7) Waste Inventory Study**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decision	Decision Criteria	Information Needs	Studies Planned
Amount of Waste Leakage Allowable During Retrieval	**Does it meet Regulatory Requirements?**	**#1) Retrieval Demonstrations** - Cost vs. waste retrieved - Maximum achievable - Worker exposure for each alternative - Production rates - This study must span the spectrum of available, plausible technologies to gain stakeholder and regulator support for the final recommendation.	**Retrieval Demonstrations**
		#6) Compliance Assessment - Assess the impacts on regulatory compliance with each regulatory agency of various levels of waste leakage during retrieval	**Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - After technical information is developed, the public should be involved in the final decision of how much waste should be allowed to leak during retrieval.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling - Requires waste characterization and inventory - This study will determine how the leaking waste will effect the public and the environment. - All transport paths will be studied for various levels of waste allowed to leak. - Worker safety from all stages of waste management. - Risk to public during and after retrieval	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)
	Provides for Worker Safety? - During retrieval and treatment - During monitoring activities - Radiation exposure considered	- Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for varying levels of waste allowed to remain	
	Protects the Environment? - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#7) Waste Inventory Study**	

Closure Basis Decision	Decision Criteria	Information Needs	Studies Planned
Treatment of Residual Waste	**Does it meet Regulatory Requirements?**	**#6) Compliance Assessment** - For an assumed amount of waste left in the SSTs after retrieval, what regulatory requirements apply.	**Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - Once the alternatives are understood, the stakeholders will be involved in the decision making process.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities - Radiation exposure considered **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each set of *alternatives* - Transport modeling - Process system impacts - Performed for each set of alternatives - Requires waste characterization and inventory - Environmental consequences **#7) Waste Inventory Study** **#15) Immobilization Demonstrations** - Each alternative for treatment of residual waste must be reviewed. Some may require demonstration.	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Retrieval of SST Shell and Structural Material - Leave SST in place - Remove SST including all structural material - Retrieve metal shell only	**Does it meet Regulatory Requirements?**	**#6) Compliance Assessment** - Determine if the regulations require removal of the SST shell and structural material after retrieval **#4) Tank Removal Study**	**Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3) **Tank Removal Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #2)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - Stakeholders will be informed of the alternatives (retrieval vs. stabilize in place) and comments will be considered.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport - Process system impacts **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each alternative - Waste site impacts - Performed for each alternative - Environmental consequences **#3) Process System Impacts** **#7) Waste Inventory Study**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Ancillary Equipment Retrieval and Treatment - Remove all ancillary equipment and treat - Stabilize equipment in place - No treatment or retrieval of ancillary equip.	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Potential worker exposure to radiation - Schedule requirements **Does it meet Regulatory Requirements?**	**#1) Retrieval Demonstrations** **#2) Alternatives for remediating ancillary tank farm equipment** - Describe the spectrum of alternatives - Cost vs. material retrieved **#6) Compliance Assessment** - Performed for each alternative - Review TPA and regulations to determine if retrieval of ancillary equipment is required	**Retrieval Demonstrations** **Ancillary Equipment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #8) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - After each alternative is fully understood, stakeholder comments will be solicited.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport - Process system impacts **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety;** **#10) Long Term Risk Study; and** **#11) Environmental Effects** - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each set of alternatives - Transport modeling - Process system impacts (if ancillary equip. is retrieved) - Performed for each alternative - Requires characterization of contamination of ancillary equipment - Environmental consequences of each alternative **#7) Waste Inventory Study** **#3) Process System Impacts**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
In-Tank Equipment Removal and Treatment - Remove all in-tank equip. and treat - Stabilize in-tank equipment in place - No treatment or retrieval of in-tank equip.	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Technical practicability - Previously demonstrated? - Potential worker exposure to radiation - Schedule requirements **Does it meet Regulatory Requirements?**	**#1) Retrieval Demonstrations** - *Worker exposure from retrieval* of in-tank equipment - Consider impact of in-tank equipment on each retrieval technology. Some technologies will require the removal of in-take equipment. **#6) Compliance Assessment** - Performed for each alternative - Determine if in-tank equipment can be left behind and still meet all *applicable regulations.* - Determine if TPA will allow in-tank equipment to remain in SSTs	**Retrieval Demonstrations** **Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - Once the alternatives are fully understood, stakeholders will be asked to provide input on removal of in-tank equipment.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Water table contamination - Process system impacts **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere - Will environmental contamination be increased if in-tank equipment remains in the tank.	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling - Process system impacts - Performed for each set of alternatives - Requires waste characterization and inventory - Environmental consequences - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each set of **#7) Waste Inventory Study** **#3) Process System Impacts**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Soil Remediation - Treat the soil in place - Retrieve and treat the soil - Don't treat the soil	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Potential worker exposure to radiation - Schedule requirements **Does it meet Regulatory Requirements?**	**#6) Compliance Assessment** - Performed for each alternative - Will each alternative satisfy TPA and other regulatory requirements **#5) Soil Remediation Study**	**Soil Remediation Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #3) **Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - Stakeholder Involvement will be solicited on the subject of soil remediation. Will soils be immobilized? How will cover selection impact this decision?	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport - Process system impacts **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling - Process system impacts - Performed for each alternative - Requires soil characterization and inventory - Environmental consequences - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each alternative **#7) Waste Inventory Study** **#3) Process System Impacts**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Vadose Zone Remediation - Treatment - Vapor extraction - Other treatment - No treatment	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Potential worker exposure to radiation - Schedule requirements **Does it meet Regulatory Requirements?**	**#12) Vadose Zone Treatment Alternatives** - Vadose zone treatment techniques should be listed by cost, efficiency, and waste products produced. **#5) Soil Remediation Study** **#6) Compliance Assessment** - Performed for each alternative - Is vadose zone treatment a requirement of TPA or any regulation?	**Soil Remediation Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #3) **Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - Once the alternatives are technically understood, stakeholders will be informed of the alternatives and asked to comment.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport - Process system impacts if treatment is selected **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling - Process system impacts - Performed for each set of alternatives - Requires waste characterization and inventory - Environmental consequences for treatment and non-treatment. - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each set of alternatives **#7) Waste Inventory Study** **#3) Process System Impacts**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Treatment Process System Effects - Treatment of Waste - Treatment of Ancillary Equipment - Treatment of Shell and Structural Material - Treatment of Residual Waste - Treatment of in-tank Equipment (either in- tank or after removal) - Treatment of contamination in soils and vadose zone	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Technical practicability - Previously demonstrated? - Potential worker exposure during treatment and disposal - Schedule requirements **Does it meet Regulatory Requirements?**	**#6) Compliance Assessment** - Performed for each set of alternatives - Does each treatment alternative meet regulatory requirements? - Itemize which wastes can be disposed of without treatment	**Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
Note: This decision is necessary to assure the global effects are considered when making treatment and retrieval decisions.	**Satisfies Public Concerns and Values?**	**#8) Stakeholder Involvement** - As stakeholders comment on key decisions, they will need to know the total effects of each retrieval and treatment decision.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Water table contamination - Air transport - Each retrieval and treatment alternative will have different process system impacts on the public. **Provides for Worker Safety?** - During retrieval and treatment **Protects the Environment?** - Each retrieval and treatment alternative will have different process system effects on the environment which must be understood.	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling - Process system impacts - Performed for each set of alternatives - Requires waste characterization and inventory - Environmental consequences - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous and radioactive materials - Performed for each set of **#7) Waste Inventory Study**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Process Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Surface Barriers - Use RCRA surface barriers - Use Hanford surface barriers - Use no surface barriers - Temporary Asphalt Barrier before retrieval	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Potential worker exposure to radiation - Schedule requirements **Does it meet Regulatory Requirements?**	**#13) Surface Barrier Alternatives** - Cost vs. efficiency - Effect on transport of sub-surface Waste **#6) Compliance Assessment** - Performed for each surface barrier alternative - Which surface barrier will meet all regulatory requirements.	**Compliance Assessment Study** (Path Forward for Developing Retrieval Performance *Evaluation Criteria*, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - Stakeholders will be asked to provide input on barrier selection.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 4 ***DQO for Implementation of MOU*** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination - Air transport **Provides for Worker Safety?** - During retrieval and treatment - During monitoring activities **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - *Hanford Wildlife and Biosphere*	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling - Process system impacts - Performed for each alternative - Requires waste characterization and inventory - Environmental consequences - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Performed for each alternative **#7) Waste Inventory Study**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

Closure Basis Decisions	Decision Criteria	Information Needs	Studies Planned
Sub-Surface Barriers - No sub-surface barriers - Sub-surface barriers on some tanks - Sub-surface barriers on all tanks	**Does it meet TPA Requirements?** - i.a.w. WAC 173-303-610 - Cost - Technical practicability - previously demonstrated? - Worker exposure during placement - Schedule requirements **Does it meet Regulatory Requirements?**	**#14) Sub-Surface Barrier Study** - Cost vs. efficiency for each - Compare each sub-surface barrier with relevant regulatory requirements - Worker exposure in placing the barriers **#6) Compliance Assessment** - Performed for each sub-surface barrier alternative - Is there any regulatory requirement for sub-surface barriers?	*TBD === What study determined that sub-surface barriers would not be used???* **Compliance Assessment Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 3)
	Satisfies Public Concerns and Values?	**#8) Stakeholder Involvement** - After the technical facts are assembled, the stakeholders will be informed of the alternatives and their opinion will be solicited.	**Stakeholder Involvement** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; Tanks Initiative Retrieval Performance Evaluation *Criteria Assessment Work Plan*, Jacobs Engineering Group Inc, Febraury 1997, Task 4 **DQO for Implementation of MOU** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1)
	Provides for Public Safety? - Subsurface transport - Future generations not aware of Hanford - Water table contamination **Provides for Worker Safety?** - During placement of barrier - During monitoring activities - During retrieval **Protects the Environment?** - Columbia River - Aquifer - Hanford Soils - Hanford Wildlife and Biosphere	**#9) Human Health and Safety; #10) Long Term Risk Study; and #11) Environmental Effects** - Transport modeling effects for each sub-surface barrier - Process system impacts - Performed for each sub-surface barrier alternative - Requires waste characterization and inventory - Environmental consequences - Worker safety - Risk to public - Programmatic risk - Industrial Risks - Risks from hazardous materials - Risks from radioactive materials - Performed for each set of *alternatives* **#7) Waste Inventory Study**	**Waste Inventory Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4) **Human Health Impacts Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 1) **Long-Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and Hanford Tanks Initiative Retrieval Performance Evaluation Criteria Assessment Work Plan, Jacobs Engineering Group Inc, Febraury 1997) **Modeling Support to Long Term Risk Study** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10) **Conclusions and Recommendations** (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #12 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, Febraury 1997, Task 5)

APPENDIX B

EVALUATION OF INFORMATION NEEDS

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#1 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Retrieval Technology Demonstrations
Need for Information: In order to establish the source term which will remain in the single-shell tanks after retrieval, the available retrieval technology capabilities must be fully understood. This technology review is mandated by the mission of the Hanford Tank Initiative.
Requirements Upon Information Gathering Activity: Retrieval Technology Demonstrations must provide the following information for each candidate technology in order to facilitate the establishment of single-shell tank closure basis: Cost versus waste quantity retrieved relationship Maximum waste retrievable Estimated worker exposure Production rates Ability to retrieve and/or work around in-tank equipment Added exposure due to removal of in-tank equipment. This information must be established for a broad spectrum of technologies.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Retrieval Technology Demonstrations. The private sector will propose technologies and those meeting the minimum requirements will be considered. Initial testing will be done at vendor facilities and final testing will be done in-tank.
Recommendations for Change of Current Scope: None
Comments: None

#2 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Alternatives for Remediating Ancillary Tank Farm Equipment
Need for Information: This study is driven by the need to understand the "source term" after closure of the single-shell tank farms. The source term is the remaining contamination after closure which will be analyzed as a threat to workers, the public, and the environment. The contribution to the source term from the contamination on the ancillary equipment may be overcome by surface barriers, subsurface barriers, immobilization of the contamination or retrieval of the ancillary equipment.
Requirements Upon Information Gathering Activity: Alternatives for Remediating Ancillary Tank Farm Equipment must provide the following information for each alternative in order to facilitate the establishment of single-shell tank closure basis: Cost versus contamination quantity retrieved relationship Long term performance of non-retrieval alternatives Estimated worker exposure Retrieval/treatment rates. This information must be established for a broad spectrum of removal and/or immobilization technologies.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Ancillary Equipment Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #8). This study will identify the ancillary equipment in AX Tank Farm and identify options for remediation. This study will assess technical feasibility, cost, and schedule. Some alternatives may retrieve some or all of the contamination without retrieving the ancillary equipment. Objectives of ancillary equipment retrieval will be established in a separate compliance assessment study.
Recommendations for Change of Current Scope: None
Comments: None

#3 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Process Systems Impacts
Need for Information: Decision making for retrieval and treatment alternatives must include analysis of the health effects of each alternative, both to the workers and the public. The life cycle health effects will include the effects of treatment of retrieved contaminated materials.
Requirements Upon Information Gathering Activity: The impacts of treatment of waste removed during tank waste removal, ancillary equipment removal, in-tank equipment removal, soil remediation and vadose zone treatment must be understood. Various treatment alternatives for each waste type should be analyzed. Each alternative studied should be examined for worker exposure and public exposure.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Process Impacts Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #7). This study will evaluate the impacts of tank removal and soil remediation on the process systems.
Recommendations for Change of Current Scope: The current scope does not include the study of impacts from in-tank equipment removal, ancillary equipment removal and treatment and vadose zone treatment. This study should be expanded to analyze the impacts of vadose zone treatment, ancillary equipment removal, and in-tank equipment removal. The FY 1998 scope of work is planned to include these considerations.
Comments: None

#4 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Tank Removal Study
Need for Information: The removal of the shell and structural material of the tank is an alternative for retrieving the maximum amount of waste possible. This study supports the decision process deciding how much of the tank shell and structure should remain.
Requirements Upon Information Gathering Activity: The Tank Removal Study must provide the following information in order to allow a decision on shell and structural material removal to be made: Cost estimate for retrieval of all or part of the structural material associated with each tank Estimated worker exposure from retrieval of the shell and structural material Production rates (will the available technology options allow completion by the milestones established in the Tri-Party Agreement?) Benefits in the form of reduced public exposure Waste site impacts. Retrieval of the shell an associated structural material may be accomplished by more than one method. Several methods should be studied.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Tank Removal Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #2). This study will identify and evaluate alternatives for removal of AX Farm tanks. It will assess technical feasibility, cost, and schedule and identify and provide rationale for options dismissed.
Recommendations for Change of Current Scope: None
Comments: None

#5 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Soil Remediation Study
Need for Information: Soil contamination may spread after tank farm closure. Contamination may be fixed in place, removed from the soil and treated, or left in the soil. Treatment alternatives must be fully understood to allow a decision to be made on soil treatment.
Requirements Upon Information Gathering Activity: The Soil Remediation Study must provide the following information for each candidate technology in order to facilitate the establishment of single-shell tank closure basis: Cost versus waste quantity retrieved relationship For non-retrieval, fixative alternatives, long term characteristics must be documented Estimated worker exposure Production rates. This information will be established for a broad spectrum of technologies.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Soil Remediation Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #3). This study will identify and evaluate alternatives for the remediation of contaminated soil. Assess technical feasibility, cost, and schedule.
Recommendations for Change of Current Scope: None
Comments: None

#6 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Compliance Assessment Study
Need for Information: Final closure of the single-shell tank farms will be in accordance with applicable regulatory requirements and the Tri-Party Agreement. A Compliance Assessment Study will determine the applicable regulatory requirements and recommend a process to comply with the process outlined in the Tri-Party Agreement for all elements in the tank farm operable units.
Requirements Upon Information Gathering Activity: The closure of a tank farm operable unit is composed of the following elements: • Waste retrieval and/or treatment • In-tank equipment retrieval and/or treatment • Ancillary equipment retrieval and/or treatment • Tank shell and structural material retrieval and/or treatment • Soil retrieval and/or treatment • Residual waste treatment • Vadose zone treatment • Surface barrier • Subsurface barrier. The regulations must be understood for each of these elements as we go into the closure process with the Tri-Party Agreement parties and the other stakeholders.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: DQO for Implementation of MOU (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1); Compliance Assessment Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #9 and HTI RPECA Work Plan, Jacobs Engineering Group, Inc., February 1997, Task #3). These studies will identify applicable and appropriate requirements and regulations associated with closure alternatives.
Recommendations for Change of Current Scope: None
Comments: The compliance assessment currently planned will assess applicable and appropriate regulatory requirements associated with all major components of each retrieval closure alternative evaluated.

#7 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Waste Inventory Study
Need for Information: In order to establish the source term which will remain in the single-shell tanks after retrieval, the waste inventory (chemicals and radionuclides) must be fully understood. A characterization of the waste is mandated to be within the scope of the HTI.
Requirements Upon Information Gathering Activity: In order to recommend a closure basis for a tank farm the radionuclide and chemical characteristics of the waste which is proposed to remain in the tank must be understood within the limits necessary to estimate risks to the public and future Hanford Site workers. The level of accuracy needed for this information is a function of other decisions which must be made as part of the closure basis. These include surface and subsurface barrier design, amount of acceptable residual waste, and vadose zone treatment. These factors will be analyzed in the transport modeling process.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Waste Inventory Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #4). This study will estimate the waste inventory in the AX Farm tanks and in the ancillary equipment in AX Farm. It will also estimate the nature and extent of existing contamination from past leaks and spills. The closure basis of future single-shell tank farms may not be bounded by the AX Tank Farm closure analysis. Characterization to some limited extent of other tank farm residual waste will be necessary in order to recommend a closure basis for other tank farms.
Recommendations for Change of Current Scope: None
Comments: None

#8 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Stakeholder Involvement
Need for Information: This activity is mandated by the mission of the Hanford Tanks Initiative. Limited stakeholder involvement is necessary to educate as technical information is developed. The stakeholders will be asked to participate in the decision making process on each aspect of closure basis, once the background information has been documented.
Requirements Upon Information Gathering Activity: The closure of a tank farm operable unit is composed of the following elements: • Waste retrieval and/or treatment • In-tank equipment retrieval and/or treatment • Ancillary equipment retrieval and/or treatment • Tank shell and structural material retrieval and/or treatment • Soil retrieval and/or treatment • Residual waste treatment • Vadose zone treatment • Surface barrier • Subsurface barrier. Each of these elements will have several major decisions associated with it. As technical information is accumulated, the stakeholders should be notified and their input requested and evaluated.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Stakeholder Involvement (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; HTI RPECA Work Plan, JEG, February 1997, Task 4; and cc:mail dated 6/11/97 from Jacobs Engineering Group to Robert W. Lober titled Revised Stakeholder Involvement Plan) and Human Health Impacts Study Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5; HTI RPECA Work Plan, Jacobs Engineering Group Inc, February 1997, Task 1) and DQO for Implementation of MOU (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #1). These three studies will result in involving the stakeholders in the decision making process for closure basis decisions.
Recommendations for Change of Current Scope: None
Comments: HTI has elected to involve the stakeholders early in order to gain their support for decisions in progress and to educate them in the process. The stakeholder involvement activities currently planned will continue through FY 1998 and are designed to address and incorporate stakeholder values into the assessment of each element of each alternative considering during the retrieval performance evaluation criteria development process.

#9 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Human Health and Safety Study
Need for Information: This study will define the impacts of certain levels of radiation exposure on the public and on workers. It is necessary to allow health-based risk analysis to be considered when selecting many of the alternatives for tank farm closure.
Requirements Upon Information Gathering Activity: Determine the effects for exposure to various levels of tank waste contamination on workers and the public. Define appropriate health-based performance measures. Include short-term and long-term risks. Identify additional information needs, if any.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Human Health Impacts Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #5 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, February 1997, Task 1). This 5-part task includes stakeholder involvement activities to determine which health-based impacts will evaluate risks to workers and the public.
Recommendations for Change of Current Scope: None
Comments: None

#10 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Long-Term Risk Study
Need for Information: In order to understand effects on the public from various decisions, we need to develop transport models for each contaminant that will remain in the tanks.
Requirements Upon Information Gathering Activity: The Long-Term Risk Study must provide transport models for various barrier alternatives including the no barrier alternative. This study should also consider transport from waste disposed of onsite, which originated in the tank farm operable units.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Long-Term Risk Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #6 and HTI RPECA Work Plan, Jacobs Engineering Group Inc, February 1997, Task 2) and Modeling Support to Long-Term Risk Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #10). These two studies develop contaminant transport models for various levels of contamination and for various alternatives. This study provides information which can be adapted regardless of the amount of waste left in each tank or the decisions on ancillary equipment and in-tank equipment. The transport models will be useful in future analyses of health-based effects. For this reason, the source term is not necessary before starting this analysis.
Recommendations for Change of Current Scope: None
Comments: None

#11 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Environmental Effects
Need for Information: The NEPA process requires that environmental effects be considered for each alternative.
Requirements Upon Information Gathering Activity: The environmental effects need to be considered for each alternative for each component in the tank farm operable units.
[ ] Currently Planned [X] Not Currently Planned (within HTI Project)
Currently Planned Studies: Stakeholder Involvement (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #11; HTI RPECA Work Plan, JEG, February 1997, Task 4; and cc:mail dated 6/11/97 from Jacobs Engineering Group to Robert W. Lober titled Revised Stakeholder Involvement Plan) - HTI intends to use the stakeholder involvement process to determine the key environmental concerns. Currently, the planned comprehensive study of environmental effects will occur in the NEPA decision making process.
Recommendations for Change of Current Scope:None
Comments: None

#12 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Vadose Zone Treatment Alternatives
Need for Information: The alternatives for vadose zone treatment must be understood in order to complete the closure basis recommendation.
Requirements Upon Information Gathering Activity: Review currently available technology for vadose zone treatment for cost, schedule, worker safety and efficiency.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: Soil Remediation Study (Path Forward for Developing Retrieval Performance Evaluation Criteria, January 6, 1997, Task #3). This study will identify and evaluate alternatives for the remediation of contaminated soil. Assess technical feasibility, cost, and schedule. The scope of this study also includes vadose zone treatment alternatives.
Recommendations for Change of Current Scope: None
Comments: None

#13 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Surface Barrier Alternatives
Need for Information: The alternatives for surface barriers must be understood in order to complete the closure basis recommendation.
Requirements Upon Information Gathering Activity: Review currently available technology for surface barriers for cost, schedule, worker safety and efficiency.
[ ] Currently Planned [X] Not Currently Planned
Currently Planned Studies: No new studies required per comment below.
Recommendations for Change of Current Scope:
Comments: There has been a tremendous amount of research on surface barriers done at Hanford. The information which will be needed to complete the AGA process has been summarized in the Focused Feasibility Study of Engineered Barriers, DOE/RL-93-33 (DOE-RL, 1993).

#14 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Subsurface Barrier Study
Need for Information: The alternatives for Subsurface Barriers must be understood in order to complete the closure basis recommendation.
Requirements Upon Information Gathering Activity: Review currently available technology for surface barriers for cost, schedule, worker safety and efficiency.
[ ] Currently Planned [X] Not Currently Planned
Currently Planned Studies: A study analyzing the alternatives for subsurface barriers has already been completed (WHC 1995). A decision has been made not to use subsurface barriers due to "poor cost/benefit" (Ecology et al. 1995). This decision may have to be revisited once source term and transport model calculations are available.
Recommendations for Change of Current Scope: None
Comments: None

#15 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Immobilization (of residual waste) Demonstrations
Need for Information: The alternatives for immobilization of residual waste must be understood in order to complete the closure basis recommendation.
Requirements Upon Information Gathering Activity: Review currently available technology for waste immobilization for cost, schedule, worker safety and efficiency in the in-tank environment.
[X] Currently Planned [ ] Not Currently Planned
Currently Planned Studies: A potential study by Sandia Labs is being considered for inclusion in FY 1998 work scope.
Recommendations for Change of Current Scope: A study analyzing the alternatives for immobilization of the waste left in the tank after retrieval is necessary to provide information to the transport studies. Sandia Labs has proposed to study the alternatives for residual waste immobilization. If selected, this study will occur in FY 1998.
Comments: None

#16 (Category) Hanford Tanks Initiative Alternatives Generation and Analysis Evaluation of Information Needs
Required Information Gathering Activity: Subsidence Prevention Summary
Need for Information: The alternatives for subsidence prevention (of the emptied tank after retrieval) must be understood to assure the closure basis performance.
Requirements Upon Information Gathering Activity: Subsidence prevention could be accomplished with a number of different types of fill. The technical merits of each will be evaluated and summarized to facilitate recommending the final closure basis.
[ ] Currently Planned [X] Not Currently Planned
Currently Planned Studies: The scope of a study will be documented in FY 1998.
Recommendations for Change of Current Scope: None.
Comments: None

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