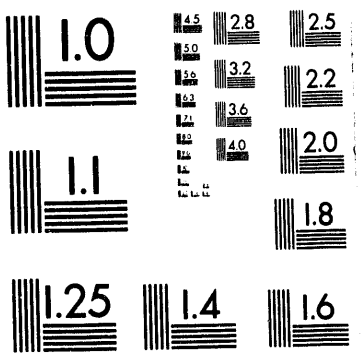
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1 of 2

WINCO-1149
(DOE/ID-10378)
Revision 2

UC-510

IDAHO NATIONAL ENGINEERING LABORATORY HIGH-LEVEL WASTE ROADMAP

August 1993

Westinghouse Idaho
Nuclear Company, Inc.

PREPARED FOR THE
DEPARTMENT OF ENERGY
IDAHO OPERATIONS OFFICE
UNDER CONTRACT DE-AC07-84ID12435

EXECUTIVE SUMMARY

The Idaho National Engineering Laboratory (INEL) High-Level Waste (HLW) Roadmap takes a strategic look at the entire HLW life-cycle starting with generation, through interim storage, treatment and processing, transportation, and on to final disposal. The roadmap is an issue-based planning approach that compares "where we are now" to "where we want and need to be."

The INEL has been effectively managing HLW for the last 30 years. Calcining operations are continuing to turn liquid HLW into a more manageable form. Although this document recognizes problems concerning HLW at the INEL, there is no imminent risk to the public or environment. By analyzing the INEL current business operations, pertinent laws and regulations, and committed milestones, the INEL HLW Roadmap has identified eight key issues existing at the INEL that must be resolved in order to reach long-term objectives. These issues are as follows:

A. The U. S. Department of Energy (DOE) needs a consistent policy for HLW generation, handling, treatment, storage, and disposal.

B. The capability for final disposal of HLW does not exist.

C. Adequate processes have not been developed or implemented for immobilization and disposal of INEL HLW.

D. HLW storage at the INEL is not adequate in terms of capacity and regulatory requirements.

E. Waste streams are generated with limited consideration for waste minimization.

F. HLW is not adequately characterized for disposal nor, in some cases, for storage.

G. Research and development of all process options for INEL HLW treatment and disposal are not being adequately pursued due to resource limitations.

H. HLW transportation methods are not selected or implemented.

A root-cause analysis uncovered the underlying causes of each of these issues. By dividing the issues into more manageable sub-issues, the actions needed for resolution became easier to determine. Identifying a final repository site and final repository criteria would resolve a number of issues. Other actions that must be completed to realize long-term goals include technology development, expanding/upgrading facilities, and continued research and development of analytical and remote

sampling. A desired resolution activities schedule was designed based on when these actions need to be completed. Problems that require DOE-Headquarter's (DOE-HQ) attention have been singled out for their resolution.

ACKNOWLEDGEMENTS

The INEL HLW Roadmap was developed through the efforts of the Westinghouse Idaho Nuclear Company, Inc. (WINCO) HLW Roadmap Team. Team members are listed below.

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The HLW Roadmap team would like to acknowledge the following individuals who also helped in the roadmap effort:

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Les Harjala
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ACRONYMS

ADS	Activity Data Sheet
AEA	Atomic Energy Act (of 1954)
ALARA	As Low As Reasonably Achievable
BDAT	Best Demonstrated Available Technology
BRC	Below Regulatory Concern
BUD	Backup Documents
CFR	Code of Federal Regulations
COCS	Common Occupational Classification System
CSSF	Calcine Solids Storage Facility
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOE-HQ	Department of Energy - Headquarters
DOE-ID	Department of Energy - Idaho Operations Office
DOT	U.S. Department of Transportation
EM	Environmental Restoration and Waste Management (DOE-HQ)
EPA	U.S. Environmental Protection Agency
ER&WM	Environmental Restoration and Waste Management (DOE-ID)
ERP	Environmental Restoration Program
FTE	Full-time equivalent
FY	Fiscal Year
FYP	Five-Year Plan
HEPA	High-Efficiency Particulate Air
HLLW	High-Level Liquid Waste
HLW	High-Level Waste
HMTA	Hazardous Materials Transportation Act
HWMA	Hazardous Waste Management Act
ICPP	Idaho Chemical Processing Plant (INEL)
INEL	Idaho National Engineering Laboratory
LDR	Land Disposal Restriction
LLW	Low-Level Waste
MLLW	Mixed Low-Level Waste

NEPA	National Environmental Policy Act (of 1969)
NON	Notice of Noncompliance
NRC	U.S. Nuclear Regulatory Commission
NWCF	New Waste Calcining Facility
NWPA	Nuclear Waste Policy Act
R&D	Research and Development
RAL	Remote Analytical Laboratory
RCRA	Resource Conservation and Recovery Act (PL-94-580)
SARP	Safety Analysis Report for Packaging
TBD	To Be Determined
TDD	Task Description Document
TRU	Transuranic Waste
TSD	Treatment/Storage/Disposal
WAC	Waste Acceptance Criteria
WMA	Waste Management Authority
WINCO	Westinghouse Idaho Nuclear Company, Inc.

1. INTRODUCTION

DOE's Office of Environmental Restoration and Waste Management (EM) initiated roadmapping to improve its integrated planning process and develop more effective strategies for reaching long-term goals. The roadmaps help DOE management understand the issues that could impede progress, the root causes of those issues, and the actions required for achieving final waste disposal and waste minimization, completing site remediation, and bringing operations into compliance.

Roadmaps are developed using a nine-step process grouped into three phases: Assessment, Analysis, and Resolution. The Assessment phase defines the background and current status of the site. In this phase, planning assumptions are made, regulatory requirements are catalogued, key milestones are determined, and logic diagrams are constructed.

The Analysis phase consists of evaluating the information gathered to determine roadblocks. Specific steps include identifying primary issues, their root causes, and the actions required to resolve the issues in a timely and effective fashion. The Resolution phase places issues into a desired resolution schedule. The issues that can not be resolved at the installation level are referred to DOE-HQ for their resolution.

With the guidance of DOE-HQ, the DOE's Idaho Operations Office (DOE-ID) is developing roadmaps for environmental restoration and waste management (ER&WM) activities at the INEL. DOE-ID has directed WINCO to produce the INEL HLW Roadmap. The Idaho Chemical Processing Plant (ICPP) is the INEL HLW treatment facility and the majority of INEL HLW inventory is located at the ICPP.

The INEL HLW Roadmap has been produced using the EM Revised Roadmap Methodology, July 1993. As required, the INEL has prepared a Land Use Planning section. Land Use Planning can be found in the INEL Installation Roadmap Document, DOE-ID-10405, May 1993, in Appendix D.

The HLW roadmap is a living document requiring periodic review and updates. The rapidly changing environment at the INEL affects the contents of the document, particularly human resources projections, activity data sheets information, and some of the key milestones. The roadmap will be reviewed and updated on an annual basis to incorporate changes and new information.

1.1 ICPP MISSION STATEMENT

ICPP's HLW plans have changed in the last year as a result of DOE's April 1992 decision to terminate reprocessing at the INEL of spent nuclear fuel for the recovery of fissile uranium. WINCO's new mission (as of April 26, 1993) is to:

> Cost-effectively manage all activities in a manner that protects the safety of INEL employees, the public, and the environment by:
>
> - Developing advanced technologies to process spent nuclear fuel for permanent off-site disposition and to achieve waste minimization.
> - Receiving, storing, and processing Navy and other Department of Energy-assigned spent nuclear fuels.
> - Managing all wastes in compliance with applicable laws and regulations.
> - Identifying and conducting site remediation consistent with facility transition activities.
> - Seeking out and implementing private sector technology transfer and cooperative development agreements.

2. ROADMAP ASSUMPTIONS

This section identifies assumptions that will establish a frame of reference or planning basis for subsequent analysis and management planning of HLW at the INEL. An assumption typically is used to fill a knowledge gap. Although the assumptions are stated as facts, it is important to realize that they are not final. The assumptions do not include contingencies for uncertainties in the project's technical, cost, or budget baselines.

2.1 INSTALLATION LEVEL ASSUMPTIONS

Installation level assumptions were developed from background obtained from DOE-HQ, operations offices, regulatory agencies, and waste-handling facilities. These assumptions were divided into four categories: Institutional Environment, Regulatory Compliance, Project Management, and Waste Stream Specific Assumptions.

These assumptions and the assumptions for all categories of DOE wastes, including Environmental Restoration are contained in the Idaho National Engineering Laboratory Installation Roadmap Assumptions Document, DOE/ID-10396, May 1993. An update of the site-specific assumptions for INEL HLW are listed in the following section.

2.2 HLW PLANNING BASELINE

For purposes of this Roadmap, HLW will be evaluated using the definition of HLW in the Nuclear Waste Policy Act (NWPA) [section 2 (12)]: "... (A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and (B) other highly radioactive material that the [Nuclear Regulatory] Commission, consistent with existing law, determines by rule requires permanent isolation."

The DOE's definition of HLW varies slightly. DOE Order 5820.2A defines HLW as: "the highly radioactive material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid waste derived from the liquid that contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation."

The following is a brief description of the status of HLW at the INEL.

- ICPP discontinued fuel reprocessing operations in April 1992 at the direction of DOE with the exception of one final 2nd/3rd cycle processing campaign, and ICPP is currently in transition.

- Reprocessing activities generated high-level liquid waste (HLLW) from 1952 to 1992. This waste was collected and is held in the tank farm until it is calcined.

- ICPP currently has 1.8 million gallons of liquid waste in inventory in storage tanks in the tank farm. These volumes change dynamically in response to plant operations.

- Approximately 3,800 m^3 of calcine have been produced since 1962 and calcine operations are continuing.

- Calcine is contained in five Calcine Solids Storage Facilities (CSSFs) which are full. Two additional CSSFs have been constructed. The sixth CSSF is in use and is currently used to receive calcine from the New Waste Calcining Facility (NWCF).

- The ICPP tank farm continues to receive mixed waste (e.g., sodium-bearing) constituents not meeting the NWPA and 5820.2A HLW definitions.

2.2.1 HLW Site-Specific Assumptions

This section identifies assumptions that establish a frame of reference or planning basis for subsequent analysis of HLW at INEL.

A. DOE HLW Policy, Regulations & Management

1. Calcined HLLW will be referred to as HLW in this roadmap.

2. ICPP will continue to function as the INEL HLW treatment facility.

3. Regulatory requirements as they currently exist will not change and the Notice Of Noncompliance (NON) Consent Order requirements (concerning the tank farm) will be met.

4. The classification of the currently stored radioactive mixed waste (sodium-bearing) that does not clearly fit the definition of HLW will be determined [i.e. low-level vs high-level vs transuranic (TRU)].

5. DOE, with contractor support, will successfully negotiate realistic compliance schedules with regulators and maintain sufficient funding to meet those schedules.

6. The hazardous components of mixed waste will remain under Resource Conservation and Recovery Act (RCRA) regulation.

7. Segregation of waste to minimize HLW volumes will continue.

8. Spent nuclear fuels have not been designated as HLW and, consequently, are not part of this roadmap. They are included in the INEL Spent Fuel Roadmap.

B. Waste Minimization

1. A process waste assessment for HLW will be developed consistent with HLW treatment technologies to comply with the U.S. Environmental Protection Agency (EPA) 33/50 Program.

C. Characterization

1. Development of remote sampling and analysis methods that meet personnel radiological exposure concerns and minimize sample volume requirements will be completed and will be approved by EPA Regional Administration.

2. In order to perform necessary characterization analysis, funding, facility expansion, and equipment upgrades will continue for ICPP facilities.

D. Research & Technology Development

1. A calcine retrieval process to remove calcine from the CSSFs will be successfully developed and demonstrated.

2. Technology to minimize future waste generation from decontamination and decommissioning (D&D) efforts will be developed and utilized.

3. Pilot plant and waste operations processes and facility replacements, expansions, or upgrades to meet regulatory requirements or revised missions will be funded and constructed.

4. Alternate HLW treatment technologies with potential for minimizing the amount of materials sent to a repository and/or disposal costs will be evaluated (e.g., isotope removal, hazardous components separations, and fission product separation using new processes such as freeze crystallization, ion exchange, crown ether extraction).

5. Technologies which contribute to the cost-effectiveness of the overall disposal system will be developed into a treatment process.

6. Treatment consistent with best demonstrated available technology (BDAT) for immobilizing mixed waste (HLLW, calcine) will be successfully verified and approved by the EPA.

7. Technology development for treatment of HLW will be considered for utilization on other waste types.

E. Process Implementation

1. Treatment facilities, that meet immobilized waste criteria or other EPA qualified BDATs, will be constructed and operated at the ICPP.

2. Calcination and CSSF storage will be acceptable to meet near-term regulatory storage requirements for HLW via no migration petition or negotiated compliance while final treatment and disposal technologies are being developed and implemented.

3. NWCF will operate as required to reduce the volume and mobility of toxic constituents until an acceptable final technology is developed.

4. CSSFs will continue to be operated as the interim storage for current and future inventories of ICPP calcine until a separation or immobilization process is developed and brought on-line.

5. Fuel conditioning for storage and/or disposal may continue to generate mixed radioactive waste, as may the phaseout of existing HLW processing facilities.

F. Storage

1. Waste management storage systems (i.e., tank farm and CSSFs) at the ICPP will continue to be operated and monitored as required to safely store HLW generated from ICPP operations.

2. HLW Land Disposal Restriction (LDR) storage prohibition issues will be resolved by DOE and its management and operations contractors with the State of Idaho and/or the EPA.

3. Liquid waste and heels stored in the existing tank farm will be removed and the tanks will be closed under RCRA.

4. Interim liquid radioactive waste storage and treatment systems will be required until INEL D&D/remediation activities are completed (minimum of 30 years).

5. Interim storage of immobilized HLW will be required before shipment to a final disposal facility.

G. Disposal

1. A repository that complies with regulatory disposal requirements will be available for the receipt of immobilized INEL HLW.

2. Repository waste acceptance criteria will be developed to help guide technology development to immobilize and dispose of INEL HLW.

3. Future immobilization processes will be developed to optimize the tradeoff between volume and cost of HLW disposal.

H. Transportation

1. Non-immobilized HLW will not be shipped off-site for processing/disposal.

2. Any movements of HLW (within the boundaries of the INEL and not accessing public roads) will be made according to DOE approved transportation plans and will adhere as closely as practical to the applicable U.S. Department of Transportation (DOT) regulations.

3. Immobilized HLW will require interim storage, possibly off-site, and will require shipment to an off-site repository. All shipments will be in full compliance with DOT, U.S. Nuclear Regulatory Commission (NRC), and State shipping regulations and will comply with the acceptance criteria of the receiving facility. Exceptions to the DOT, NRC, and EPA shipping regulations will be obtained as a last option.

4. There will be a need to send samples to off-site laboratories and to receive HLW samples from off-site for analysis at the ICPP Remote Analytical Laboratory. These sample shipments will be in full compliance with DOT, NRC, and State regulations, and DOE orders.

5. NRC licensed and DOT approved packaging and casks will be developed as necessary to facilitate the off-site shipments and the on-site movements of HLW.

6. The only roads on the INEL considered "public access roads" are U.S. Highways 20, 26, and State Highways 22, 28, and 33.

7. Any on-site movement of HLW that accesses public roads will be in full compliance with DOT, NRC, and State shipping regulations.

3. KEY REGULATORY REQUIREMENTS

The purpose of this section is to briefly convey to the roadmap audience the regulations and other requirements related to HLW management, and provide substantive support for issues, needs, and activities identified in the analysis phase of the roadmap methodology.

This document is not intended to specifically list each applicable section of every regulatory requirement affecting HLW. Instead, an overview of the relevant regulatory requirements, statutes, and Code of Federal Regulations (CFRs) are listed below. A more comprehensive list of these regulatory requirements can be found in Appendix B of the INEL Installation Roadmap Document. Included in Appendix B is the title of each order or regulation, the source of the regulation, a short summary including applicability, and, if appropriate, the effective date.

Applicable statutes, regulations, and DOE requirements for HLW include:

- DOE Order 1540.1 Materials Transportation and Traffic Management
- DOE Order 4330.4A Conduct of Maintenance
- DOE Order 5000.3B Occurrence Reporting and Processing of Operations Information
- DOE Order 5400.1 General Environmental Protection Program
- DOE Order 5400.2A Environmental Compliance Issue Coordination
- DOE Order 5400.3 Hazardous and Radioactive Mixed Waste Program
- DOE Order 5400.5 Radiation Protection of the Public and the Environment
- DOE Order 5440.1C National Environmental Policy Act (NEPA)
- DOE Order 5480.11 Radiation Protection for Occupational Workers
- DOE Order 5480.19 Conduct of Operations

• DOE-ID 5480.3	Hazardous Materials Packaging and Transportation Safety Requirements
• DOE Order 5480.4	Environmental Protection, Safety, & Health Protection Standards
• DOE Order 5480.5	Safety of Nuclear Facilities
• DOE Order 5481.5	Safety Analysis & Review System
• DOE Order 5700.6C	Quality Assurance
• DOE Order 5820.2A	Radioactive Waste Management
• DOE Order 6430.1A	General Design Criteria
• DOE-ID 10333	Waste Minimization and Pollution Prevention Awareness Plan
• DOE EH-0256T	Radiological Control Manual
• DOE/RW-0351 P	Waste Acceptance Systems Requirements Document
• 10 CFR 60	Disposal of HLW in Geologic Repositories
• 10 CFR 71	Packaging and Transportation of Radioactive Material
• 10 CFR 835	Occupational Radiation Protection
• 29 CFR 1910	Occupational Safety and Health Agency Subpart Z Toxics and Hazardous Substances Hazard Communication Standard
• 40 CFR 191	Environmental Radioactive Protection Standard for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Waste
• 40 CFR 260	Hazardous Waste Management System: General

- 40 CFR 261 — Identification and Listing of Hazardous Waste
- 40 CFR 262 — Standards Applicable to Generators of Hazardous Waste
- 40 CFR 263 — Standards for Transporters of Hazardous Waste
- 40 CFR 264 — Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- 40 CFR 265 — Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- 40 CFR 266 — Standards for Materials Being Recycled/Reused
- 40 CFR 268 — Land Disposal Restrictions
- 40 CFR 270 — U.S. Environmental Protection Agency (EPA) Administered Permit Programs: The Hazardous Waste Permit Program
- 42 USC 7401 — Clean Air Act
- 33 USC 1251 — Clean Water Act
- Resource Conservation and Recovery Act of 1976 as amended by the Hazardous and Solid Waste Amendments of 1984
- Consent Order to State of Idaho Notice of Noncompliance (NON) 1090-1-24-6601, April 1992
- Atomic Energy Act of 1954
- Nuclear Waste Policy Act (1982) as amended in 1987
- Federal Facilities Compliance Act, October 1992
- Hazardous Materials Transportation Act

4. MILESTONE DOCUMENTS AND DIAGRAMS

The purpose of listing and evaluating milestones is to generate a basis for reviewing site activities. This document contains only those milestones considered key HLW INEL commitments. All key milestones pertain to ICPP. These milestones can be found in the Activity Data Sheets (ADS) of the FY 95 EM Five-Year Plan, Volume III, DOE/ID-10234, April 1993. These are the most current list of milestones for FY 94 and will be updated annually. Known deviations from milestone dates are footnoted. These milestones incorporate installation programmatic commitments, commitments to DOE-HQ, regulatory requirements, NON consent orders, and commitments to the State of Idaho and other federal agencies. Figure 4-1 displays a time line of the key milestones positioned according to their schedule dates.

1995 Five-Year Plan Milestones
FY 95 - FY 99

Diagram No.	ADS Milestone No.	Description	Scheduled Date
1	1001.01.01	Complete NWCF Campaign H-3	4Q FY 93[1]
2	1001.01.02	WM/CF-5 Inspection of one of the HLLW tanks	1Q FY 94
3	1001.01.03	Characterize six remaining HLLW tanks	2Q FY 94
4	1001.01.04	Begin NWCF Campaign H-4	1Q FY 96
5	1001.01.05	Begin NWCF Campaign H-5	2Q FY 98
6	1001.01.06	Complete transfer of waste from tanks WM-182 through WM-186 including the heel.	2Q FY 09
7	1001.01.07	Complete transfer of waste from tanks WM-180, WM-181, and WM-187 through WM-190 including the heel.	3Q FY 15
8	1001.03.03	Submit CSSF RCRA Part B Application to the State of Idaho	4Q FY 94
9	1001.05.01	Develop alternative Na waste flowsheets and issue final report	4Q FY 93
10	1001.05.03	Determine corrosive effects of solids in the tank farm	4Q FY 94

[1] Will probably slip to 1Q FY 94

Diagram No.	ADS Milestone No.	Description	Scheduled Date
11	1001.05.05	Complete permit calculations for PEW, the Bin Sets, and NWCF	4Q FY 94
12	1001.05.08	Establish concentration limits for the tank farm to prevent stainless steel cracking	1Q FY 97
13	1001.05.09	Determine corrosion of calcine	4Q FY 97
14	1001.06.01/ 1001.06.02	Perform NWCF RCRA performance test and issue report	3Q FY 96
15	1004.01.04	Complete advanced conceptual design for Bin Set #1 retrieval system	3Q FY 96
16	1004.01.05	Complete conceptual design for Bin Set #8 calcine storage	2Q FY 96
17	1004.04.02	Complete conceptual design on the multifunction Pilot Plan Facility	3Q FY 94
18	1004-DE	Complete advanced conceptual design on the multifunction Pilot Plant.	4Q FY 95
19	1008.01.04	Complete preliminary performance assessment addressing the performance of INEL spent fuel and wastes in two hypothetical geological repositories	4Q FY 93
20	1008.01.07	Complete preliminary waste acceptance criteria report	4Q FY 93
21	1008.02.09	Complete evaluation of five candidate sodium waste technologies	4Q FY 94
22	1008.02.11	Complete evaluation of alternative decontamination technologies	4Q FY 94
23	1008.03.29	Complete evaluation of remote demolition and fabrication equipment for retrieval access to calcine storage Bin Set #1.	4Q FY 93
24	1008.03.35	Issue draft ICPP Waste Form Specification	4Q FY 94
25	1008.03.52	Complete hot waste forms tests	4Q FY 97
26	1008.03.53	Complete calcine stabilization tests	4Q FY 97
27	6321.05.07	Complete construction and start up of the HLLW Evaporator	3Q FY 95

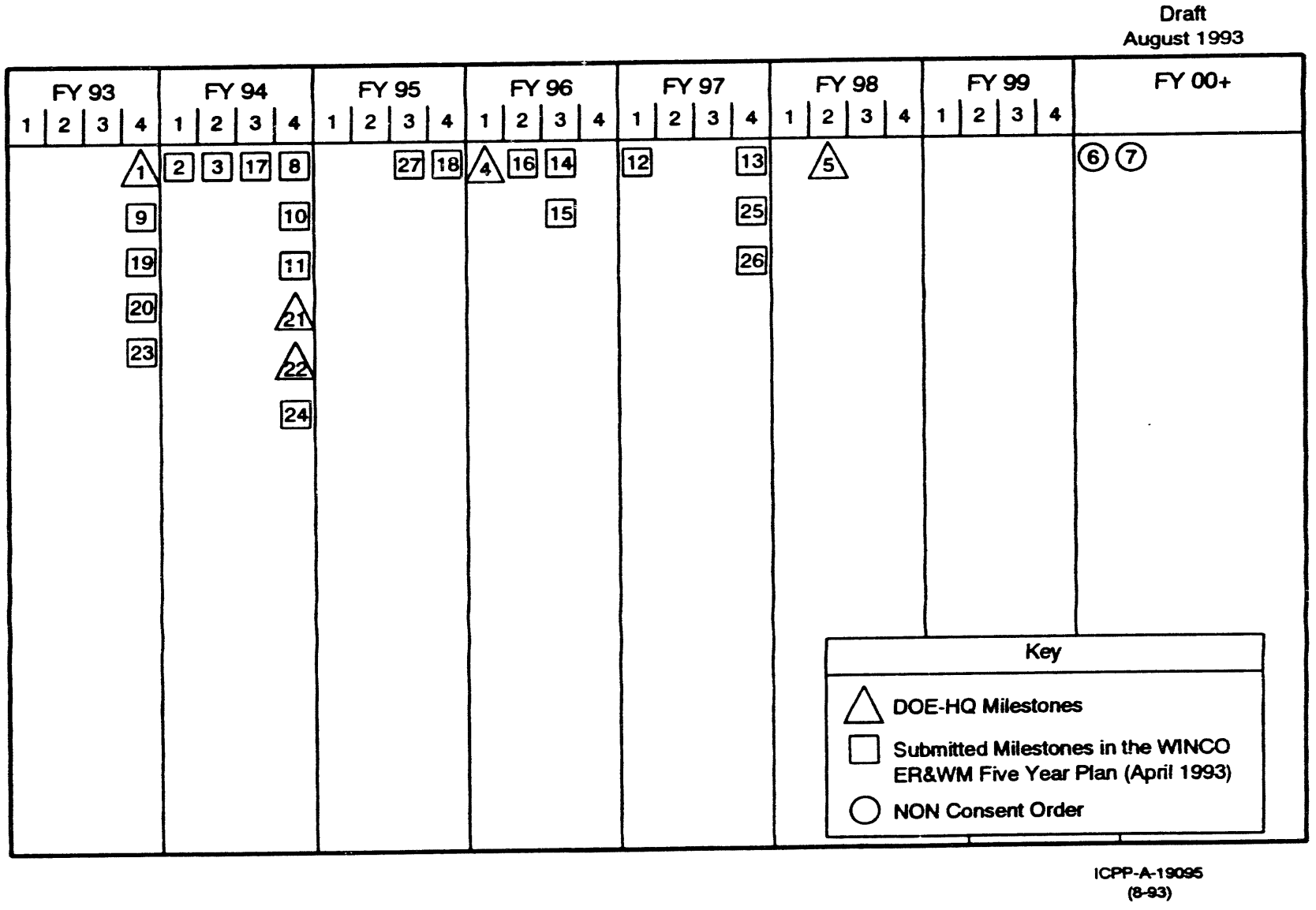


Figure 4-1. INEL HLW Milestones

5. LOGIC DIAGRAMS

Logic diagrams illustrate the activities, events, and requirements necessary to bring waste products to final disposal or satisfy other regulatory requirements. The HLW logic diagrams are constructed to portray the steps necessary to take HLW from cradle-to-grave. These logic diagrams reflect the completion status of activities and operation paths.

The following pages contain the logic diagrams for the HLW stream:

- Figure 5-1 High-Level Liquid Waste Sources
- Figure 5-2 High-Level Waste Management

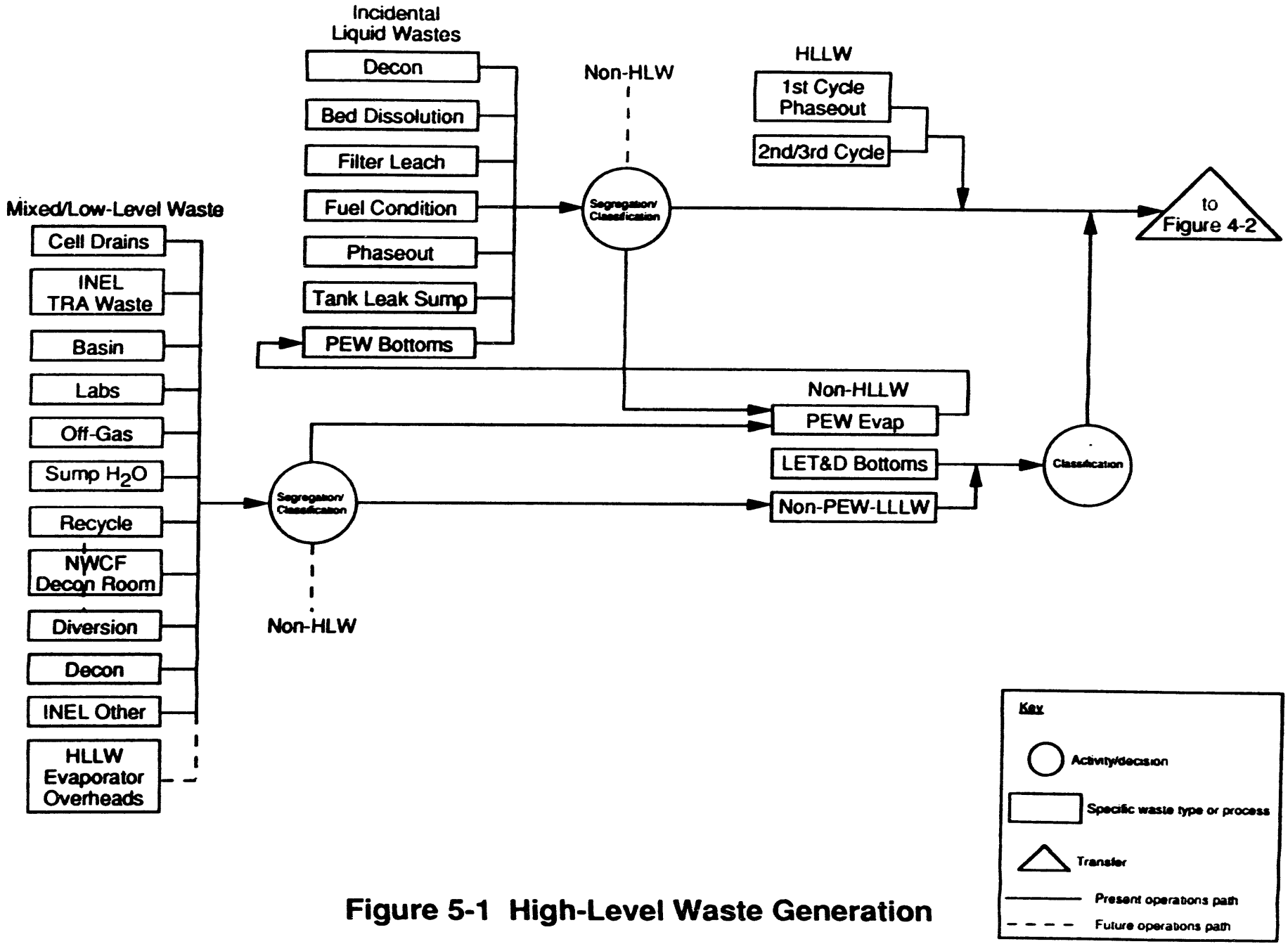


Figure 5-1 High-Level Waste Generation

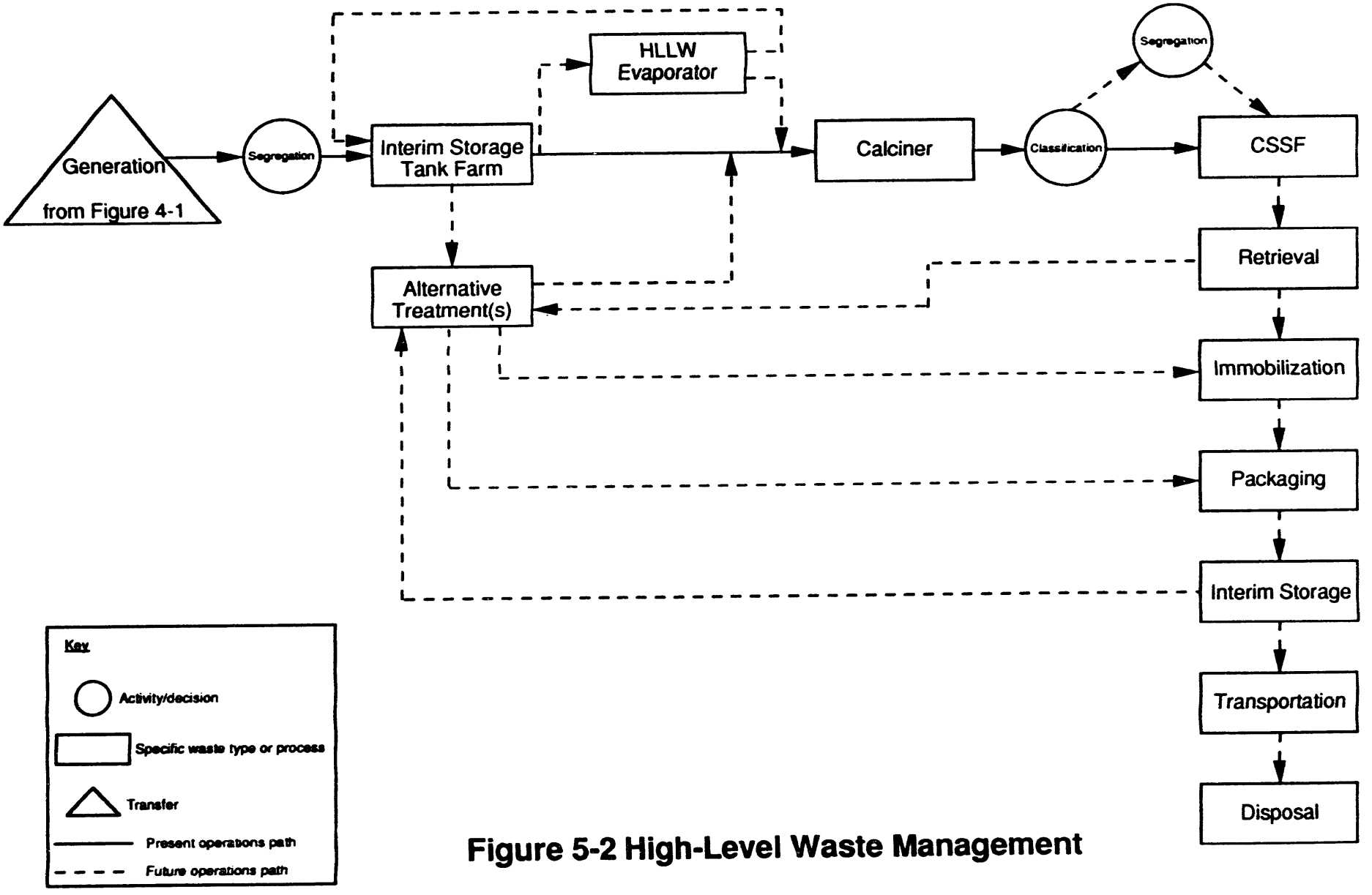


Figure 5-2 High-Level Waste Management

6. ISSUE STATEMENTS AND ROOT-CAUSE ANALYSIS

6.1 ISSUE STATEMENTS

Issue statements identify situations or problems that may hinder the INEL from achieving strategic objectives. They also reflect information management wants to communicate up the organizational chain of authority for resolution.

These statements have been ranked in order of importance to the INEL and have been assigned a priority using the EM Five-Year Plan (FYP) prioritization system. The FYP prioritization categories are as follows:

Priority 1
Includes activities necessary to prevent near-term adverse impacts on workers, the public, or the environment. Examples include containment to prevent the spread of contamination, actions to prevent or minimize releases to the environment, and ongoing waste operation activities required to maintain safe conditions.

Priority 2
Includes activities required to meet the terms of agreements (whether in place or under negotiation) between DOE and tribal governments and local, state, and Federal agencies. These agreements represent legal, or in the case of Agreements-in-Principle, procedural commitments to complete activities on the schedules agreed to by DOE.

Priority 3
Includes activities required for compliance with external environmental regulations that were not covered by priorities 1 or 2. Priority 3 also includes compliance with DOE Orders that implement external regulations or that set specific DOE regulatory standards, actions that would reduce risk or costs, and actions that would prevent disruption of DOE's production mission.

Priority 4
Includes activities that are not required by regulation, but would be desirable. Examples of Priority 4 actions include complying with DOE Orders that are more stringent than external regulations, implementing improved management practices, reducing personnel exposure below levels required by regulations or standards, and accelerating actions to satisfy agreements or milestones ahead of schedule.

The following primary issues have been identified for HLW at the INEL:

A. **DOE HLW Policy, Regulations, and Management** - DOE needs a consistent policy for HLW generation, handling, treatment, storage, and disposal. (Priority 2)

B. **Disposal** - The capability for final disposal of INEL HLW does not exist. (Priority 3)

C. **Process Implementation** - Adequate processes have not been developed or implemented for immobilization and disposal of INEL HLW. (Priority 2).

D. **Storage** - HLW storage at the INEL is not adequate in terms of capacity and regulatory requirements. (Priority 2)

E. **Waste Minimization** - Waste streams are generated with limited consideration for waste minimization. (Priority 3)

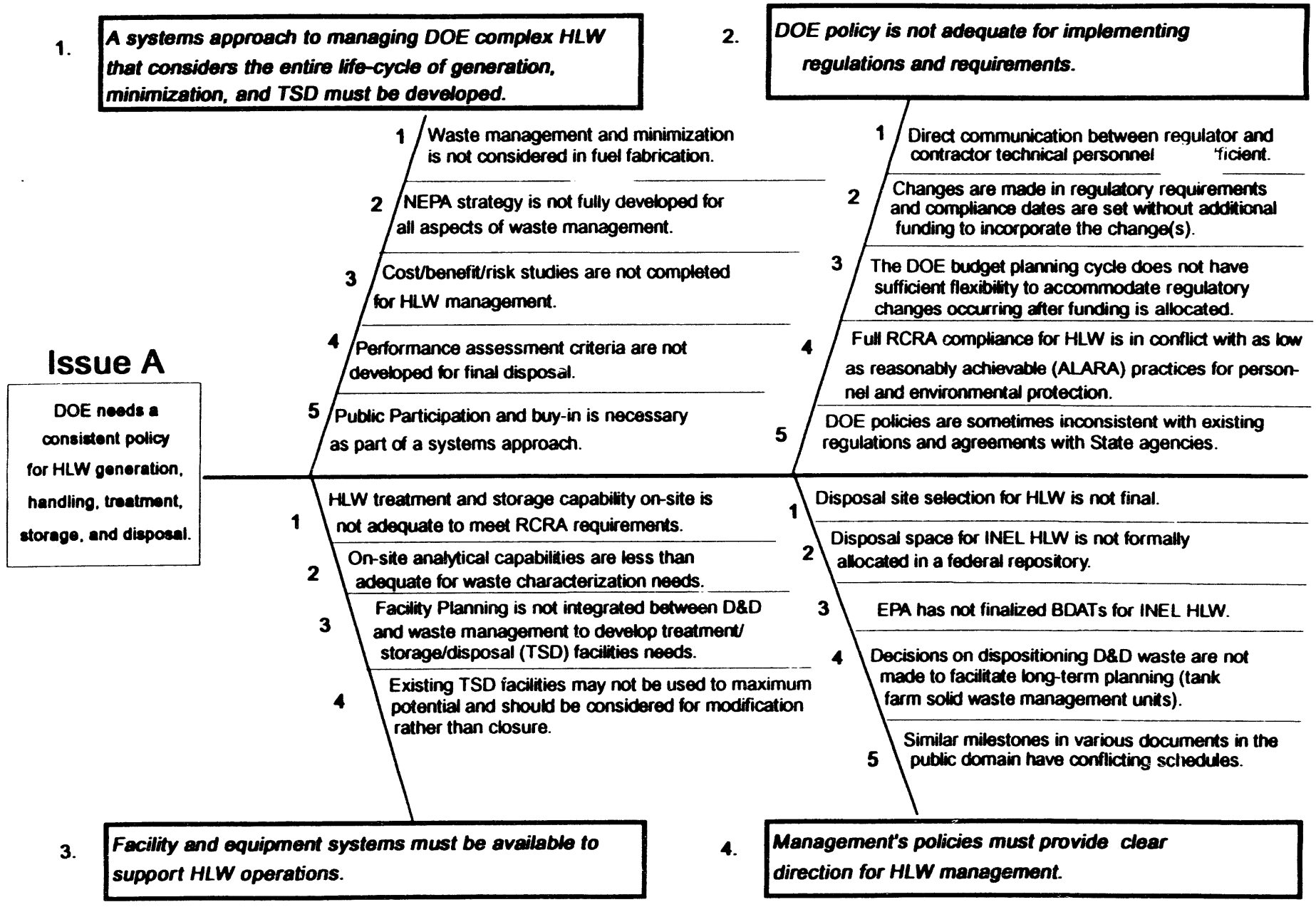
F. **Characterization** - HLW is not adequately characterized for disposal nor, in some cases, for storage. (Priority 3).

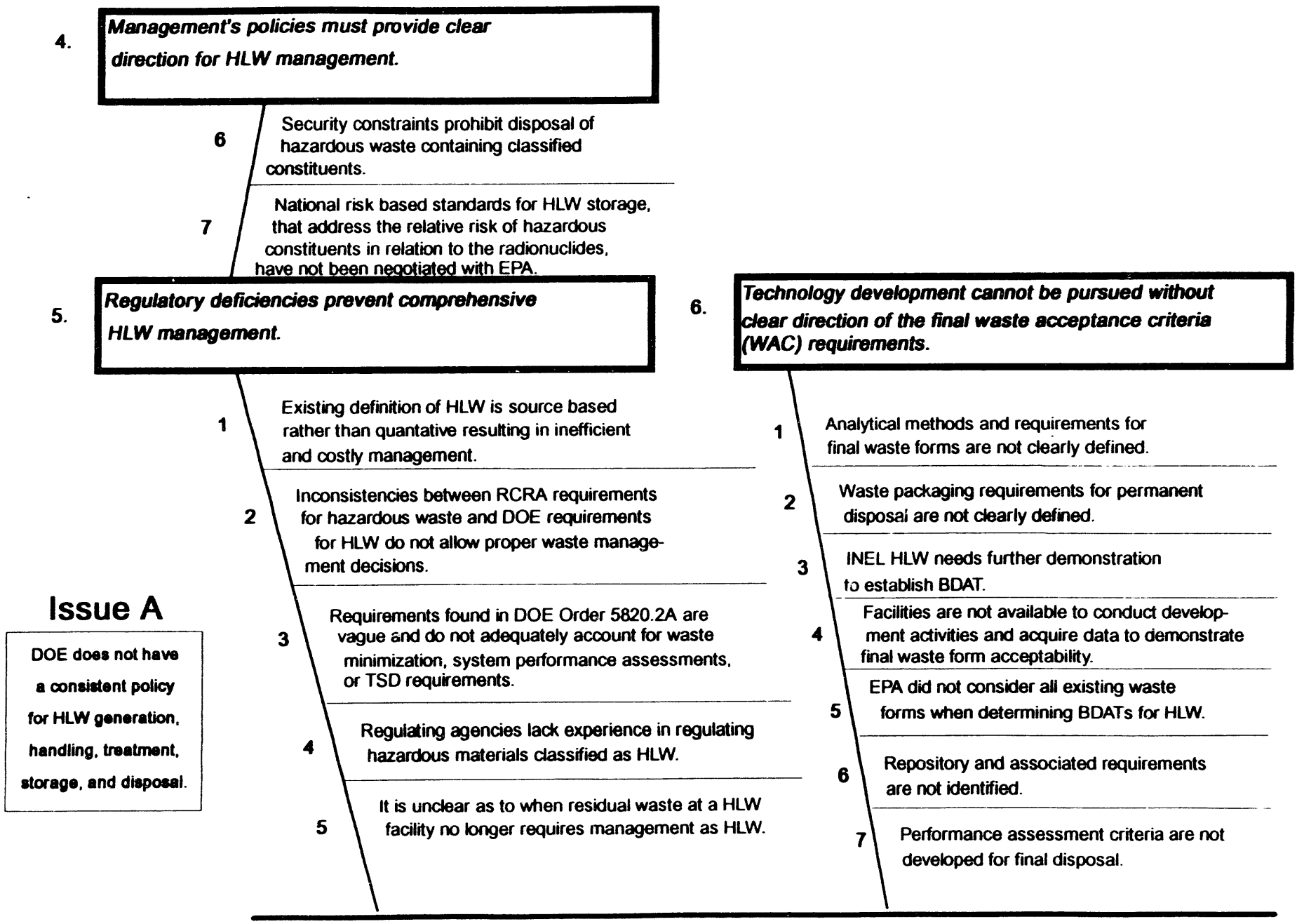
G. **Research and Technology Development** - Research and development of all process options for INEL HLW treatment and disposal are not being adequately pursued due to resource limitations. (Priority 3)

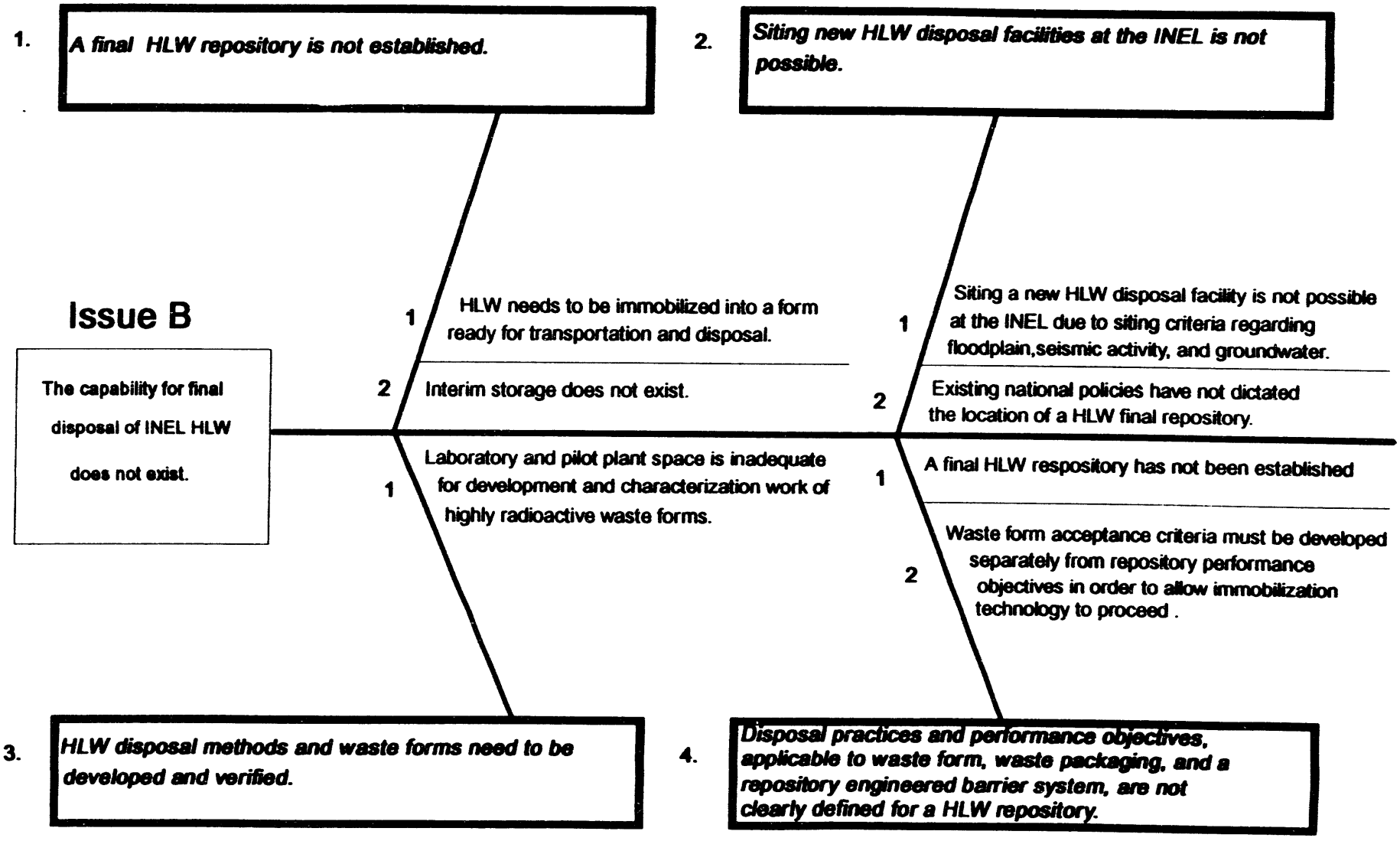
H. **Transportation** - HLW transportation methods are not selected or implemented. (Priority 3)

6.2 ROOT-CAUSE ANALYSIS

Root-cause analysis has one purpose: to find the underlying causes of our primary issues or problems. Root-cause analysis involves organizing issues into a hierarchy and then illustrating this hierarchy in diagrams. These diagrams graphically depict the transformation process of reducing primary issues into sub-level issues. Each issue listed in the Issue Statements (Section 6.1) is considered a primary issue and has a separate diagram. The secondary issues or causes are listed across the top and bottom of the page (in boxes) and are the major contributors to the primary issues. Finally, the tertiary issues or causes are listed on the "ribs" of the root-cause diagram and are the major contributors to the secondary issues. By dividing the issue statements into more manageable pieces, determining actions for resolution becomes easier.


Issue A
DOE needs a consistent policy for HLW generation, handling, treatment, storage, and disposal.
1. A systems approach to managing DOE complex HLW that considers the entire life-cycle of generation, minimization, and TSD must be developed.
1 Waste management and minimization is not considered in fuel fabrication.
2 NEPA strategy is not fully developed for all aspects of waste management.
3 Cost/benefit/risk studies are not completed for HLW management.
4 Performance assessment criteria are not developed for final disposal.
5 Public Participation and buy-in is necessary as part of a systems approach.
2. DOE policy is not adequate for implementing regulations and requirements.
1 Direct communication between regulator and contractor technical personnel 'ficient.
2 Changes are made in regulatory requirements and compliance dates are set without additional funding to incorporate the change(s).
3 The DOE budget planning cycle does not have sufficient flexibility to accommodate regulatory changes occurring after funding is allocated.
4 Full RCRA compliance for HLW is in conflict with as low as reasonably achievable (ALARA) practices for personnel and environmental protection.
5 DOE policies are sometimes inconsistent with existing regulations and agreements with State agencies.
3. Facility and equipment systems must be available to support HLW operations.
1 HLW treatment and storage capability on-site is not adequate to meet RCRA requirements.
2 On-site analytical capabilities are less than adequate for waste characterization needs.
3 Facility Planning is not integrated between D&D and waste management to develop treatment/ storage/disposal (TSD) facilities needs.
4 Existing TSD facilities may not be used to maximum potential and should be considered for modification rather than closure.
4. Management's policies must provide clear direction for HLW management.
1 Disposal site selection for HLW is not final.
2 Disposal space for INEL HLW is not formally allocated in a federal repository.
3 EPA has not finalized BDATs for INEL HLW.
4 Decisions on dispositioning D&D waste are not made to facilitate long-term planning (tank farm solid waste management units).
5 Similar milestones in various documents in the public domain have conflicting schedules.


Issue A
DOE does not have a consistent policy for HLW generation, handling, treatment, storage, and disposal.
4. Management's policies must provide clear direction for HLW management.
6 Security constraints prohibit disposal of hazardous waste containing classified constituents.
7 National risk based standards for HLW storage, that address the relative risk of hazardous constituents in relation to the radionuclides, have not been negotiated with EPA.
5. Regulatory deficiencies prevent comprehensive HLW management.
1 Existing definition of HLW is source based rather than quantative resulting in inefficient and costly management.
2 Inconsistencies between RCRA requirements for hazardous waste and DOE requirements for HLW do not allow proper waste management decisions.
3 Requirements found in DOE Order 5820.2A are vague and do not adequately account for waste minimization, system performance assessments, or TSD requirements.
4 Regulating agencies lack experience in regulating hazardous materials classified as HLW.
5 It is unclear as to when residual waste at a HLW facility no longer requires management as HLW.
6. Technology development cannot be pursued without clear direction of the final waste acceptance criteria (WAC) requirements.
1 Analytical methods and requirements for final waste forms are not clearly defined.
2 Waste packaging requirements for permanent disposal are not clearly defined.
3 INEL HLW needs further demonstration to establish BDAT.
4 Facilities are not available to conduct development activities and acquire data to demonstrate final waste form acceptability.
5 EPA did not consider all existing waste forms when determining BDATs for HLW.
6 Repository and associated requirements are not identified.
7 Performance assessment criteria are not developed for final disposal.



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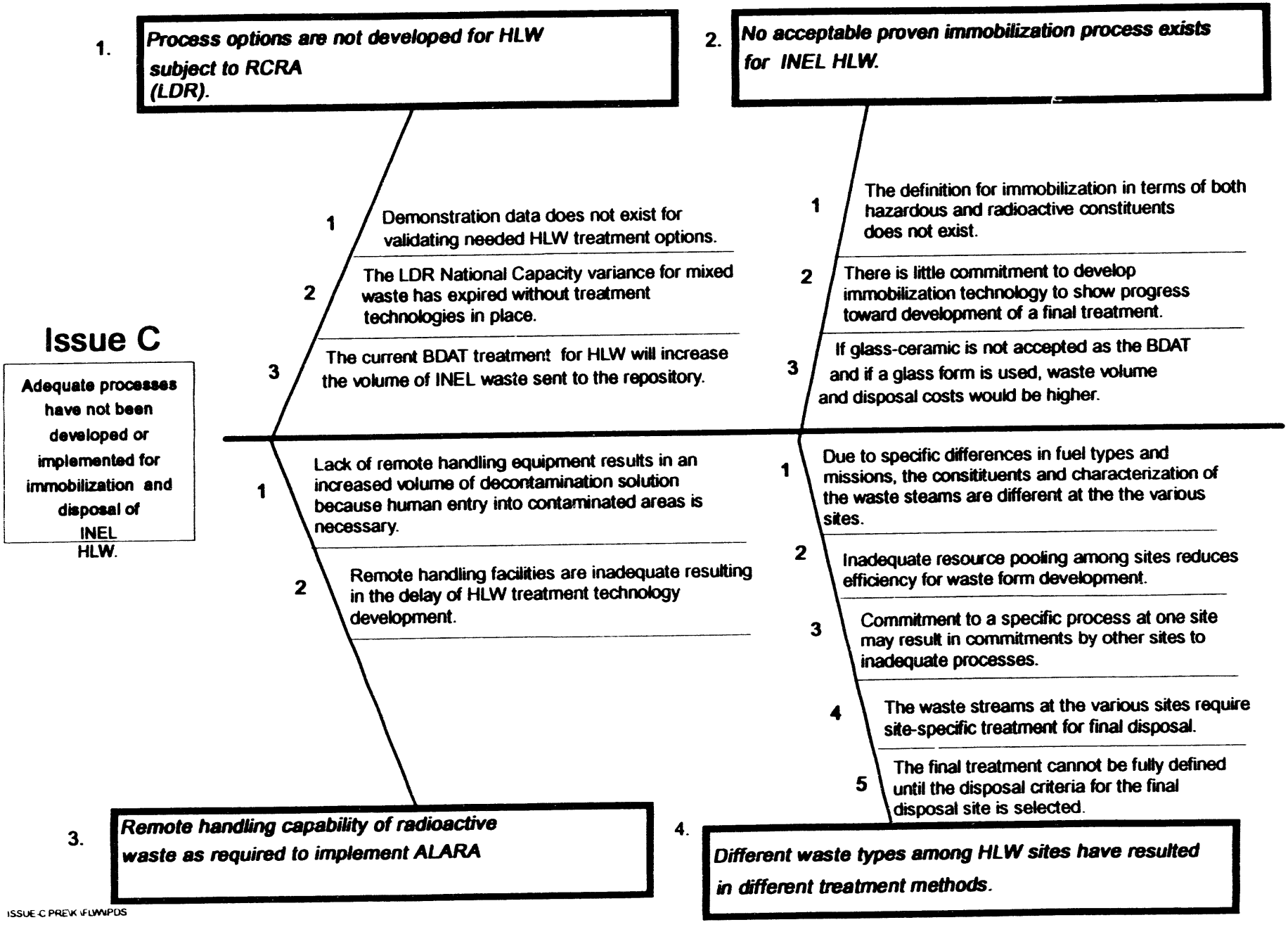

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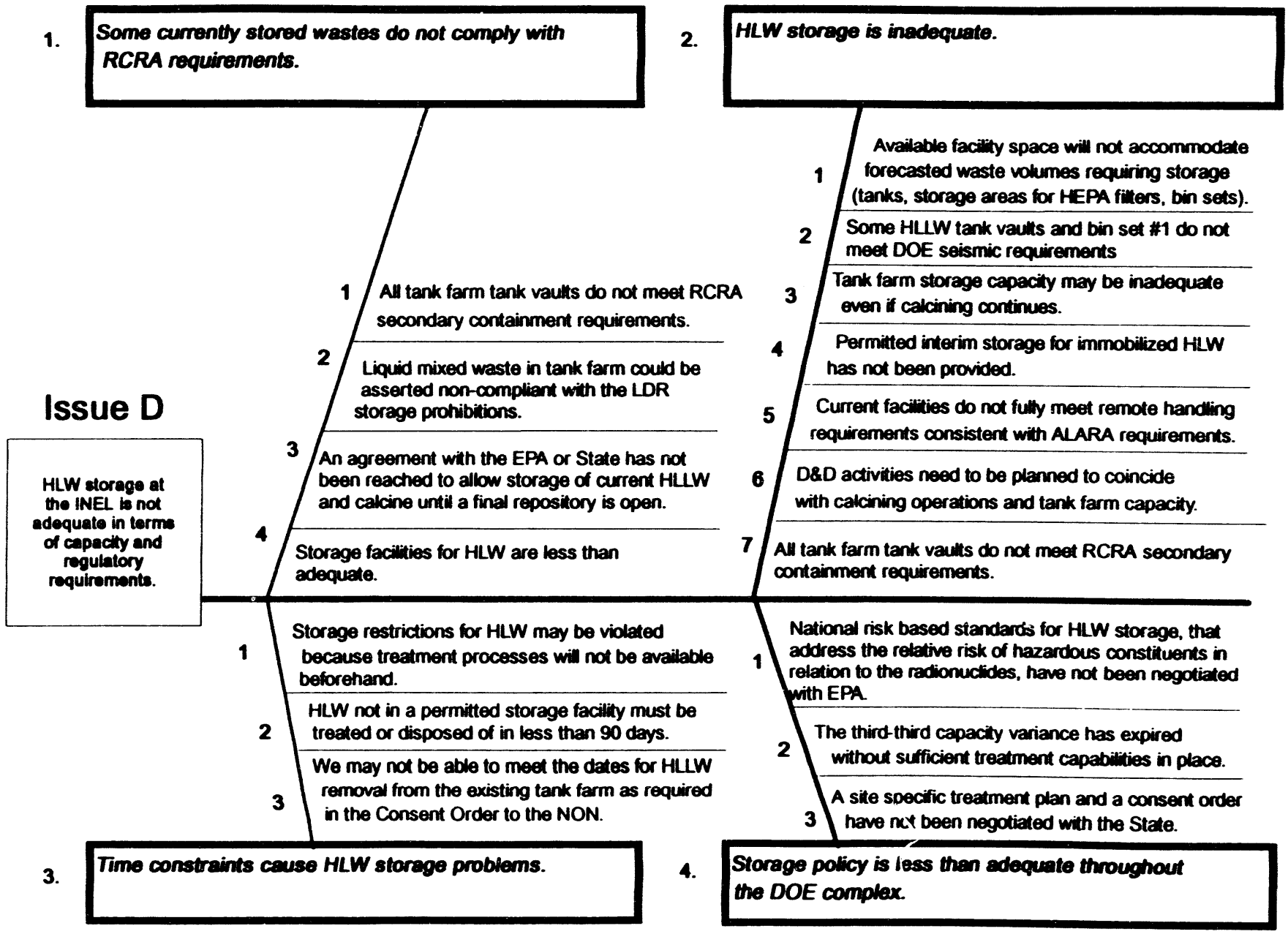
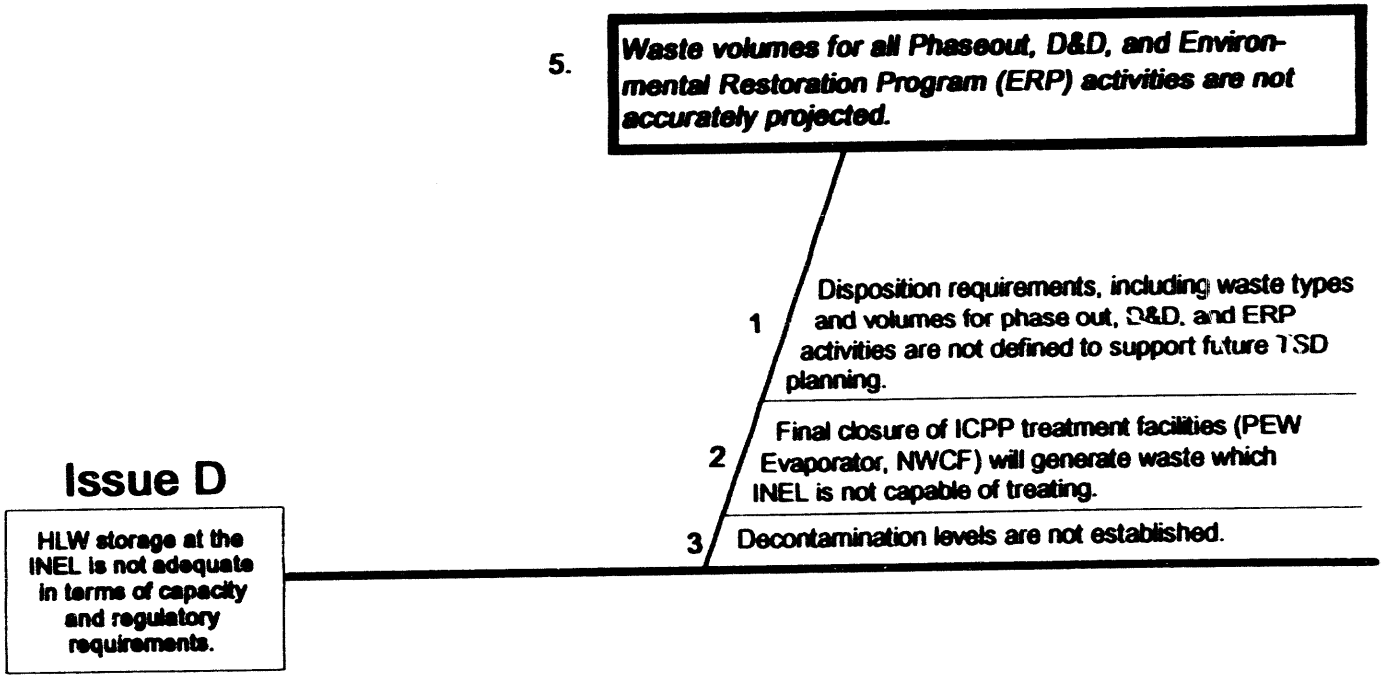
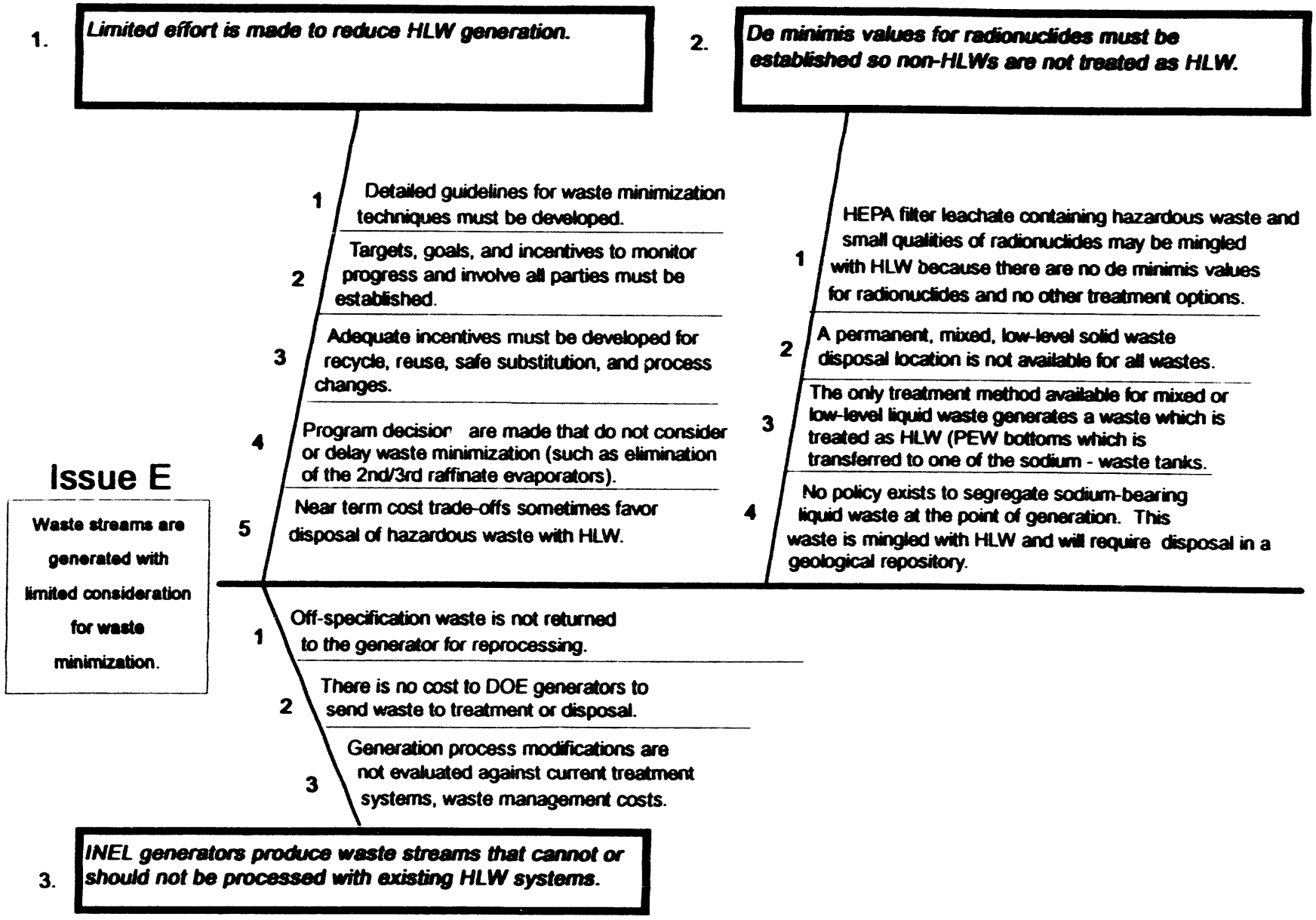
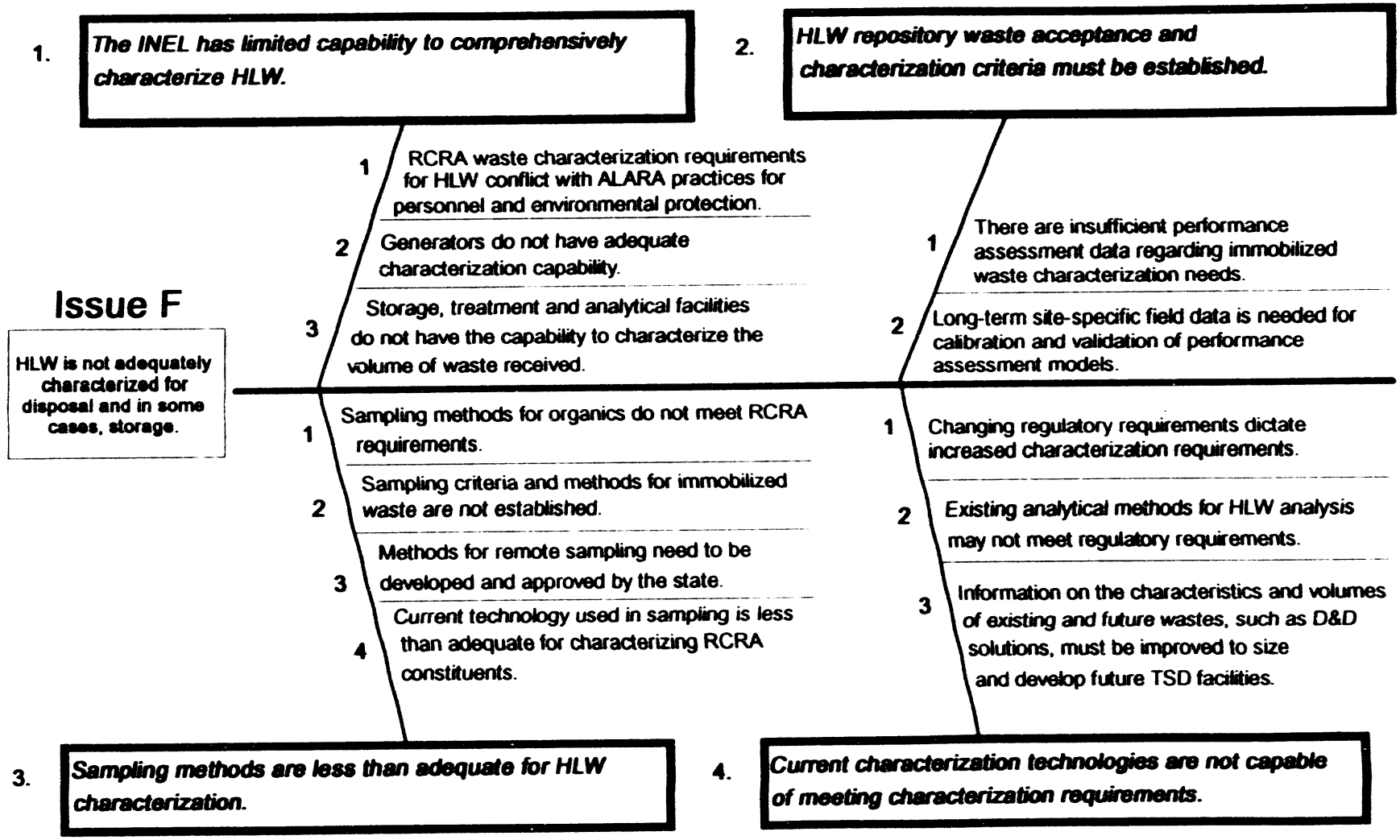
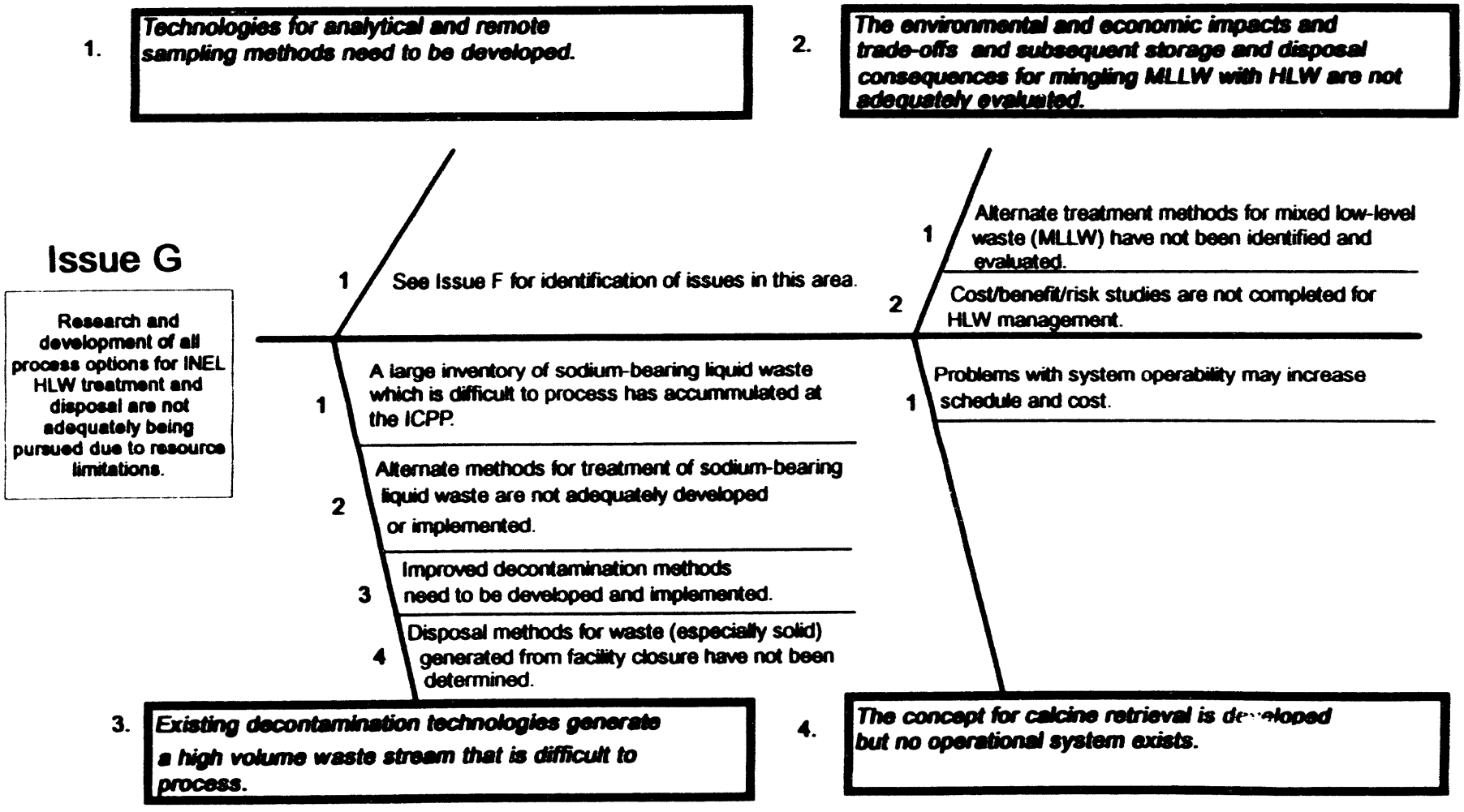
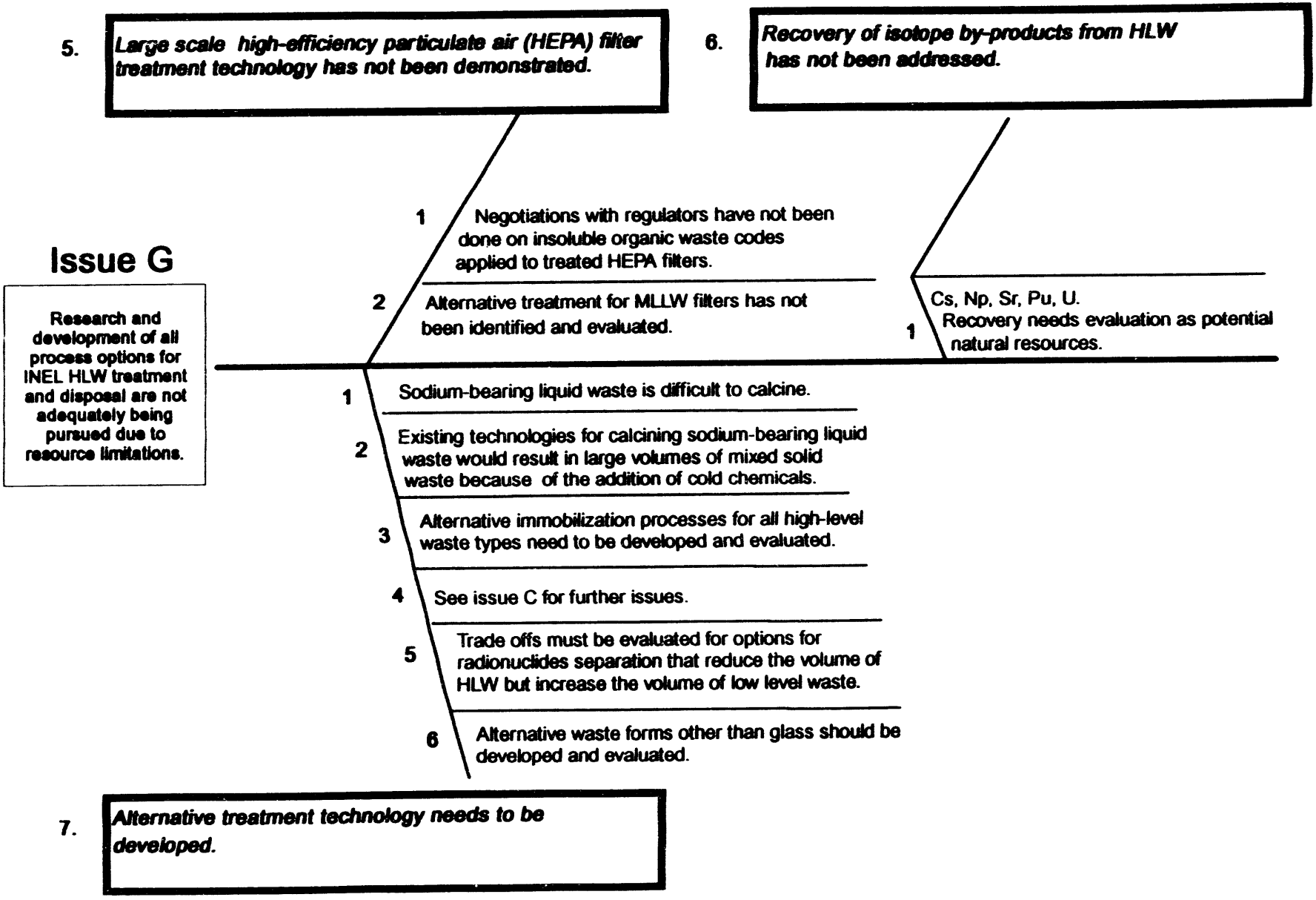

Issue D
HLW storage at the INEL is not adequate in terms of capacity and regulatory requirements.
1. Some currently stored wastes do not comply with RCRA requirements.
1 All tank farm tank vaults do not meet RCRA secondary containment requirements.
2 Liquid mixed waste in tank farm could be asserted non-compliant with the LDR storage prohibitions.
3 An agreement with the EPA or State has not been reached to allow storage of current HLLW and calcine until a final repository is open.
4 Storage facilities for HLW are less than adequate.
2. HLW storage is inadequate.
1 Available facility space will not accommodate forecasted waste volumes requiring storage (tanks, storage areas for HEPA filters, bin sets).
2 Some HLLW tank vaults and bin set #1 do not meet DOE seismic requirements
3 Tank farm storage capacity may be inadequate even if calcining continues.
4 Permitted interim storage for immobilized HLW has not been provided.
5 Current facilities do not fully meet remote handling requirements consistent with ALARA requirements.
6 D&D activities need to be planned to coincide with calcining operations and tank farm capacity.
7 All tank farm tank vaults do not meet RCRA secondary containment requirements.
3. Time constraints cause HLW storage problems.
1 Storage restrictions for HLW may be violated because treatment processes will not be available beforehand.
2 HLW not in a permitted storage facility must be treated or disposed of in less than 90 days.
3 We may not be able to meet the dates for HLLW removal from the existing tank farm as required in the Consent Order to the NON.
4. Storage policy is less than adequate throughout the DOE complex.
1 National risk based standards for HLW storage, that address the relative risk of hazardous constituents in relation to the radionuclides, have not been negotiated with EPA.
2 The third-third capacity variance has expired without sufficient treatment capabilities in place.
3 A site specific treatment plan and a consent order have not been negotiated with the State.


Issue D
HLW storage at the INEL is not adequate in terms of capacity and regulatory requirements.
5.
Waste volumes for all Phaseout, D&D, and Environmental Restoration Program (ERP) activities are not accurately projected.
1
Disposition requirements, including waste types and volumes for phase out, D&D, and ERP activities are not defined to support future TSD planning.
2
Final closure of ICPP treatment facilities (PEW Evaporator, NWCF) will generate waste which INEL is not capable of treating.
3
Decontamination levels are not established.


Issue E
Waste streams are generated with limited consideration for waste minimization.
1. Limited effort is made to reduce HLW generation.
1 Detailed guidelines for waste minimization techniques must be developed.
2 Targets, goals, and incentives to monitor progress and involve all parties must be established.
3 Adequate incentives must be developed for recycle, reuse, safe substitution, and process changes.
4 Program decisior are made that do not consider or delay waste minimization (such as elimination of the 2nd/3rd raffinate evaporators).
5 Near term cost trade-offs sometimes favor disposal of hazardous waste with HLW.
2. De minimis values for radionuclides must be established so non-HLWs are not treated as HLW.
1 HEPA filter leachate containing hazardous waste and small qualities of radionuclides may be mingled with HLW because there are no de minimis values for radionuclides and no other treatment options.
2 A permanent, mixed, low-level solid waste disposal location is not available for all wastes.
3 The only treatment method available for mixed or low-level liquid waste generates a waste which is treated as HLW (PEW bottoms which is transferred to one of the sodium - waste tanks.
4 No policy exists to segregate sodium-bearing liquid waste at the point of generation. This waste is mingled with HLW and will require disposal in a geological repository.
1 Off-specification waste is not returned to the generator for reprocessing.
2 There is no cost to DOE generators to send waste to treatment or disposal.
3 Generation process modifications are not evaluated against current treatment systems, waste management costs.
3. INEL generators produce waste streams that cannot or should not be processed with existing HLW systems.

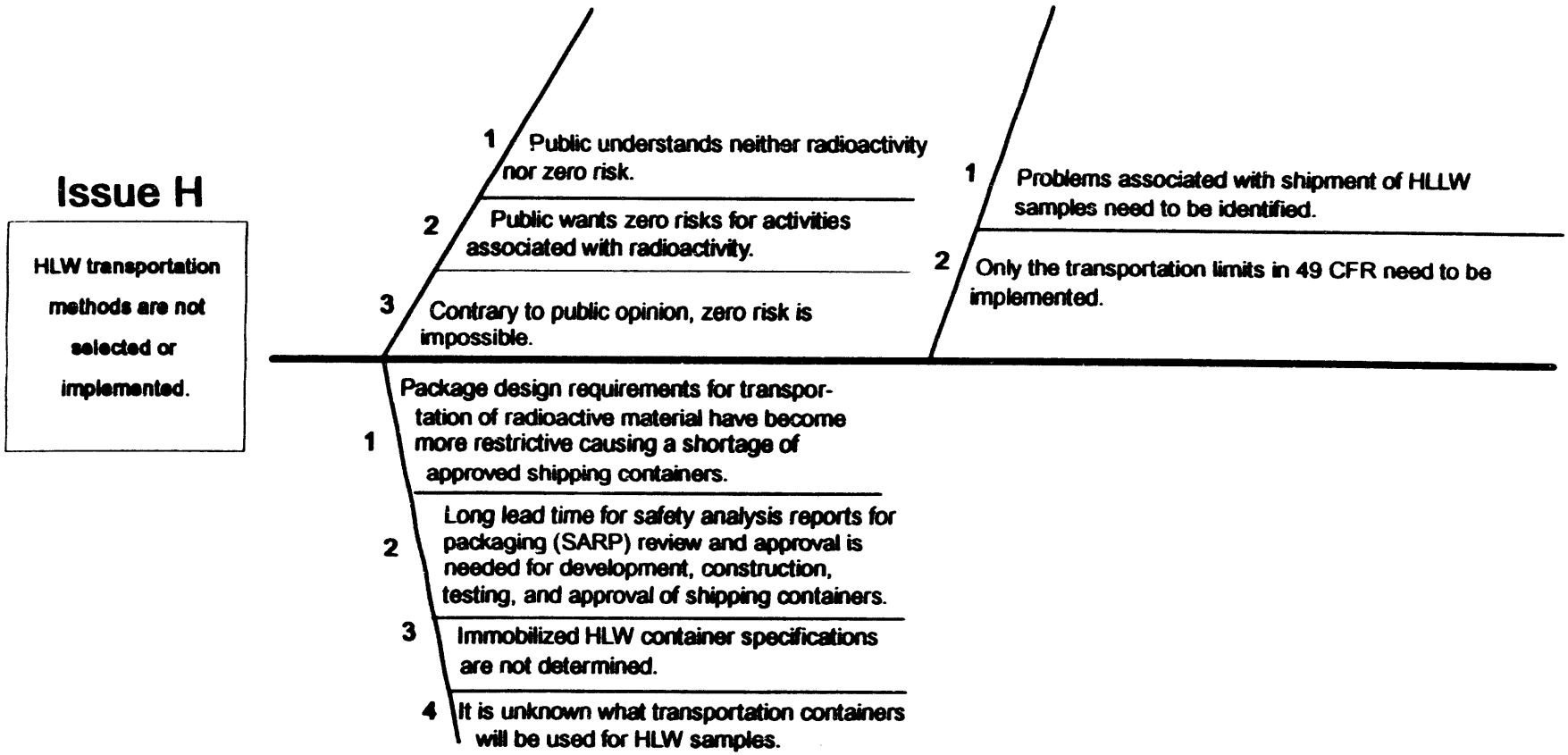

Issue F
HLW is not adequately characterized for disposal and in some cases, storage.
1. The INEL has limited capability to comprehensively characterize HLW.
1 RCRA waste characterization requirements for HLW conflict with ALARA practices for personnel and environmental protection.
2 Generators do not have adequate characterization capability.
3 Storage, treatment and analytical facilities do not have the capability to characterize the volume of waste received.
2. HLW repository waste acceptance and characterization criteria must be established.
1 There are insufficient performance assessment data regarding immobilized waste characterization needs.
2 Long-term site-specific field data is needed for calibration and validation of performance assessment models.
3. Sampling methods are less than adequate for HLW characterization.
1 Sampling methods for organics do not meet RCRA requirements.
2 Sampling criteria and methods for immobilized waste are not established.
3 Methods for remote sampling need to be developed and approved by the state.
4 Current technology used in sampling is less than adequate for characterizing RCRA constituents.
4. Current characterization technologies are not capable of meeting characterization requirements.
1 Changing regulatory requirements dictate increased characterization requirements.
2 Existing analytical methods for HLW analysis may not meet regulatory requirements.
3 Information on the characteristics and volumes of existing and future wastes, such as D&D solutions, must be improved to size and develop future TSD facilities.


1.
Technologies for analytical and remote sampling methods need to be developed.
2.
The environmental and economic impacts and trade-offs and subsequent storage and disposal consequences for mingling MLLW with HLW are not adequately evaluated.
Issue G
Research and development of all process options for INEL HLW treatment and disposal are not adequately being pursued due to resource limitations.
1 See Issue F for identification of issues in this area.
1 A large inventory of sodium-bearing liquid waste which is difficult to process has accummulated at the ICPP.
2 Alternate methods for treatment of sodium-bearing liquid waste are not adequately developed or implemented.
3 Improved decontamination methods need to be developed and implemented.
4 Disposal methods for waste (especially solid) generated from facility closure have not been determined.
3.
Existing decontamination technologies generate a high volume waste stream that is difficult to process.
1 Alternate treatment methods for mixed low-level waste (MLLW) have not been identified and evaluated.
2 Cost/benefit/risk studies are not completed for HLW management.
1 Problems with system operability may increase schedule and cost.
4.
The concept for calcine retrieval is developed but no operational system exists.


Issue G
Research and development of all process options for INEL HLW treatment and disposal are not adequately being pursued due to resource limitations.
5. Large scale high-efficiency particulate air (HEPA) filter treatment technology has not been demonstrated.
1 Negotiations with regulators have not been done on insoluble organic waste codes applied to treated HEPA filters.
2 Alternative treatment for MLLW filters has not been identified and evaluated.
6. Recovery of isotope by-products from HLW has not been addressed.
1 Cs, Np, Sr, Pu, U. Recovery needs evaluation as potential natural resources.
1 Sodium-bearing liquid waste is difficult to calcine.
2 Existing technologies for calcining sodium-bearing liquid waste would result in large volumes of mixed solid waste because of the addition of cold chemicals.
3 Alternative immobilization processes for all high-level waste types need to be developed and evaluated.
4 See issue C for further issues.
5 Trade offs must be evaluated for options for radionuclides separation that reduce the volume of HLW but increase the volume of low level waste.
6 Alternative waste forms other than glass should be developed and evaluated.
7. Alternative treatment technology needs to be developed.

1. ***Public perception about radioactive material shipments is generally negative and apprehensive.***

2. ***It is uncertain whether DOE will impose additional requirements to U.S. Department of Transportation (DOT) specifications for HLW shipments.***



3. ***Approved transportation containers are not developed.***

7. ISSUE ANALYSIS

Issues identified in the root-cause analysis have been analyzed to determine the actions needed to resolve them. Applicable regulations and requirements associated with each category are identified. A description and status of the primary issues are also provided.

Issue A. DOE HLW Policy, Regulations, and Management

Issue: A consistent policy is needed for HLW generation, handling, treatment, storage, and disposal.

Need: Develop a system approach to waste management from cradle to grave and resolve regulatory conflicts.

ADS Number: ID-1008-WN, ID-6328-WN, ID-1004-WN, ID-1001-WN, ID-1005-WN, ID-1006-WN

Waste Stream/Facility: HLW

Regulatory Agency: DOE, EPA, State of Idaho, NRC

Regulatory Authority: Atomic Energy Act (AEA), Nuclear Waste Policy Act (NWPA), RCRA, Hazardous Waste Management Act (HWMA).

Implementing Regulations and Orders:

DOE Order 1540.1	Materials Transportation and Traffic Management
DOE Order 5400.3	Hazardous and Radioactive Mixed Waste Program
DOE Order 5440.1	NEPA
DOE Order 5480.11	Radiation Protection for Occupational Workers
DOE Order 5820.2A	Radioactive Waste Management
DOE-ID 5480.3	Hazardous Materials Packaging and Transportation Safety Requirements
10 CFR 60	Disposal of HLW in Geologic Repositories
40 CFR 191	Environmental Radioactive Protection Standard for Management and disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Waste
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste TSD
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs - The Hazardous Waste Permit Program

Description: A systems approach that considers waste management and minimization of the waste volumes generated needs to be developed. Establish effective TSD programs. Regulatory conflicts exist such as between DOE's ALARA directions and the emphasis toward RCRA compliance. As part of the HLW management policy, DOE will reach an agreement with other agencies when and if D&D will generate HLW.

Status: Guidance for conducting system performance assessments has not been issued by DOE-HQ. BDATs, waste packaging criteria, and remote handling techniques have not been defined for ICPP HLW. There has been an increase in direct communication between the management and operations contractors and the regulators, yet there is room for improvement. Recent budget changes have caused uncertainties in how the ICPP will meet existing regulations and agreements with

State agencies. The Preliminary Waste Acceptance Criteria and the Performance Assessment based on conceptual repository types are currently being funded and will be out for external review by the end of FY 93.

Priority: 2

Issue B: Disposal

Issue: The capability for final disposal of INEL HLW does not exist.

Need: DOE must open a final repository and provide space in it for INEL HLW. Waste form acceptance criteria and repository performance objectives must be determined.

ADS Number: ID-1008-WN.

Waste Stream/Facility: HLW/ICPP tank farm, CSSFs, HEPA filter storage, and Waste Immobilization Facility

Regulatory Agency: DOE, EPA, NRC

Regulatory Authority: NWPA, RCRA

Implementing Regulations and Orders:

DOE Order 5400.2A	Environmental Compliance Issue Coordination
DOE Order 5400.3	Hazardous and Radioactive Mixed Waste Program
DOE Order 5820.2A	Radioactive Waste Management
10 CFR 60	Disposal of HLW in Geologic Repositories
40 CFR 191	Environmental Radioactive Protection Standard for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Waste
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
40 CFR 268	Prohibitions on Storage of Restricted Waste
40 CFR 270	EPA Administered Permit Programs - The Hazardous Waste Permit Program

Description: INEL HLW must be immobilized and sent to a repository for final disposal. Although a site has been chosen for characterization for use as a repository, it is uncertain whether it will be accepted as the final repository site. Additionally, the DOE has not designated storage space in that facility for INEL HLW.

Status: Regulators and DOE have not defined waste acceptance criteria and performance assessment requirements for HLW disposal. A site for the HLW repository has not been identified. However, performance assessments are in progress for some conceptual repository types.

Priority: 3

Issue C. Process Implementation

Issue: Adequate processes have not been developed or implemented for immobilization and disposal of INEL HLW.

Need: Develop and implement processes to immobilize INEL HLW at minimum volume for final disposition. Waste acceptance criteria and performance assessment requirements need to be agreed upon to ensure resources are properly used.

ADS Number: ID-1008-WN, ID-1304-WN through ID-1311-WN

Waste Stream: HLW/ICPP HLW Immobilization Facility, CPP-637, Multifunction Pilot Plant

Regulatory Agency: DOE, State of Idaho, EPA

Regulatory Authority: RCRA, NWPA, HWMA, Pollution Prevention Act

Implementing Regulations and Orders:

DOE Order 5820.2A	Radioactive Waste Management
40 CFR 191	Environmental Radioactive Protection Standard for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Wastes
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal
40 CFR 268	Prohibitions on Storage of Restricted Waste

Description: ICPP HLW is a mixed waste. The regulations require that technology be available to provide alternative treatment, recovery, or disposal. The Nuclear Waste Policy Act authorizes conversion of HLW to a solid form suitable for disposal and requires permanent isolation of the material. The Pollution Prevention Act and DOE Order 5820.2A requires that the volume of waste be reduced through waste minimization and waste treatment facilities.

Status: The Spent Fuel and Waste Management Technology Program was established in FY 93 at the ICPP. Through a part of this program, calcine immobilization, ICPP personnel are responsible for investigating process options and conducting R&D for HLW disposal. Another part of this program was also started in FY 93 to investigate alternative HLW separation and immobilization technologies and staff is in place to conduct the initial R&D effort.

Priority: 2

Issue D: Storage

Issue: HLW storage at the INEL is inadequate in terms of capacity and regulatory requirements.

Need: Storage facilities for INEL HLW need to be either upgraded or replaced to meet RCRA waste storage requirements and DOE remote handling requirements. Storage capacity for HLW must be expanded to provide for future waste generation projections.

ADS Number: ID-1001-WN, ID-1004-WN, ID-1005-WN, ID-1008-WN, ID-6328-WN, ID-1304-WN through ID-1311-WN

Waste Stream/Facility: HLW/ICPP tank farm and CSSFs

Regulatory Agency: DOE, State of Idaho, EPA

Regulatory Authority: RCRA, NWPA, HWMA

Implementing Regulations and Orders: Consent Order to the State of Idaho NON 1090-1-24-6601

DOE Order 5400.3	Hazardous and Radioactive Mixed Waste Program
DOE Order 5820.2A	Radioactive Waste Management
DOE Order 6430.1A	General Design Criteria
40 CFR 191	Environmental Radioactive Protection Standard for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Waste
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal
40 CFR 268	Prohibitions on Storage of Restricted Waste
40 CFR 270	EPA Administered Permit Programs - The Hazardous Waste Permit Program

Description: ICPP HLW is a mixed waste and the regulations establish requirements for its accumulation and storage. DOE orders also require that remotely operated facilities be used to handle and store HLW.

Status: Activities at the ICPP are in progress to remove waste from tanks that do not meet RCRA requirements and construct a new CSSF. ICPP HLW is an integral part of the DOE LDR Consent Order and site treatment plan for radioactive mixed waste. Work is in progress to project requirements for HLW storage capacity.

Priority: 2

Issue E. Waste Minimization

Issue: HLW streams are generated with limited consideration for waste minimization. Non-HLWs are processed/treated with HLW.

Need: Rewrite DOE Order 5820.2A, DOE Order 5400.3, and DOE-ID-10333. Clarify the definition of HLW. Conduct development activities to improve HLW operations.

ADS Number: ID-1001-WN, ID-1008-WN, ID-6328-WN

Waste Stream/Facility: HLW/waste management facilities (NWCF, CSSFs)

Regulatory Agency: DOE, EPA

Regulatory Authority: RCRA, Pollution Prevention Act

Implementing Regulations and Orders:

DOE Order 5400.3	Hazardous and Radioactive Mixed Waste Program
DOE Order 5820.2A I.3.b.(7)(a)	Radioactive Waste Management
DOE-ID-10333	Waste Minimization and Pollution Awareness Plan
40 CFR 262.41	Standards Applicable to Generators of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal

Description: Implementation of HLW minimization program is required by DOE Order 5820.2A. DOE Order 5400.3 requires waste minimization for hazardous waste. These orders implement the RCRA requirements.

Status: Initial waste minimization activities for HLW have been started; however, the guidelines in DOE-ID-10333 seem to conflict with DOE Order 5820.2A for HLW. A study to evaluate costs, benefits, and risks of alternative processing options for HLW was performed in FY 93 with a goal of minimizing the volume of HLW requiring disposal and also the number of waste form types. Below regulatory concern (BRC) values or de minimis waste disposal criteria have not been established to eliminate mingling other radioactive waste streams with HLW. A Waste Management Authority (WMA) has been established at ICPP to review HLW and existing waste streams and to promote minimization.

Priority: 3

Issue F. Characterization

Issue: HLW is not adequately characterized for disposal nor, in some cases, for storage.

Need: HLW waste streams must be characterized to meet RCRA, DOE, and NRC disposal criteria. Analytical methods must be developed to comply with RCRA (SW-846) and DOE ALARA policies. Remote sampling methods must be developed and approved to comply with RCRA representative sample requirements.

ADS Number: ID-1001-WN, ID-1008-WN, ID-6328-WN, ID-1003-WN

Waste Stream/Facility: HLW/RAL, NWCF, tank farm

Regulatory Agency: EPA, DOE, State of Idaho

Regulatory Authority: RCRA, HWMA

Implementing Regulations and Orders:

DOE Order 6430.1A	Facilities Design Criteria
DOE Order 5820.2A	Radioactive Waste Management
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal
40 CFR 268	Land Disposal Restrictions

Description: The RAL at the ICPP is used for analysis of mixed-waste samples including HLW from ICPP processes and waste characterization activities. Physical configuration of RAL and the presence of radioactive constituents prevent sampling and analysis in accordance with RCRA requirements. Current technology is not available to sample all HLW forms.

Status: Due to the limited capacity, analytical work must be prioritized. This can result in a delay in characterizing waste streams and delays in developing improved methods. Existing sampling and analytical methods which may not be approved by the regulatory agencies are used for characterization purposes. Large sample sizes required by SW-846 are not practical for existing remote handing and analytical capabilities. Changes in sample volume are being pursued. New analytical equipment is currently being procured to increase analytical capability. There is currently a study being done to look at upgrading, renovating, and/or expanding RAL. In addition, regulators are requiring more sampling and analyses instead of relying on process knowledge for waste characterization. The ICPP is in the process of securing contracts from other on-site and off-site facilities to analyze their samples.

Priority: 3

Issue G. Research and Technology Development

Issue: Research and technology development activities for process options for INEL HLW disposal are inadequately pursued due to resource limitations.

Need: To ensure ultimate repository disposal of INEL HLW, technologies must be evaluated and developed to produce waste forms that meet regulatory requirements. Stable funding for these activities needs to be established and incorporated into the long-term planning process. DOE oversight requirements also need to be established. Development and demonstration is necessary for calcine retrieval, sodium-bearing liquid waste reduction, and improved D&D methods.

ADS Number: ID-1008-WN, ID-1001-WN

Waste Stream/Facility: HLW/ICPP HLW Immobilization Facility, Filter Leaching Process, CSSFs, CPP-637

Regulatory Agency: DOE, State of Idaho, EPA

Regulatory Authority: AEA, NWPA, RCRA, HWMA

Implementing Regulations and Orders: Consent Order to the State of Idaho NON, 1090-1-24-660

40 CFR 268	Land Disposal Restrictions
40 CFR 191	Environmental Radioactive Protection Standard for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Wastes
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal
40 CFR 270	EPA Administered Permit Programs - The Hazardous Waste Permit Program
10 CFR 60	Disposal of HLW in Geologic Repositories

Description: Discussions between DOE, EPA, and the State of Idaho have improved the understanding of ICPP missions. Research, development, and demonstration of technologies for HLW need to be funded to maintain and strengthen DOE's HLW management position. The regulations authorize and require that technologies be developed to treat HLW to meet release specifications and minimize volume.

Status: The Spent Fuel and Waste Management Technology Program was established in FY 93 at the ICPP. The staff involved in calcine immobilization, a part of this program, is responsible for investigating process options and conducting research and development (R&D) for HLW disposal. A program was also started and staff is in place to conduct the initial R&D effort. As part of this program, alternative treatment technologies for sodium-bearing liquid waste are also being identified and developed. Some HEPA filter treatment testing is planned for late FY 93, or early FY 94. New decontamination development and metal recycle programs were started in FY 93 to help minimize HLW generation.

Priority: 3

Issue H. Transportation

Issue: HLW transportation methods are not selected and implemented.

Need: Transportation plans and suitable, approved casks are needed for transport of immobilized HLW for disposal in a federal repository. Transportation plans and containers are needed for shipment of HLW samples from other sites for analysis.

ADS Number: ID-1008-WN

Waste Stream/Facility: HLW/Waste Immobilization Facility, Interim storage facility

Regulatory Agency: DOT, DOE, EPA

Regulatory Authority: Hazardous Materials Transportation Act (HMTA), NWPA

Implementing Regulations and Orders:

DOE Order 5400.3	Hazardous and Radioactive Mixed Waste Program
DOE Order 1540.1	Materials Transportation and Traffic Management
DOE Order 1540.2	Hazardous Materials Packaging for Transportation
DOE-ID 5480.3	Hazardous Materials Packaging and Transportation Safety Requirements
10 CFR 71	Packaging and Transportation of Radioactive Material
49 CFR 173	Shippers - General Requirements for Shipments and Packaging

Description: HLW generated at the INEL is transported to ICPP but no HLW is currently transported off-site. Transport plans (including community awareness and training programs), SARPs, and casks need to be developed in a timely manner for immobilized HLW shipments to a federal repository.

Status: A small amount of work has been done to prepare for the future shipping and transportation of INEL immobilized waste. However, a repository site must be identified before final transportation and shipping decisions can be made (e.g. waste form, waste packaging, mode of transportation). It is unknown what transportation containers will be used to transport HLW. Preliminary discussions are underway with other sites to supply analytical analysis for their samples.

Priority: 3

7.1 KEY ISSUES AND ACTIVITIES IDENTIFICATION

Key HLW issues that were identified in the root-cause analysis are translated into actions that will resolve the issues in this section. The actions are then examined to determine what tasks are required to implement the action and resolve the issue. The impact of not completing the action is also determined.

A. DOE HLW Policy, Regulations, and Management

	ISSUE	*ACTION*	*REQUIRED*	*NO-ACTION IMPACTS*
1.	DOE does not have a systems approach for HLW generation, handling, treatment, storage, and disposal.	Develop a systems approach for waste management and waste minimization during life cycle including generation, treatment, disposal of HLW, and D&D of treatment and storage facilities and equipment.	Establish and perform systems analysis to assist waste management and coordinate with other sites.	INEL facilities will continue to store and process excessive quantities of HLW. Cost of disposal may be adversely affected.
2.	DOE policy is not adequate for implementing current regulations and requirements.	DOE should reconcile conflicts with implementing regulations and requirements. Establish direct communication with regulators to help develop a regulatory compliance strategy.	Contractors will identify conflicts between regulations and implementation strategies.	Never be in full compliance. Inefficient use of resources.
3	Facility and equipment systems must be available to support HLW operations.	Provide adequate funds to maintain, upgrade, and build treatment and storage facilities as necessary to support HLW operations.	Provide temporary storage locations for waste.	Continued interim storage of HLW. Risk conflict with State regulators.
4.	Management policies must provide clear direction for HLW management.	Clarify policy based on requirements of the regulators.	DOE should reconcile conflicts with implementing regulations and requirements.	Decrease in productive effort. Never be in full compliance Inefficient use of resources.
5.	Regulatory deficiencies prevent comprehensive HLW management.	Clarify what amounts of fission product concentrations trigger the permanent isolation of waste.	DOE needs to obtain definition of fission products.	Ineffective waste management practices. Inconsistency in implementing RCRA requirements.
6.	Technology development cannot be completed without clear direction of the final WAC.	Define remote handling requirements for treatment and storage. Agree upon BDAT/treatability variance for treating INEL HLW. Define waste packaging requirements. Develop performance assessment criteria.	Identify a final repository site.	Indefinite interim storage of HLW. Delayed schedules and wasted productivity.

B. Disposal

	ISSUE	ACTION	REQUIRED	NO ACTION IMPACTS
1,2.	A final repository for HLW is not established.	Provide repository volume requirements for INEL HLW to DOE.	Identify a final repository site.	INEL HLW would remain on-site violating regulatory requirements which require permanent disposal.
3,4.	Waste form acceptance criteria and performance objectives have not been defined.	DOE, EPA, and WINCO must define waste form acceptance criteria and repository performance objectives.	Identify a final repository site.	HLW forms cannot be developed with assurance of meeting the proper criteria.

C. Process Implementation

	ISSUE	ACTION	REQUIRED	NO-ACTION IMPACTS
1.	Process options are not developed for HLW subject to RCRA (LDR).	Develop and implement processes to treat HLW to meet RCRA requirements.	Assure adequate level of funding.	Failure to implement an acceptable HLW treatment process will lead to RCRA violations.
2.	No acceptable proven immobilization process exists for INEL HLW.	Develop and demonstrate processes (such as a glass-ceramic and/or pyrochemical) to immobilize INEL HLW for disposal. Obtain agreement on the BDAT for INEL HLW.	Waste acceptance preliminary specifications must be developed for alternate (glass-ceramic) waste forms.	Slow progress on research and development efforts will jeopardize State and EPA confidence with DOE in addressing the INEL HLW issue. Use of a glass form as the BDAT will result in higher waste volume.
3.	Remote handling capability of radioactive waste as required to implement ALARA principles is insufficient.	Develop and demonstrate remote handling capability for remote D&D work. Upgrade existing remote facilities to support planned technology development.	Continue the schedule for robotics and decontamination development. Provide funding for facility upgrades.	Increased decontamination solution volume, which must be handled as HLW. Schedule delays in developing treatment technologies for HLW.
4.	Different waste types among HLW sites has resulted in different treatment methods.	Establish the BDAT for INEL HLW.	Develop and submit treatability variance petition.	Use of current BDAT (vitrification) will result in higher volumes of HLW requiring repository disposal.

D. Storage

	ISSUE	*ACTION*	*REQUIRED*	*NO-ACTION IMPACTS*
1.	Some currently stored wastes do not comply with RCRA requirements.	Negotiate a Consent Order with the State of Idaho.	Develop Site Treatment Plan.	Potential fines for improper storage of waste and restrictions on waste generation.
2,3.	HLW storage is inadequate in terms of capacity and regulatory requirements.	Provide for adequate liquid storage. Include interim storage in design of immobilization facility. Ensure NWCF capacity is adequate to handle waste volume.	Provide capital funds to construct tanks for segregation of other waste types from HLW. Provide capital funds to construct new storage for calcine and HEPA filters as needed. Provide capital funds to upgrade or increase NWCF capacity to maintain needed operations.	Potential violation of Consent Order. Fines for improper storage of waste and restrictions on waste generations. Inability to meet Consent Order requirements.
4.	Storage policy is less than adequate throughout the DOE complex.	Pursue LDR relief or provide treatment methods for these wastes.	Pursue either LDR Consent Order, or No Migration Petition, or risk based standards, or provide funding for treatment development.	Potential fines for improper storage of waste and restrictions on waste generation.
5.	Waste volumes for all Phaseout, D&D, and ERP activities are not accurately projected.	Include projected volumes in the Site Treatment Plan.	Accurately project volumes.	Future TSD facilities may not have capability to accommodate future D&D projects.

E. Waste Minimization

	ISSUE	*ACTION*	*REQUIRED*	*NO-ACTION IMPACTS*
1.	Limited effort is made to reduce HLW generation.	Clarify/rewrite 5820.2A/5400.3 and DOE-ID-10333 to provide HLW information for waste minimization. Ensure that any materials that may increase the volume of HLW in the tank farm are approved by the WMA.	The concept/ understanding of the differences between HLW and low-level waste (LLW) needs to be included in DOE Orders.	Waste generation with minimal concern for waste minimization. Final waste volume for disposal will not be minimized.
2.	De minimis values for radionuclides must be established so non-HLWs are not treated as HLW.	Reconcile rules and regulations for HLW/LLW disposal so that proper treatment can be accomplished. Define BRC or de minimis waste disposal criteria.	The difference between HLW and LLW needs to be included in the orders. Establish BRC levels.	Waste generation with minimal concern for waste minimization. Final waste volume will not be minimized.
3.	INEL generators produce waste streams that cannot or should not be processed with the existing HLW systems. (See Figures 5-1 and 5-2)	Development work needed to improve HLW operations along with reconciliation of rules to properly handle HLW. WMA will review waste streams prior to generation to ensure capability with existing HLW capabilities.	Make decision on final storage location and provide space for INEL HLW.	Continued generation of larger amounts of HLW and possible handling problems. Noncompliance with storage requirements.

F. Characterization

	ISSUE	*ACTION*	*REQUIRED*	*NO-ACTION IMPACTS*
1.	The INEL has limited capability to comprehensively characterize HLW.	Expand/modify the existing ICPP RAL or build a state of the art facility to provide increased capability to characterize HLW and meet increasing sampling requirements. Develop analytical and remote sampling methods.	HLW needs to be characterized to meet regulatory requirements. Waste characterization analytical work to support current glass ceramic research and development is not done at the INEL. By 1996 additional analytical equipment and facility expansion will be needed to support waste characterization of HLW samples, in continual support of immobilization research and development. Capital funding needs to be provided for facility and equipment modification.	Could be out of compliance with RCRA waste characterization requirements for TSD facilities. May not receive permits for units if waste characterization methodologies are inadequate. Exposure for sampling and analytical personnel may not meet ALARA.
2.	HLW repository waste acceptance and characterization criteria must be established.	Develop waste acceptance and characterization criteria for HLW disposal.	DOE-HQ and DOE operations offices need to coordinate and begin development of waste acceptance and characterization criteria for HLW to be disposed of in a HLW final repository.	Inefficient use of allocated resources. Delay of final waste form development.
3,4.	Existing sampling and analytical methods are less than adequate for meeting regulatory requirements.	Continue research and development of analytical and remote sampling methods for HLW to meet regulatory requirements. Obtain approval for analytical methods.	Must use SW-846 analytical methods or equivalent analytical methods approved by regulators as required by RCRA.	Could be out of compliance with RCRA waste characterization requirements for TSD facilities. May not receive permits for units if waste characterization methodologies are inadequate. Exposure for sampling and analytical personnel may not meet ALARA.

G. Research and Technology Development*

	ISSUE	ACTION	REQUIRED	NO-ACTION IMPACTS
1.	Technologies for analytical and remote sampling methods need to be developed.	Same as Issue F.	Same as Issue F.	Same as Issue F.
2.	The environmental and economic impacts and trade-offs and subsequent storage and disposal consequences for mingling MLLW with HLW are not adequately evaluated.	Conduct a system analysis for immobilized HLW storage and disposal.	Agreement needs to be reached on the appropriate HLW treatment avenues.	Decisions will not balance risk reduction, cost control, increased safety, public acceptance, and waste minimization
3.	Existing decontamination technologies generate a high volume waste stream that is difficult to process.	Develop and test alternative concepts to improve effectiveness, compatibility and minimize waste from D&D activities. Determine whether waste from D&D or any remediation is HLW.	Provide continued support for ongoing R&D activities to ensure continued and timely application of resources for technology development.	Continued generation of waste streams which are difficult to treat. Liquid storage capacity may be exceeded.
4.	The concept for calcine retrieval is developed, but no operational system exists.	Develop and demonstrate an operational system for calcine retrieval.	Finalize a schedule for activity development.	Calcine removal from CSSFs will be unavailable Bin Set #1 does not meet current DOE seismic criteria and transfer to an acceptable bin set will not be possible.
5.	Large scale HEPA filter treatment technology has not been demonstrated.	Demonstrate HEPA filter treatment technology. Upgrade Filter Leach System.	Obtain State approval of Waste Analysis Plan. Obtain determination of No Contamination (organics) from the State.	Failure to implement an acceptable treatment process will lead to improper waste storage and RCRA violations.
6.	Recovery of isotope by-products from HLW has not been addressed.	Identify available uses and markets for isotope by-product.	Determine the economic and safety implications of isotope recovery.	The loss of valuable isotope resources might be caused by inadequate evaluation of future applications.

* see Appendix A-3 for Technology Development Plans

	ISSUE	ACTION	REQUIRED	NO-ACTION IMPACTS
7.	Alternative treatment technology needs to be developed.	Develop and evaluate alternative treatments for sodium-bearing liquid waste. Develop and evaluate alternative separation and immobilization processes for all waste types.	Continue evaluation of alternative technologies.	Volume and cost of HLW requiring disposal will not be optimized.

H. Transportation

	ISSUE	ACTION	REQUIRED	NO-ACTION IMPACTS
1.	Public perception about radioactive material shipments is generally negative and apprehensive.	Conduct community awareness and community support training sessions.	Extensive communications to public concerning radioactive shipments.	Negative public sentiment may prohibit shipments.
2.	It is uncertain whether DOE will impose additional requirements to DOT specifications for HLW shipments.	Provide input and comment when asked.	Stay informed on DOE transportation requirements.	Continued ambiguities concerning transportation of HLLW samples.
3.	Approved transportation containers are not developed.	Develop, construct and license casks for immobilized HLW shipments.	Work with researchers on waste form criteria and shipping requirements to develop acceptable containers.	Indefinite interim storage required in Idaho, which would give the impression of permanent storage at the INEL, violating regulatory and interagency agreements.

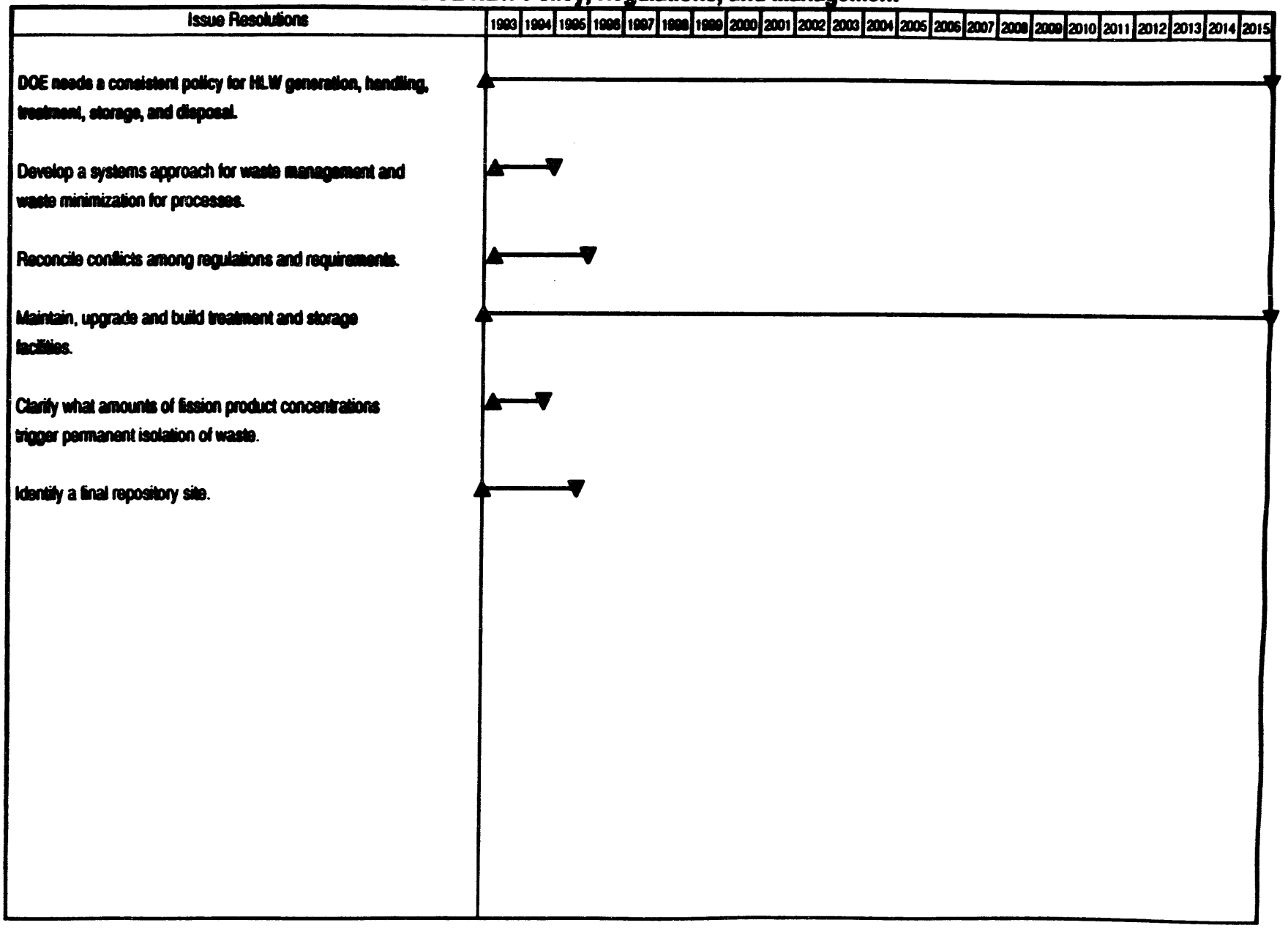
8. ISSUE RESOLUTION DESIRED ACTIVITIES SCHEDULE

The purpose of this section is to summarize ER&WM activities which will resolve the issues identified. The schedule is organized to show the hierarchical structure of the sub-issue's resolution leading to the resolution of the primary issue. The charts also depict the desired start and completion dates of each action item. The primary issues' start and completion dates are a combination of the earliest sub-issue start date and the latest sub-issue completion date.

It is important to keep in mind that these dates are not necessarily set schedules, instead, they are dates when actions need to be resolved in order to reach certain compliance dates. In many cases, the start and completion times were reached by approximating how long a project would take, or what is the anticipated technology development time, or how long construction/modifications on a facility would last.

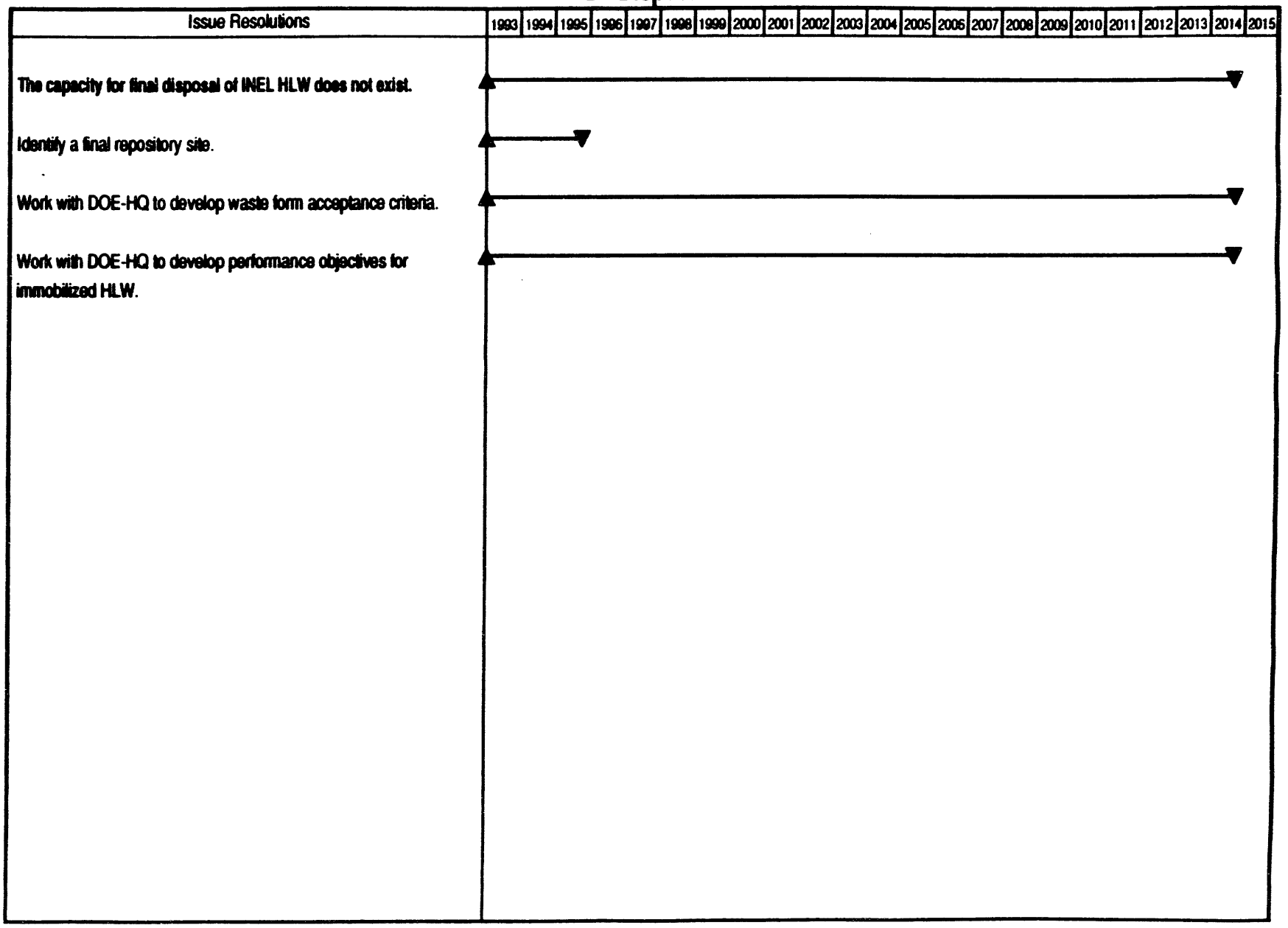
Issue Resolution Desired Activities Schedule

A. DOE HLW Policy, Regulations, and Management



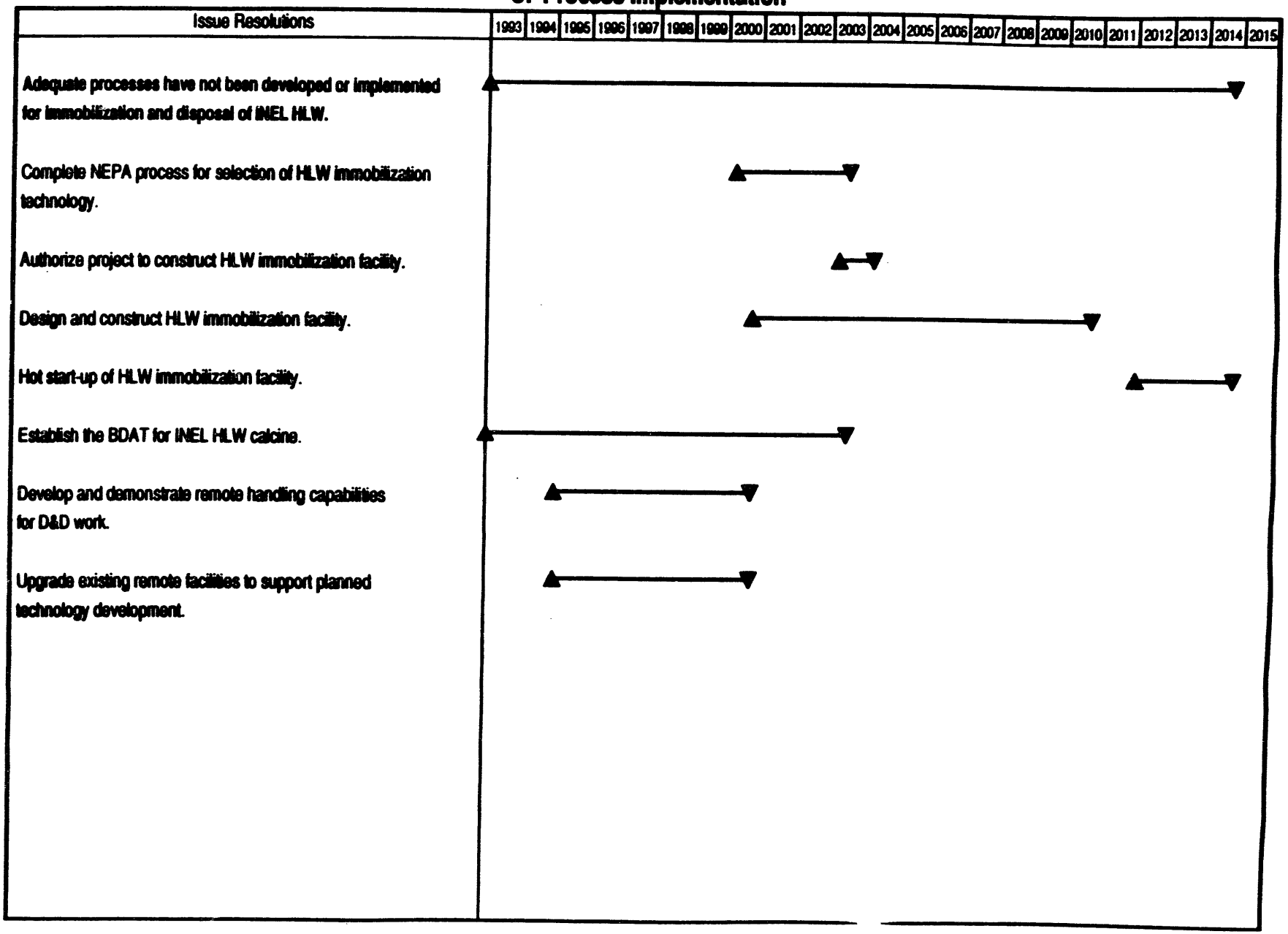
Issue Resolution Desired Activities Schedule

B. Disposal



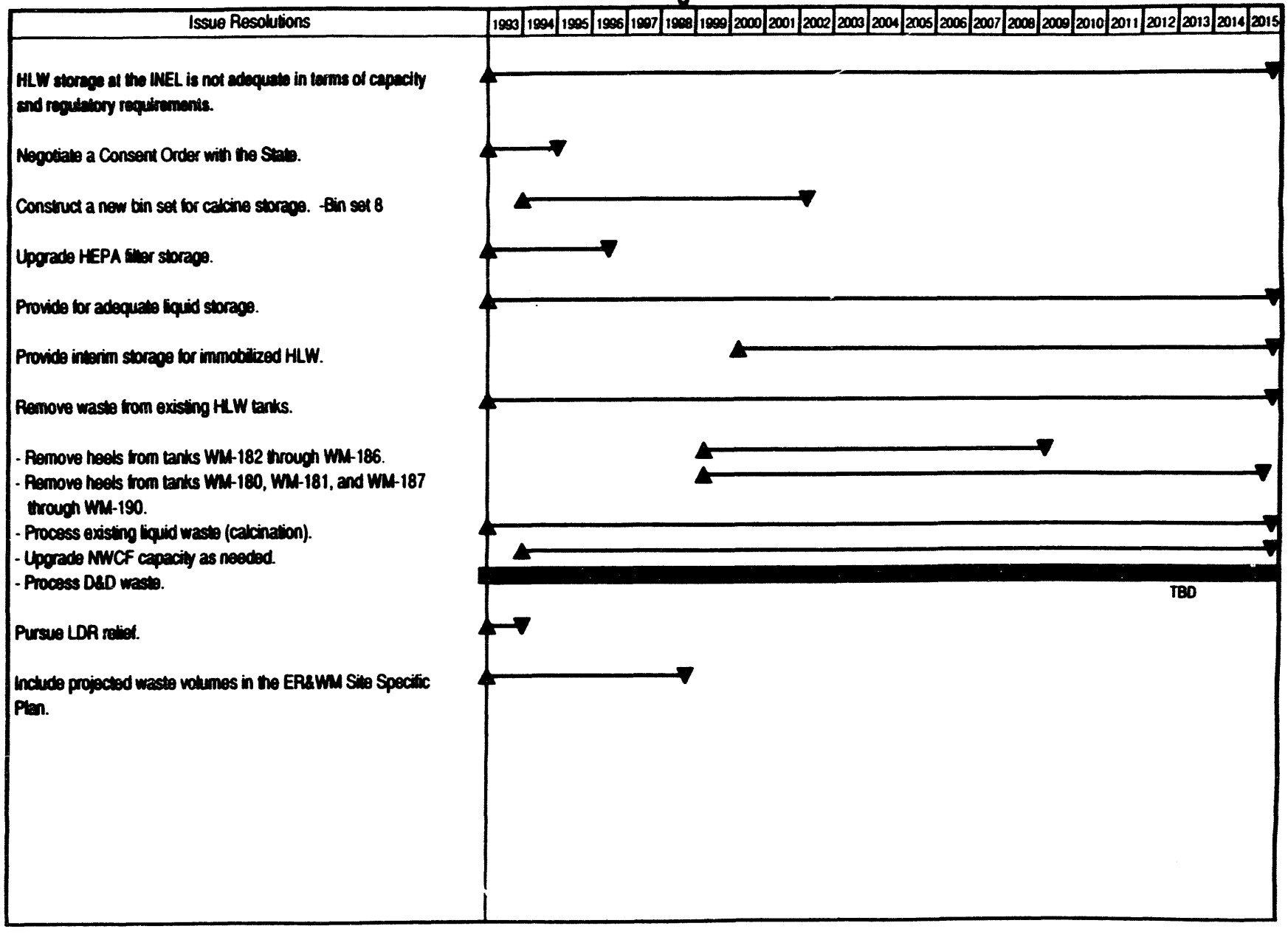
Issue Resolution Desired Activities Schedule

C. Process Implementation



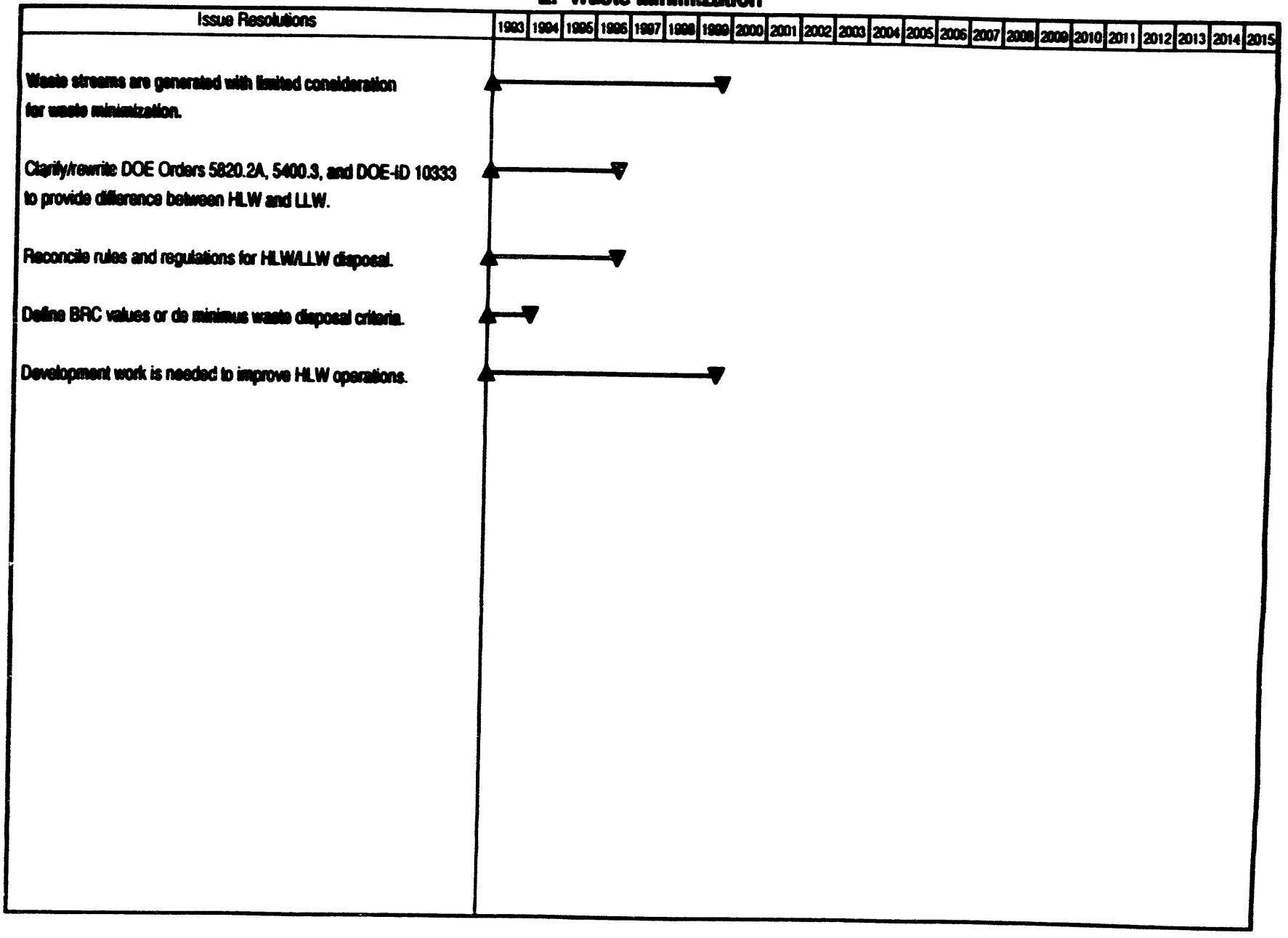
Issue Resolution Desired Activities Schedule

D. Storage



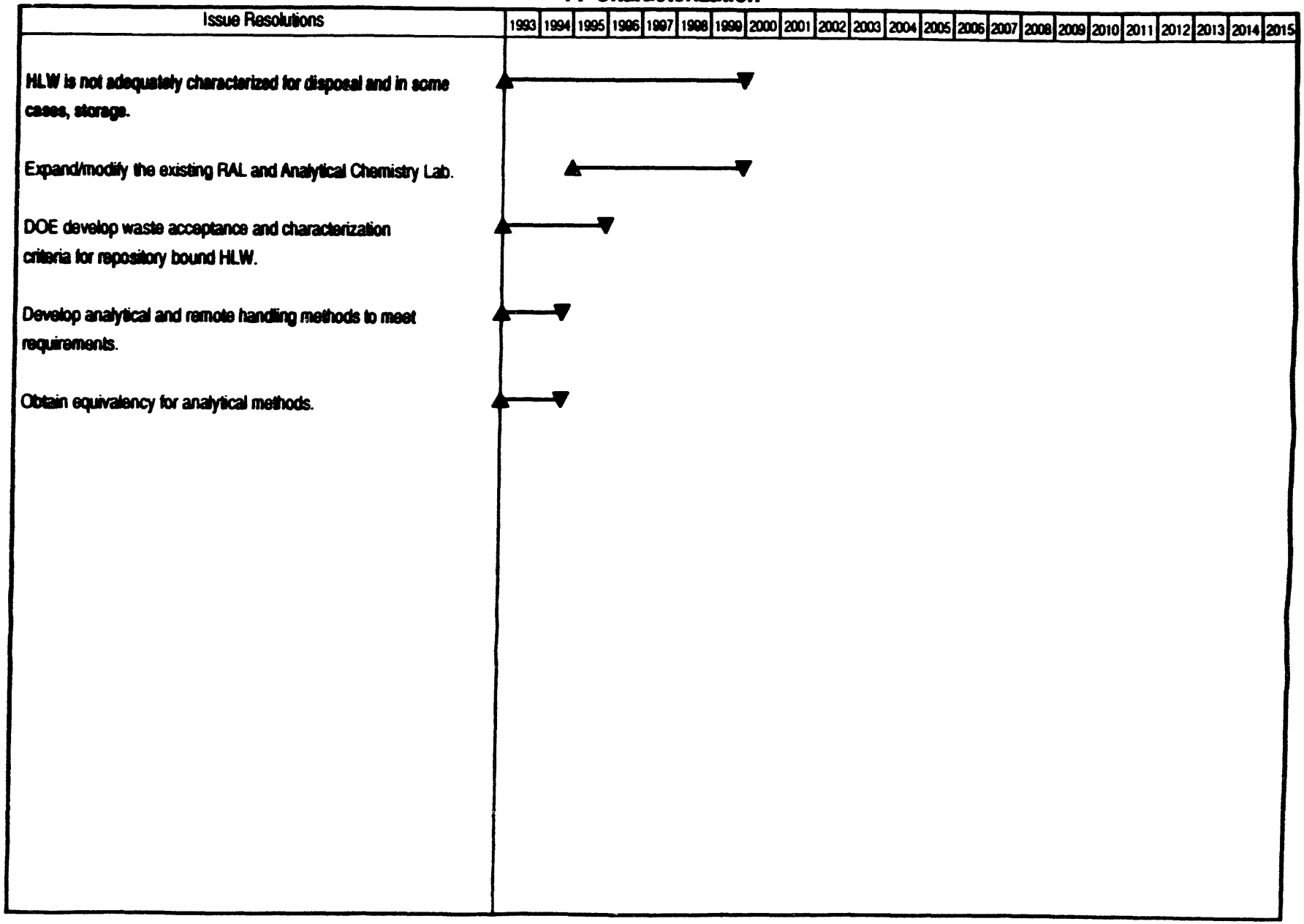
Issue Resolution Desired Activities Schedule

E. Waste Minimization



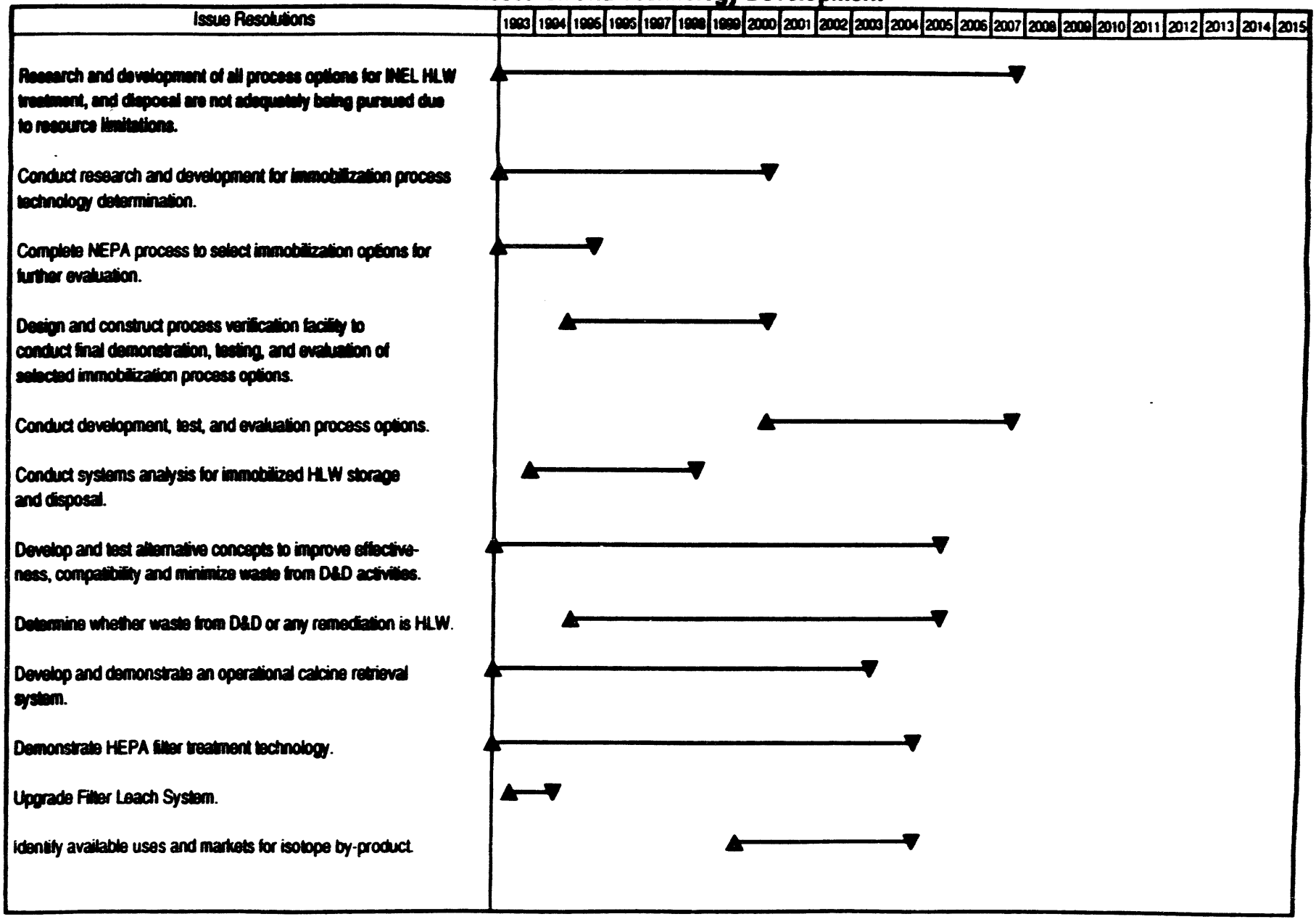
Issue Resolution Desired Activities Schedule

F. Characterization



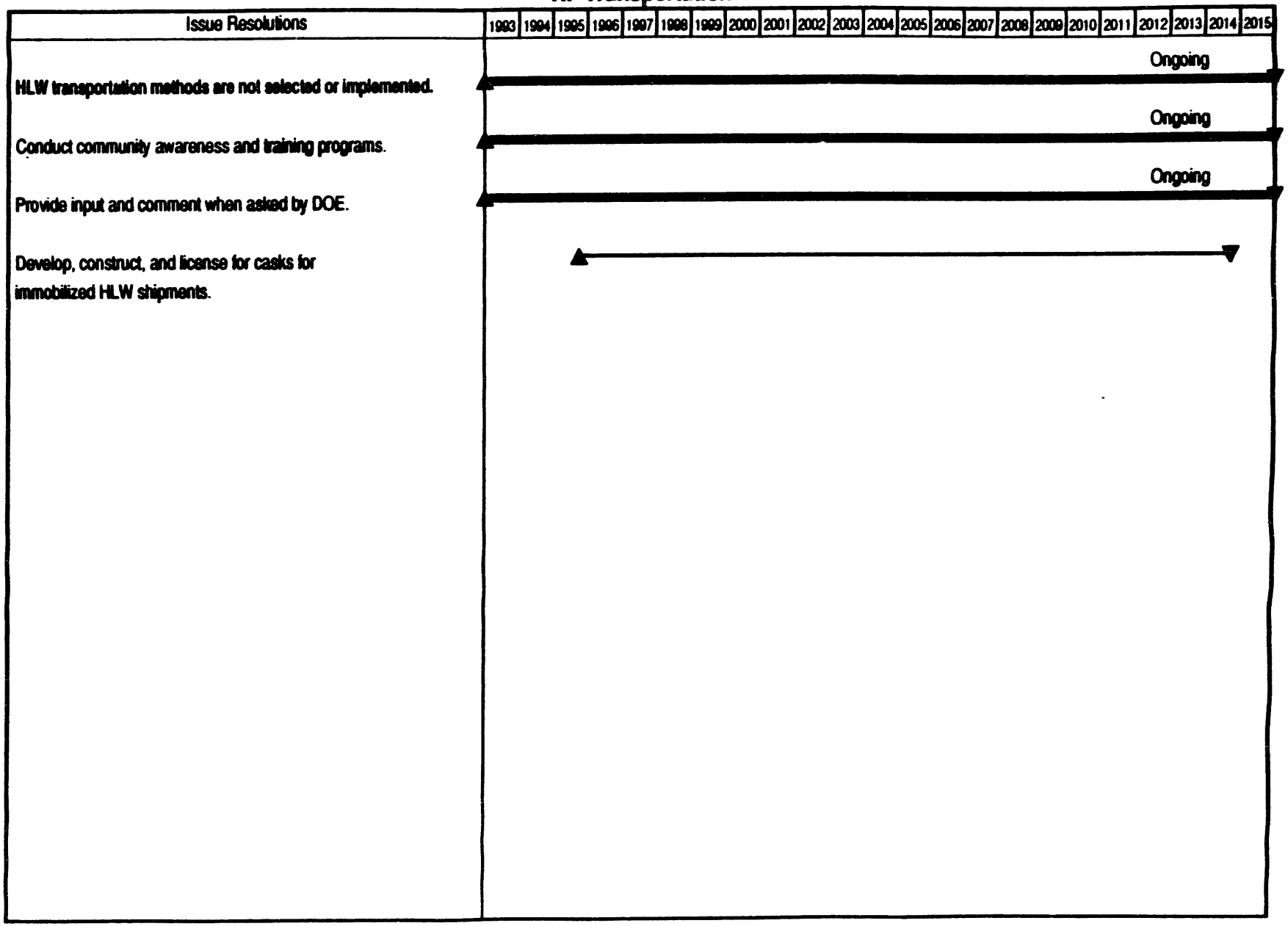
Issue Resolution Desired Activities Schedule

G. Research and Technology Development



Issue Resolution Desired Activities Schedule

H. Transportation



9. DOE-HQ ISSUES

As HLW key issues were evaluated, the lead organization for resolving each issue was identified. The INEL recognizes its obligation to resolve the issues falling under its responsibility in an expedient manner. Furthermore, the INEL will assist DOE-HQ by assuming a lead role in resolving issues for the Idaho Operations Office and will provide help to any other sites that are restrained by issues similar to those found at the INEL.

The issues requiring DOE-HQ action are outlined in this section. Each primary DOE-HQ issue is listed followed by potential impact, proposed resolution activities, and priority. The priorities are based on the EM FYP prioritization categories as described in Section 5, Issue Statements. A detailed summary along with the status and regulatory authority of each major issue can be found in Section 6, Issue Analysis.

ISSUE A: DOE HLW Policy, Regulations, and Management

DOE needs a consistent policy for HLW generation, handling, treatment, storage, and disposal.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 2

POTENTIAL IMPACTS

- Never be in full compliance.
- Continued storage and processing of excessive quantities of HLW.
- Cost of disposal may be adversely affected.
- Inefficient use of resources.
- Ineffective waste management practices.
- Inconsistency in implementing requirements.
- Delayed schedules and wasted productivity.
- Indefinite interim storage of HLW.

PROPOSED RESOLUTION

To avoid potential impacts, DOE-HQ must:

- Develop a systems approach for waste management, and waste minimization during life cycle of HLW (including generation, treatment, and disposal) and D&D of treatment and storage facilities and equipment. Coordinate the system approach with other sites.
- Reconcile conflicts with implementing regulations and requirements.
- Clarify policy based on requirements of the regulators.
- Provide adequate funds to maintain, upgrade, and build treatment and storage facilities as necessary to support HLW operations.
- Obtain definition of fission products to determine what concentration amounts trigger the permanent isolation of waste.
- Identify a final repository site.

- Define remote handling requirements for treatment and storage.
- Agree with other agencies as to the BDAT for treating INEL HLW.
- Define waste packaging requirements.
- Develop performance assessment criteria.

ISSUE B: Disposal

The capability for final disposal of INEL HLW does not exist.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 3

POTENTIAL IMPACTS

- Violation of regulatory requirements.
- HLW forms cannot be developed with assurance of meeting the proper criteria.

PROPOSED RESOLUTION

To avoid potential impacts, DOE-HQ must:

- Identify a final repository site.
- Define waste form acceptance criteria and repository performance requirements.

ISSUE C: Process Implementation

Adequate processes have not been developed or implemented for immobilization and disposal of INEL HLW.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 2

POTENTIAL IMPACTS

- Possible RCRA violations.
- Use of current BDAT (vitrification) for INEL HLW will result in higher volumes of HLW. These higher volumes of waste will require repository disposal.
- Schedule delays in treatment technologies for HLW.

PROPOSED RESOLUTION

To avoid potential impacts, DOE-HQ must:

- Submit treatability variance petition requesting approval of the BDAT for INEL HLW calcine.
- Assure adequate level of funding to develop and implement process options.
- Provide funding for facility upgrades.

ISSUE D: Storage

HLW storage at the INEL is not adequate in terms of capacity and regulatory requirements.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 2

POTENTIAL IMPACTS

- Potential violation of Consent Order requirements.
- Fines for improper storage of waste and restrictions on waste generation.

PROPOSED RESOLUTION

To avoid potential impacts, DOE-HQ must:

- Provide capital funding for adequate HLW storage.
- Provide support for Idaho Operations Office to pursue either LDR Consent Order, or No Migration Petition, or risk based standards, or provide funding for treatment development.

ISSUE E: Waste Minimization

Waste streams are generated with limited consideration for waste minimization.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 3

POTENTIAL IMPACTS

- Noncompliance with storage requirements.
- Waste generation with minimal concern for waste minimization.
- Continued generation of large amounts of HLW and possible handling problems.

PROPOSED RESOLUTION

To avoid potential impact, DOE-HQ must:

- Clarify/rewrite DOE Orders 5820.2A, 5400.3 and DOE-ID-10333 to provide HLW information for waste minimization. Include the differences between HLW and LLW.
- Reconcile rules and regulations for HLW/LLW disposal.
- Define BRC levels or de minimis waste disposal criteria.
- Identify a final repository site and provide space for INEL HLW.
- Reconcile rules to properly handle HLW.

ISSUE F: Characterization

HLW is not adequately characterized for disposal nor, in some cases, for storage.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 3

POTENTIAL IMPACTS

- Non Compliance with RCRA waste characterization requirements for TSD facilities.
- Inefficient use of allocated resources.
- Delay of final waste form development.

PROPOSED RESOLUTION

To avoid potential impact, DOE-HQ must:

- Provide adequate funding to meet characterization requirements and needs.
- Coordinate and develop waste acceptance and characterization criteria for HLW disposal in the HLW repository.

ISSUE G: Research and Technology Development

Research and development of all process options for INEL HLW treatment and disposal are not being adequately pursued due to resource limitations.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 3

POTENTIAL IMPACTS

- Research and technology development decisions will not balance risk reduction, cost control, increased safety, public acceptance, and waste minimization.

PROPOSED RESOLUTION

To avoid potential impacts, DOE-HQ must:

- Reach agreements on the appropriate HLW treatment avenues.
- Conduct systems analysis for HLW immobilization, storage, and disposal.
- Provide support for R&D activities, some of which are already in progress, to insure continued and timely application for resources for technology development.

ISSUE H: Transportation

HLW transportation methods are not selected or implemented.

SUMMARY

For a complete discussion of this issue, please see Section 6, Issue Analysis.

PRIORITY: 3

POTENTIAL IMPACTS

- Without transportation containers, HLW will require indefinite interim storage in Idaho, which would give the impression of permanent storage at the INEL, violating regulatory and interagency agreements.
- Negative public sentiment may prohibit shipments.

PROPOSED RESOLUTION

To avoid potential impacts, DOE-HQ must:

- Work with researchers on waste form criteria and shipping requirements to develop acceptable containers.
- Adopt DOT specifications without additional specifications.
- Conduct community awareness and community support training sessions.

10. VISION OF THE FUTURE

The purpose of this section is to illustrate the ideal future of HLW management at the INEL. In general, the INEL will focus the facilities, technologies, and capabilities developed at the INEL to resolve HLW issues.

Generation

The generation of HLW has been reduced due to the cessation of spent fuels reprocessing at the ICPP. A systems approach that considers waste management and waste minimization of HLW generation will be followed to ensure further diminished volumes of future HLW generation from phaseout activities. The capability to segregate non-HLW from the current HLW inventory will be available to minimize volume of future HLW.

Storage

All regulations and requirements concerning storage facilities currently in conflict will be resolved. There will be adequate HLLW storage and interim storage for calcine. Any upgrades or construction of storage facilities necessary will be completed.

A final repository will be identified and space will be allocated for the final disposal of INEL HLW.

Treatment

The INEL will be the leader in waste characterization and treatment of HLW, focusing its efforts on the development of durable HLW forms tailored for volume reduction. HLW will be characterized by state-of-the-art equipment in a state-of-the-art complex.

Treatment facilities will be built or upgraded as necessary. Developed and demonstrated technology will be accepted as BDAT and will meet the WAC for the identified repository. Sodium-bearing liquid waste will be classified as non-HLW and segregation capabilities will exist to segregate mixed LLW/TRU/sodium-bearing liquid waste from HLW. Alternate treatment technologies for sodium-bearing liquid waste will be developed and demonstrated as well.

Transportation

The immobilized INEL HLW packages will be placed in approved transportation containers. Transportation plans and regulations will be complied with in the transportation of immobilized HLW for disposal in a federal repository.

The INEL will have public support and acceptance on its HLW management as well as all its operations.

For a process model of the life-cycle of INEL HLW including future options, refer to Figure 5-2 on page 19.

INEL HLW ROADMAP

APPENDIX A

A-1 Human Resource Projections

Human Resource Projections - INEL HLW Roadmap Addendum

Human resource requirements are estimated to support the EM programs for projected cleanup through 2019. Staffing needs have been broken into job categories specified in the EM's Common Occupational Classification System (COCS). As specified in the COCS, full-time equivalent (FTE) classification was based on what individuals do in their occupation, not on the qualities or characteristics they bring to the job. By standardizing the job classifications across the DOE complex, EM will be better able to effectively compare human resource trends and projections.

A current staffing profile was obtained using Human Resource Department data from December 1992. The total headcount has remained relatively steady since that time. A job ratioing method was used to determine the percentage of WINCO employees within a particular job classification category (Table A-1). These fractions are used as the company baseline. The FY 95 Environmental Restoration and Waste Management Five-Year Plan (FYP) (April 1993) was analyzed to determine future staffing needs at WINCO (Table A-3). The total of projected direct FTE's from each Task Description Document (TDD) or Back-up Document (BUD) was multiplied by the baseline fraction to determine the percentage of FTE's forecasted in each specified job category (Table A-2). Human resource projections are listed each year for the first five years (93-98), and then every fifth year for years six through 30 (2003, 2008, 2013, 2018).

The following are planning assumpt for the ICPP resource loading projections:

1. WINCO employs five direct funded FTE's for every one indirect funded FTE.

2. Beginning in FY 94, all funding of FTE's will come from EM.

3. Reference documentation (Activity Data Sheets (ADS), TDDs, and BUDs) is a valid tool for projecting FTE's.

4. Inconsistency in planning and budget estimates by project managers may yield variable FTE requirements.

5. Because WINCO's current job classifications was a forced fit to EM's COCS, there may be some discrepancies between WINCO job titles and the COCS titles.

Table A-1 identifies the occupational mix of human resources at the ICPP. Table A-2 looks at the break down of the estimated occupational mix based on the current staffing profile and the five-year planning level FTE projection. The WINCO ADS are the basis for work activity necessary to accomplish the

ICPP overall ER&WM mission. Table A-3 shows the ICPP resource allocation of EM funded direct FTE's. This information is based on TDD and BUD data from April 1993. For a list of ADS numbers and titles, please refer to Table A-4 on page A-13.

It is important to stress that these staffing levels are projected planning levels. At this time, WINCO's Human Resources Department plans to hold headcount levels steady for at least the next few years.

Resource Loading for the entire INEL can be found in the INEL Installation Roadmap Document (May 1993) in Appendix C.

Table A-1 WINCO RESOURCE LOADING
CROSSWALK TO THE COMMON OCCUPATIONAL CLASSIFICATION SYSTEM

12/09/92

WINCO JOB FAMILY	JOB TITLE	INDIRECT FTE'S	DIRECT FTE'S	1800 TOTAL FTE'S	TOTAL FRACTION	DIRECT FTE'S FRACTION
MANAGERS		93	254	347	0.193	0 170
	FIRST LINE (SUPERVISORS/FOREMAN)	4	82	86	0.048	0.055
	GENERAL MGR & EXECUTIVES	14	0	14	0.008	0 000
	PROJ/PROG MGRS	30	46	76	0.042	0.031
	MID-MANAGEMENT	45	126	171	0.095	0 084
ENGINEERS		8	387	395	0.219	0 259
	ARCHITECTS/DESIGNERS	0	0	0	0.000	0.000
	CHEMICAL	0	112	112	0.062	0.075
	CIVIL	0	11	11	0.006	0 007
	COMPUTER	0	10	10	0.006	0.007
	ENVIRONMENTAL/WASTE	0	34	34	0.019	0.023
	ELECTRICAL	0	31	31	0.017	0.021
	INDUSTRIAL	0	8	8	0.004	0.005
	MECHANICAL	0	52	52	0.029	0.035
	NUCLEAR	0	25	25	0.014	0 017
	PETROLEUM / MINING	0	2	2	0.001	0 001
	SAFETY	0	39	39	0.022	0.026
	QUALITY CONTROL	0	25	25	0.014	0 017
	PLANT/FACILITY	0	36	36	0.020	0.024
	OTHER	8	2	10	0.006	0.001
SCIENTISTS		1	104	105	0.058	0.070
	CHEMISTS	0	49	49	0.027	0.033
	ENVIRONMENTAL	0	19	19	0.011	0 013
	LIFE (BIOLOGISTS)	0	5	5	0.003	0 003
	GEOLOGISTS	0	1	1	0.001	0.001
	MATERIALS	0	10	10	0.006	0.007
	MATHEMATICIANS	0	6	6	0.003	0.004
	PHYSICISTS	0	12	12	0.007	0.008
	SOCIAL	0	0	0	0.000	0.000
	OTHER	1	2	3	0.002	0 001
ADMINISTRATIVE & OTHER		105	188	293	0.163	0.126
	ARCHITECTS	0	0	0	0.000	0.000
	ACOUNTANTS/AUDITORS	20	0	20	0.011	0 000
	COMPLIANCE INSPECTORS	0	29	29	0.016	0 019
	COMPUTER SYSTEMS ANALYSTS	20	17	37	0.021	0 011
	COST / PLAN / SCHEDULERS	17	26	43	0.024	0 017
	LAWYERS	2	0	2	0.001	0 000
	PERSONNEL & LABOR RELATIONS	14	0	14	0.008	0.000
	PHYSICIANS	0	0	0	0.000	0.000
	MEDICAL ASSISTANTS	2	0	2	0.001	0.000
	COMMUNICATIONS SPECIALISTS	5	0	5	0.003	0.000
	HEALTH PHYSICISTS	0	14	14	0.008	0.009
	INDUSTRIAL HYGIENISTS	0	9	9	0.005	0 006
	TRAINERS	0	37	37	0.021	0 025
	TECHNICAL WRITERS &EDITORS	4	31	35	0.019	0 021
	SAFEGUARDS & SECURITY SPEC.	0	9	9	0.005	0.006
	BUY / PROCURE / CONTRACTING	14	0	14	0.008	0 000
	OTHER	7	16	23	0.013	0 011
SECY & CLERICAL SUPPORT STAFF		97	74	171	0.095	0 049
	ADMINISTRATIVE ASSISTANTS	61	38	99	0.055	0 025

Table A-1 WINCO RESOURCE LOADING
CROSSWALK TO THE COMMON OCCUPATIONAL CLASSIFICATION SYSTEM

12/09/92

WINCO JOB FAMILY	JOB TITLE	INDIRECT FTE'S	DIRECT FTE'S	1800 TOTAL FTE'S	TOTAL FRACTION	DIRECT FTE'S FRACTION
	OFFICE CLERKS (GENERAL)	18	22	40	0.022	0.015
	OFFICE CLERKS (SPECIALIZED)	8	0	8	0.004	0.000
	SECRETARIES	10	0	10	0.006	0.000
	TYPISTS & WORD PROCESSORS	0	12	12	0.007	0.008
	OTHER	0	2	2	0.001	0.001
TECHNICIANS		0	189	189	0.105	0.126
	ENGINEERING	0	23	23	0.013	0.015
	LABORATORY	0	19	19	0.011	0.013
	COMPUTER	0	5	5	0.003	0.003
	DRAFTERS	0	16	16	0.009	0.011
	DRILLERS	0	0	0	0.000	0.000
	ENVIRONMENTAL SCIENCES	0	3	3	0.002	0.002
	HEALTH PHYSICS	0	54	54	0.030	0.036
	INDUSTRIAL SAFETY & HEALTH	0	4	4	0.002	0.003
	SURVEY & MAPPING	0	0	0	0.000	0.000
	INSTRUMENT & CONTROL	0	47	47	0.026	0.031
	MEDIA	0	7	7	0.004	0.005
	OTHER	0	11	11	0.006	0.007
LABORERS & SERVICE		0	38	38	0.021	0.025
	FIREFIGHTERS	0	0	0	0.000	0.000
	HANDLERS/HELPERS	0	15	15	0.008	0.010
	FOOD SERVICES	0	0	0	0.000	0.000
	JANITORS	0	21	21	0.012	0.014
	LAUNDRY	0	2	2	0.001	0.001
	MAIL CLERK	0	0	0	0.000	0.000
CRAFTS		0	98	98	0.054	0.066
	CARPENTERS	0	5	5	0.003	0.003
	ELECTRICIANS	0	28	28	0.016	0.019
	HVAC	0	0	0	0.000	0.000
	MOBILE EQUIPMENT MECHANICS	0	20	20	0.011	0.013
	MACHINISTS	0	3	3	0.002	0.002
	MASONS	0	0	0	0.000	0.000
	MILLWRIGHTS	0	0	0	0.000	0.000
	PAINTERS	0	6	6	0.003	0.004
	PLUMBERS & PIPEFITTERS	0	21	21	0.012	0.014
	STRUCTURAL & METAL WORKERS	0	0	0	0.000	0.000
	WELDERS	0	11	11	0.006	0.007
	OTHER	0	4	4	0.002	0.003
OPERATORS		0	164	164	0.091	0.110
	CHEMICAL SYSTEM	0	79	79	0.044	0.053
	LIGHT VEHICLE	0	0	0	0.000	0.000
	MATERIAL MOVING EQUIPMENT	0	9	9	0.005	0.006
	NUCLEAR PLANT	0	0	0	0.000	0.000
	NUCLEAR WASTE PROCESS	0	52	52	0.029	0.035
	UTILITIES SYSTEMS	0	24	24	0.013	0.016
	WASTE STORAGE & HANDLING	0	0	0	0.000	0.000
	TOTALS	304	1496	1800	1.000	1.000
	DOE ID EMPYS @ 1 per 20	15	75	90		

Table A-2 WINCO PROJECTED PLANNING STAFFING LEVELS FOR EM FUNDED DIRECT FTE'S
CROSSWALK TO THE COMMON OCCUPATIONAL CLASSIFICATION SYSTEM
JULY 1993

JOB FAMILY	JOB TITLE	1993*	1994*	1995	1996	1997	1998	2003	2008	2013	2018
	CHEMICAL	42.3	121.5	140.2	145.3	144.1	145.3				
	CIVIL	4.0	11.3	13.1	13.6	13.4	13.6				
	COMPUTER	4.0	11.3	13.1	13.6	13.4	13.6				
	ENVIRONMENTAL / WASTE	13.0	37.2	43.0	44.6	44.2	44.6				
	ELECTRICAL	11.9	34.0	39.3	40.7	40.3	40.7				
	INDUSTRIAL	2.8	8.1	9.3	9.7	9.6	9.7				
	MECHANICAL	19.8	56.7	65.4	67.8	67.2	67.8				
	NUCLEAR	9.6	27.5	31.8	32.9	32.7	32.9				
	PETROLEUM / MINING	0.6	1.6	1.9	1.9	1.9	1.9				
	SAFETY	14.7	42.1	48.6	50.4	49.9	50.4				
	QUALITY CONTROL	9.6	27.5	31.8	32.9	32.7	32.9				
	PLANT / FACILITY	13.5	38.9	44.9	46.5	46.1	46.5				
	OTHER	0.6	1.6	1.9	1.9	1.9	1.9				
ENGINEERS		146	419	484	502	498	502	518	518	544	
	CHEMISTS	18.6	53.4	61.7	63.9	63.4	63.9				
	ENVIRONMENTAL	7.3	21.1	24.3	25.2	25.0	25.2				
	LIFE (BIOLOGISTS)	1.7	4.9	5.6	5.8	5.8	5.8				
	GEOLOGISTS	0.6	1.6	1.9	1.9	1.9	1.9				
	MATERIALS	4.0	11.3	13.1	13.6	13.4	13.6				
	MATHEMATICIANS	2.3	6.5	7.5	7.8	7.7	7.8				
	PHYSICISTS	4.5	13.0	15.0	15.5	15.4	15.5				
	SOCIAL	0.0	0.0	0.0	0.0	0.0	0.0				
	OTHER	0.6	1.6	1.9	1.9	1.9	1.9				
SCIENTISTS		40	113	131	136	134	136	140	140	147	
	ENGINEERING	8.5	24.3	28.0	29.1	28.8	29.1				
	LABORATORY	7.3	21.1	24.3	25.2	25.0	25.2				
	COMPUTER	1.7	4.9	5.6	5.8	5.8	5.8				
	DRAFTERS	6.2	17.8	20.6	21.3	21.1	21.3				
	DRILLERS	0.0	0.0	0.0	0.0	0.0	0.0				
	ENVIRONMENTAL SCIENCES	1.1	3.2	3.7	3.9	3.8	3.9				
	HEALTH PHYSICS	20.3	58.3	67.3	69.8	69.2	69.8				
	INDUSTRIAL SAFETY & HEALTH	1.7	4.9	5.6	5.8	5.8	5.8				
	SURVEY & MAPPING	0.0	0.0	0.0	0.0	0.0	0.0				
	INSTRUMENT & CONTROL	17.5	50.2	57.9	60.1	59.5	60.1				
	MEDIA	2.8	8.1	9.3	9.7	9.6	9.7				
	OTHER	4.0	11.3	13.1	13.6	13.4	13.6				
TECHNICIANS		71	204	236	244	242	244	252	252	265	
TECHNICAL		257	737	850	882	874	882	910	910	956	819
	FIRST LINE SUPERVISORS	31.0	89.1	102.8	106.6	105.6	106.6				
	GENERAL MGR & EXECUTIVES	0.0	0.0	0.0	0.0	0.0	0.0				
	PROJ / PROG MGRS	17.5	50.2	57.9	60.1	59.5	60.1				
	OTHER MGRS	47.4	136.0	157.0	162.8	161.4	162.8				
MANAGERS		96	275	318	329	327	329	340	340	357	
MANAGEMENT		96	275	318	329	327	329	340	340	357	306
	ACCOUNTANTS/AUDITORS	0.0	0.0	0.0	0.0	0.0	0.0				
	ARCHITECTS	0.0	0.0	0.0	0.0	0.0	0.0				
	BUY / PROCURE / CONTRACTING	0.0	0.0	0.0	0.0	0.0	0.0				
	COMMUNCIATIONS SPECIALISTS	0.0	0.0	0.0	0.0	0.0	0.0				
	COMPLIANCE INSPECTORS	10.7	30.8	35.5	36.8	36.5	36.8				
	COMPUTER SYSTEMS ANALYSTS	6.2	17.8	20.6	21.3	21.1	21.3				
	COST / PLAN / SCHEDULERS	9.6	27.5	31.8	32.9	32.7	32.9				
	HEATH PHYSICISTS	5.1	14.6	16.8	17.4	17.3	17.4				
	INDUSTRIAL HYGIENISTS	3.4	9.7	11.2	11.6	11.5	11.6				

Table A-2 WINCO PROJECTED PLANNING STAFFING LEVELS FOR EM FUNDED DIRECT FTE'S

CROSSWALK TO THE COMMON OCCUPATIONAL CLASSIFICATION SYSTEM

JULY 1993

JOB FAMILY	JOB TITLE	1993*	1994*	1995	1996	1997	1998	2003	2008	2013	2018
	LAWYERS	0.0	0.0	0.0	0.0	0.0	0.0				
	PERSONNEL & LABOR RELATIONS	0.0	0.0	0.0	0.0	0.0	0.0				
	PHYSICIANS	0.0	0.0	0.0	0.0	0.0	0.0				
	MEDICAL ASSISTANTS	0.0	0.0	0.0	0.0	0.0	0.0				
	SAFEGUARDS & SECURITY SPEC.	3.4	9.7	11.2	11.6	11.5	11.6				
	TECHNICAL WRITERS &EDITORS	11.9	34.0	39.3	40.7	40.3	40.7				
	TRAINERS	14.1	40.5	46.7	48.4	48.0	48.4				
	OTHER	6.2	17.8	20.6	21.3	21.1	21.3				
ADMINISTRATIVE & OTHER		71	202	234	242	240	242	250	250	263	
	ADMINISTRATIVE ASSISTANTS	14.1	40.5	46.7	48.4	48.0	48.4				
	OFFICE CLERKS (GENERAL)	8.5	24.3	28.0	29.1	28.8	29.1				
	OFFICE CLERKS (SPECIALIZED)	0.0	0.0	0.0	0.0	0.0	0.0				
	SECRETARIES	0.0	0.0	0.0	0.0	0.0	0.0				
	TYPISTS & WORD PROCESSORS	4.9	14.1	16.3	16.9	16.7	16.9				
	OTHER	0.8	2.4	2.8	2.9	2.9	2.9				
GENERAL ADMIN SECY & CLERICAL SUPPORT STAFF		28	81	94	97	96	97	100	100	105	
ADMINISTRATIVE		99	284	327	340	337	340	350	350	368	315
	CARPENTERS	1.7	4.9	5.6	5.8	5.8	5.8				
	ELECTRICIANS	10.7	30.8	35.5	36.8	36.5	36.8				
	HVAC	0.0	0.0	0.0	0.0	0.0	0.0				
	MOBILE EQUIPMENT MECHANICS	7.3	21.1	24.3	25.2	25.0	25.2				
	MACHINISTS	1.1	3.2	3.7	3.9	3.8	3.9				
	MASONS	0.0	0.0	0.0	0.0	0.0	0.0				
	MILLWRIGHTS	0.0	0.0	0.0	0.0	0.0	0.0				
	PAINTERS	2.3	6.5	7.5	7.8	7.7	7.8				
	PLUMBERS & PIPEFITTERS	7.9	22.7	26.2	27.1	26.9	27.1				
	STRUCTURAL & METAL WORKERS	0.0	0.0	0.0	0.0	0.0	0.0				
	WELDERS	4.0	11.3	13.1	13.6	13.4	13.6				
	OTHER	1.7	4.9	5.6	5.8	5.8	5.8				
CRAFTS		37	105	121	126	125	126	130	130	137	
	CHEMICAL SYSTEM	29.9	85.8	99.1	102.7	101.8	102.7				
	LIGHT VEHICLE	0.0	0.0	0.0	0.0	0.0	0.0				
	MATERIAL MOVING EQUIPMENT	3.4	9.7	11.2	11.6	11.5	11.6				
	NUCLEAR PLANT	0.0	0.0	0.0	0.0	0.0	0.0				
	NUCLEAR WASTE PROCESS	19.8	56.7	65.4	67.8	67.2	67.8				
	UTILITIES SYSTEMS	9.0	25.9	29.9	31.0	30.7	31.0				
OPERATORS		62	178	206	213	211	213	220	220	231	
	FIREFIGHTERS	0.0	0.0	0.0	0.0	0.0	0.0				
	HANDLERS / HELPERS	5.6	16.2	18.7	19.4	19.2	19.4				
	FOOD SERVICES	0.0	0.0	0.0	0.0	0.0	0.0				
	JANITORS	7.9	22.7	26.2	27.1	26.9	27.1				
	LAUNDRY	0.6	1.6	1.9	1.9	1.9	1.9				
	MAIL CLERK	0.0	0.0	0.0	0.0	0.0	0.0				
LABORERS & SERVICE		14	40	47	48	48	48	50	50	53	
CRAFTS		113	324	374	388	384	388	400	400	420	360
TOTALS (DIRECT FTE'S ONLY)*		565	1620	1870	1938	1921	1938	2000	2000	2100	1800
	DOE ID EMPYS @ 1 per 20	28	81	93	97	96	97	100	100	105	90

* *The total of FTEs from FY93 to FY94 changes significantly due to a shift in funding from Defense Programs to EM funded activities.*

Table A-3 RESOURCE LOADING OF EM FUNDED ADS AND TDDs
PLANNING LEVEL DIRECT FTE's

JULY 1993

ADS	TDD/BUD	FY 93*	FY 94*	FY 95	FY 96	FY 97	FY 98	FY 99	Fraction HLW
ID-1001-WN	1001.01	156.2	162.0	194.4	195.4	195.4	195.4	195.4	0.95
	1001.02	31.0	11.5	24.3	11.3	16.0	14.6	12.4	0
	1001.03	19.2	19.8	19.5	19.5	19.5	19.5	19.5	0.2
	1001.04	23.0	26.0	28.0	30.0	32.0	34.0	36.0	0
	1001.05	0.0	14.1	15.5	15.2	15.3	14.7	14.8	1
	1001.06	83.8	83.8	83.8	111.6	112.1	112.6	112.6	0
	1001.07	32.8	22.0	46.8	39.8	39.8	39.8	39.8	0.4
	1001.08	2.1	3.0	6.0	6.0	6.0	6.0	6.0	0.4
ID-1003-WN	1003.01	25.9	40.1	42.2	46.3	46.3	46.3	46.3	0.5
ID-1004-WN	1004.01	0.0	1.9	5.2	9.6	11.8	19.5	35.2	1
	1004.02	0.0	0.0	0.0	1.1	2.4	3.4	5.0	0
	1004.03	0.0	0.0	2.9	13.3	16.3	16.9	17.9	0
	1004.04	0.0	0.0	7.0	8.0	8.0	8.0	8.0	1
	1004.05	0.0	16.3	16.0	16.0	16.0	16.0	15.5	0.4
ID-1005-WN	1005.01	37.0	49.0	53.0	45.0	52.0	59.0	21.0	1
ID-1006-WN	1006.01	15.8	14.9	21.0	19.7	19.5	6.2	0.0	1
ID-1008-WN	1008.01	19.0	31.0	38.0	40.0	41.0	41.0	41.0	0.88
	1008.02	17.5	36.0	43.7	41.0	41.0	39.7	27.0	1
	1008.03	48.6	61.6	113.2	125.9	133.0	123.9	101.3	1
	1008.04	25.7	19.2	23.1	23.2	26.7	32.6	40.5	1
	1008.05	3.2	10.5	14.0	34.1	35.9	46.0	49.0	1
	1008.06	21.7	15.7	15.7	15.7	15.7	15.7	15.7	1
ID-1010-WN	1010.01	0.0	105.8	105.8	105.8	105.8	105.8	105.8	0
	1010.02	0.0	71.1	71.5	65.6	70.6	87.6	87.6	0
	1010.03	0.0	22.5	22.3	22.3	22.3	22.3	22.3	0
	1010.04	0.0	26.6	19.5	12.7	5.0	7.5	7.5	0
ID-1204-WN		0.0	0.0	46.0	57.0	26.0	12.0	90.0	0
ID-1304-WN		0.0	0.0	0.0	0.0	0.0	3.0	1.0	0
ID-1305-WN		0.0	0.0	5.0	5.0	2.0	0.0	0.0	0
ID-1306--WN		0.0	0.0	5.0	1.0	0.0	0.0	0.0	0
ID-1307-WN		0.0	0.0	1.0	8.0	7.0	10.0	10.0	0
ID-1308-WN		0.0	0.0	0.0	4.0	5.0	7.0	9.0	0
ID-1309-WN		0.0	0.0	1.0	1.0	5.0	5.0	5.0	0
ID-1310-WN		0.0	0.0	1.0	3.0	3.0	4.0	4.0	0
ID-1311-WN		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
ID-6321-WN	6321.01	0.0	1.0	3.9	12.0	22.0	22.7	19.2	0
	6321.03	0.0	3.6	11.9	11.4	14.7	9.6	0.0	0
	6321.04	2.0	0.0	0.0	12.2	5.6	4.5	3.2	0
	6321.05	0.0	10.4	10.4	2.0	0.0	0.0	0.0	0.75
	6321.06	0.0	6.1	5.0	3.3	0.0	0.0	0.0	1
ID-6323-WN	6323.01	0.0	0.0	0.0	0.0	15.0	15.0	15.0	0
	6323.02	0.0	0.0	61.4	61.4	61.4	61.4	61.4	0
ID-6324-WN	6324.01	0.0	15.0	19.4	24.5	0.0	0.0	0.0	0.4
	6324.02	0.0	102.0	0.0	0.0	0.0	0.0	0.0	0
	6324.03	0.0	7.7	17.1	17.3	15.2	15.2	0.0	0
	6324.04	0.0	4.2	3.1	2.7	2.2	2.2	2.2	0
	6324.05	0.0	6.0	5.0	5.0	10.0	11.0	11.0	0.2

Table A-3 RESOURCE LOADING OF EM FUNDED ADS AND TDDs
PLANNING LEVEL DIRECT FTE's

JULY 1993

ADS	TDD/BUD	FY 93*	FY 94*	FY 95	FY 96	FY 97	FY 98	FY 99	Fraction HLW
ID-6328-WN	6328.01	0.0	45.1	50.6	51.8	42.4	42.2	41.7	0.4
	6328.02	0.0	40.7	40.7	31.0	31.0	31.0	31.0	0.4
	6328.03	0.0	7.3	7.3	7.3	7.3	7.3	7.3	0
	6328.04	0.0	64.0	68.0	68.0	69.0	69.0	69.0	0.4
	6328.05	0.0	89.8	92.2	92.2	92.2	92.2	92.2	0.4
	6328.06	0.0	63.4	81.0	82.4	82.4	82.4	82.4	0.4
	6328.07	0.0	47.2	47.2	47.2	47.2	47.2	47.2	0.4
	6328.08	0.0	135.2	133.9	133.8	130.7	130.7	130.7	0.4
	6328.09	0.0	38.0	38.0	38.0	38.0	38.0	38.0	0.4
	6328.10	0.0	51.6	53.6	53.6	53.6	53.6	53.6	0.4
	6328.11	0.0	9.5	9.5	9.5	9.5	9.5	9.5	0.4
	6328.12	0.0	3.3	5.1	4.6	4.6	4.6	4.6	0.4
	6328.13	0.0	4.0	13.5	13.5	13.5	13.5	13.5	0.4
Total Direct FTE'S*		564.5	1619.5	1869.2	1937.8	1920.9	1937.8	1934.8	
High-Level Waste		371.8	712.5	867.5	887.4	891.6	898.1	844.9	

* *The total of FTEs from FY93 to FY94 changes significantly due to a shift in funding from Defense Programs to Em funded activities.*

TABLE A-4
FY 95 ER&WM FIVE-YEAR PLAN
ADS NUMBERS AND TITLES

ADS NUMBER	TITLES
ID-1001-WN	Waste Operations
ID-1003-WN	General Plant Projects
ID-1004-WN	New Facilities Planning
ID-1005-WN	HLW Tank Farm Replacement - Phase I
ID-1006-WN	NOx Abatement
ID-1008-WN	New ICPP Mission Activities
ID-1010-WN	Fuel Receipt, Storage and Handling
ID-1204-WN	WAG 3 Environmental Restoration
ID-1304-WN	CPP-603 D&D
ID-1305-WN	SFE-20/CPP-740 D&D Activities
ID-1306-WN	CPP-631, -709, -734, CRS D&D
ID-1307-WN	CPP-640 D&D
ID-1308-WN	CPP-601 D&D
ID-1309-WN	Waste Calcine Facility D&D
ID-1310-WN	Tank Farm D&D
ID-1311-WN	WINCO Post D&D S&M Program
ID-6321-WN	Program Integration
ID-6323-WN	Surveillance and Maintenance
ID-6324-WN	Facility Deactivation and Compliance
ID-6328-WN	Landlord Programs

A-2 Roadmap Link to ADS

ACTIVITY DATA SHEET (ADS) LINKAGE -- INEL HLW ROADMAP

The issues and the actions necessary to resolve the issues are linked to the FY 95 ER&WM FYP (April 1993) ADS to help ensure defensible budget requests and funding for issue resolution activities. The following table identifies the HLW issues, the issue resolution activity, the applicable ADS, and indicates if the applicable ADS was existing in the current FYP, or needs to be, modified, or proposed for FY 96. In certain cases, the TDD or BUD number is also listed to provide added detail. For a listing of ADS numbers and titles, please refer to Table A-4 on page A-13.

A. DOE HLW Policy, Regulations, and Management

ISSUE	*ACTION*	*APPLICABLE ADS*	*ADS STATUS*
DOE does not have a systems approach for HLW generation, handling, treatment, storage, and disposal.	Develop a systems approach for waste management and waste minimization during life cycle including generation, treatment, disposal of HLW, and D&D of treatment and storage facilities and equipment.	ID-1008-WN	Modified
DOE policy is not adequate for implementing current regulations and requirements.	DOE should reconcile conflicts with implementing regulations and requirements.	ID-6328-WN BUD ID-6328.06	Existing
	Establish direct communication with regulators to help develop a regulatory compliance strategy.	ID-6328-WN BUD ID-6328.06	Existing
Facility and equipment systems must be available to support HLW operations.	Provide capital funds to maintain, upgrade, and build treatment and storage facilities as necessary to support HLW operations.	ID-1001-WN ID-1004-WN ID-1005-WN ID-1006-WN ID-1008-WN	Existing Existing Existing Existing Existing
Management policies must provide clear direction for HLW management.	Clarify policy based on requirements of the regulators.	ID-1001-WN TDD: ID-1001.03	Existing
Regulatory deficiencies prevent comprehensive HLW management	Clarify what amounts of fission product concentrations trigger the permanent isolation of waste.	Proposed	Proposed
Technology development cannot be completed without clear direction of the final WAC.	Define remote handling requirements for treatment and storage.	ID-1008-WN TDD: ID-1008.03	Existing
	Agree upon BDAT for treating INEL HLW.	ID-1008-WN TDD: ID-1008.03	Existing
	Define waste packaging requirements.	ID-1008-WN TDD: ID-1008.01	Existing
	Develop Performance Assessment criteria.	ID-1008-WN TDD: ID-1008.01	Existing

B. Disposal

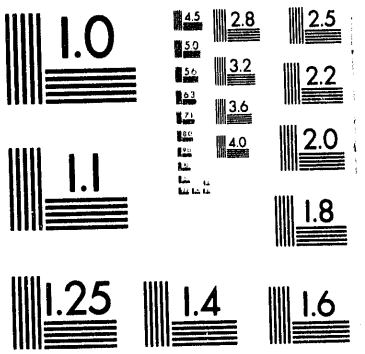
ISSUE	*ACTION*	*APPLICABLE ADS*	*ADS STATUS*
A final repository for HLW is not established.	Provide volume requirements for INEL HLW to DOE.	ID-1008-WN TDD: 1008.01	Existing
Waste form acceptance criteria and performance objectives have not been defined.	DOE, EPA, and WINCO must define waste form acceptance criteria and repository performance objectives.	ID-1008-WN TDD: 1008.01	Existing

C. Process Implementation

ISSUE	ACTION	APPLICABLE ADS	ADS STATUS
Process options are not developed for HLW subject to RCRA (LDR).	Develop and implement processes to treat HLW to meet RCRA requirements.	ID-1008-WN TDD: ID-1008.05	Existing
No acceptable proven immobilization process exists for ICPP HLW.	Obtain agreement that glass-ceramic is BDAT for ICPP HLW.	ID-1008-WN TDD: ID-1008.05	Existing
	Develop and demonstrate a glass-ceramic and/or pyrochemical process to immobilize ICPP HLW for disposal.	ID-1008-WN TDD: ID-1008.05	Existing
Remote handling capability of radioactive waste as required to implement ALARA principles is insufficient.	Develop and demonstrate remote handling capability for remote D&D work.	ID-1304-WN through ID-1311-WN	Existing
Different waste types among HLW sites has resulted in different treatment methods.	Establish glass-ceramic as the BDAT for ICPP HLW calcine.	ID-1008-WN TDD: ID-1008.03	Existing

D. Storage

ISSUE	*ACTION*	*APPLICABLE ADS*	*ADS STATUS*
Some currently stored wastes do not comply with the LDR RCRA requirements.	Negotiate a Consent Order with the State.	ID-1001-WN TDD: 1001.03	Existing
HLW storage is inadequate.	Construct additional tanks.	ID-1005-WN TDD: 1003.01	Existing
	Include interim storage in design of immobilization facility.	Proposed	Proposed
	Ensure NWCF capacity is adequate to handle waste volume.	ID-1001-WN TDD: 1001.01	Existing
	Construct another CSSF (Bin Set #8)	ID-1004-WN TDD: 1004.01	Existing
Storage policy is less than adequate throughout the DOE complex.	Pursue LDR relief or provide treatment methods for these wastes.	ID-1008-WN ID-6328-WN	Modified Modified
Waste volumes for all Phaseout, D&D, and ERP activities are not accurately projected.	Develop plans for characterizing and projecting D&D volumes.	ID-1304-WN through ID-1311-WN	Existing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2 of 2

E. Waste Minimization

ISSUE	*ACTION*	*APPLICABLE ADS*	*ADS STATUS*
Limited effort is made to reduce HLW generation.	Clarify/rewrite 5820.2A/5400.3 and DOE-ID-10333 to provide HLW information proper for waste minimization.	ID-1001-WN	Modified
De minimis values for radionuclides must be established so non-HLWs are not treated as HLW.	Reconcile rules and regulations for HLW/LLW disposal so that proper treatment can be accomplished.	ID-1001-WN	Modified
INEL generators produce waste streams that cannot be processed with the existing HLW systems.	Development work needed to improve HLW operations along with reconciliation of rules to properly handle HLW.	ID-1001-WN TDD: ID-1001.03 ID-1008-WN TDD: ID-1008.02 ID-6328-WN	Existing Existing

F. Characterization

ISSUE	*ACTION*	*APPLICABLE ADS*	*ADS STATUS*
The INEL has limited capability to comprehensively characterize HLW.	Expand/modify the existing ICPP RAL or build a new facility to provide increased capability to characterize HLW. Develop analytical and remote sampling methods.	ID-1003-WN Proposed	Modified Proposed
HLW repository waste acceptance and characterization criteria must be established.	Develop waste acceptance and characterization criteria for HLW disposal.	ID-1008-WN TDD: ID-1008.01	Existing
Existing sampling and analytical methods are less than adequate for meeting the RCRA regulatory requirements.	Continue research and development of analytical and remote sampling methods for HLW to meet regulatory requirements. Obtain approval for analytical methods.	ID-1001-WN TDD: ID-1001.03 ID-6328-WN BUD: ID-6328.06	Existing Existing

G. Research and Technology Development

ISSUE	*ACTION*	*APPLICABLE ADS*	*ADS STATUS*
Technologies for analytical and remote sampling methods need to be developed.	Same as Issue F.	Same as Issue F	Same as Issue F
The environmental and economic impacts and tradeoffs and subsequent storage and disposal correlations for mingling MLLW with HLW are not adequately evaluated.	Conduct a system analysis for immobilized HLW storage and disposal.	ID-1008-WN TDD: 1008.01	Modified
Existing decontamination technologies generate a high volume waste stream that is difficult to process.	Develop and test alternative concepts to improve effectiveness, compatibility and minimize waste from D&D activities.	ID-1008-WN TDD: 1008.02	Existing
	Determine whether waste from D&D or any remediation is HLW.	ID-1008-WN TDD: 1008.02	Existing
The concept for calcine retrieval is developed, but no operational system exists.	Develop and demonstrate an operational system for calcine retrieval.	ID-1008-WN TDD: 1008.03	Existing
Large scale HEPA filter treatment technology has not been demonstrated.	Demonstrate HEPA filter treatment technology.	ID-1001-WN	Existing
	Upgrade Filter Leach System.	ID-1001-WN	Existing
Recovery of isotope by-products from HLW has not been addressed.	Identify available uses and markets for isotope by-product.	Proposed	Proposed
Alternative treatment technology needs to be developed.	Develop and evaluate alternative treatments for sodium-bearing liquid waste.	ID-1008-WN TDD: 1008.02	Existing
	Develop and evaluate alternative immobilization processes for all HLW types.	ID-1008-WN TDD: 1008.03 TDD: 1008.02 TDD: 1008.07 TDD: 1008.01	Existing

H. Transportation

ISSUE	*ACTION*	*APPLICABLE ADS*	*ADS STATUS*
Public perception about radioactive material shipments is generally negative and apprehensive.	Conduct community awareness and community support training sessions.	Proposed	Proposed
It is uncertain whether DOE will impose additional requirements to DOT specifications for HLW shipments.	Stay informed on DOE transportation requirements and provide technical support as needed.	Proposed	Proposed
Approved transportation containers are not developed.	Develop, construct and license casks for immobilized HLW shipments.	ID-1008-WN	Modified

A-3 Technology Development

1. CALCINE IMMOBILIZATION

Issue	Needs	Actions	Milestones	Target Date
No proven immobilization process exists for ICPP HLW				
a. Waste form sampling and QA requirements for final disposal need are not defined.	• Federal repository waste acceptance criteria and programmatic quality assurance requirements or specifications for INEL HLW need to be established.	• Establish R&D resource requirements and complete detailed R&D planning documents.	• Complete process and waste form verification testing to support design of the waste immobilization facility.	2000

Technology Development -- INEL HLW Roadmap Addendum (cont.)

1. CALCINE IMMOBILIZATION (contd)

Issue	Needs	Actions	Milestone	Target Date
b. HLW treatment options have not been fully explored.	• HLW treatment and immobilization options need to be identified and evaluated. • Feasible HLW treatment and immobilization technologies need to be demonstrated. • HLW waste forms need to be verified. • A HLW treatment/immobilization facility needs to be designed, constructed, and operated.	• Justify and secure adequate funding. • Prepare waste acceptance and quality assurance specification and initiate approval process (including HLW containers and shipping requirements). • Test and determine cost/benefit for prospective treatment options. • Develop and verify HLW waste forms. • Develop and verify HLW processing technologies. • Recommend HLW waste forms and process systems to immobilize and prepare HLW for final disposal. • Demonstrate HLW process technologies using non-radioactive component testing to provide design criteria for facility design. • Demonstrate HLW waste forms using radioactive calcine or compound feeds. • Construct and operate the Waste Immobilization Facility to prepare INEL HLW for final disposal.	• Complete demonstration testing to support waste immobilization facility construction. • Complete EIS and issue Record of Decision recommending HLW immobilization technology, waste forms, and processes for final implementation. • Complete construction of waste immobilization facility. • Commence hot operations to immobilize HLW.	2007 2003 2010 2014

Technology Development -- INEL HLW Roadmap Addendum (cont.)

1. CALCINE IMMOBILIZATION (cont.)

Issue	Needs	Actions	Milestone	Target Date
c. Recover calcine from storage bins for final disposal.	• Develop and construct an operational calcine retrieval system.	• Write an F&OR for retrieval system.	Complete feasibility study for bin set #1 retrieval system.	10/94
		• Identify equipment options.	Submit data sheet for bin set #1 retrieval system.	2/95
		• Complete demonstration testing to support recommendations and construction.	Start advanced conceptual design.	1/96
			Initiate title design.	1/97
		• Complete construction of calcine retrieval system.		
		• Begin calcine retrieval.		

Regulatory Drivers: 40 CFR Part 268 (Land Disposal Restrictions), 40 CFR Part 268.5 Case-by-Case Extension, DOE Waste Reduction Policy Statement, 40 CFR Part 265.75 (Waste Minimization), Pollution Prevention Act of 1990, DOE 5820.2A. The Nuclear Waste Policy Act requires that EPA 40 CFR Part 191 and NRC 10 CFR Part 60 apply to ICPP HLW forms. NEPA requires evaluation of all alternatives prior to ROD, INEL AE standards, DOE Order 5400.1.

Technology Development -- INEL HLW Roadmap Addendum (cont.)

2. RADIOACTIVE LIQUID WASTE PROCESSING

Issue	Needs	Actions	Milestones	Target Date
a. Past and current plant processes (including decontamination) generate a waste stream that is difficult to treat by calcination.	• Determine waste acceptance criteria, treatment methods, and disposal form and location for mixed LLW. • Develop and implement alternate methods for treating sodium-bearing liquid waste and mixed LLW.	• Establish criteria for evaluating technologies based on cost, waste minimization, regulatory requirements, and feasibility. • Identify and evaluate candidate technologies. • Perform laboratory and pilot plant tests of treatment methods. • Perform demonstration tests.	• Cease use of tanks WM-182-186. • Cease use of tanks WM-180-181 and WM-187-190. • Establish criteria to evaluate candidate processing and decontamination methods. • Identify candidate and alternative technologies for processing and decontamination.	2009 2015 09/93 09/93
b. Current decontamination methods generate large volumes of waste.	• Develop and implement new decontamination methods to minimize waste generation. • Develop remote decontamination methods to reduce radiation exposure.	• Identify and evaluate alternative decontamination chemicals, methods, techniques, and equipment to minimize waste generation. • Test, recommend, verify, and construct specified equipment. • Perform laboratory testing. • Perform in-plant testing.	• Complete preliminary cold laboratory scoping tests for candidate technologies. • Complete evaluation of candidate technologies. • Complete cold experimental lab tests. • Complete construction or upgrade of subsystem test facilities, process component test facilities, and pilot plants. • Complete testing of selected technologies. • Complete design of Cold Integrated Test Facility. • Complete construction of Cold Integrated Test Facility Modules.	09/93 06/94 06/94 09/95 06/97 10/97 09/98

Regulatory Drivers: Consent order to State of Idaho Notice of Noncompliance 1090-1-24-6601, 40 CFR 268, 40 CFR 262, NEPA, 40 CFR 265.75, DOE 5400.1, DOE 5400.3, DOE 5820.2A, DOE-ID-10333.

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Technology Development -- INEL HLW Roadmap Addendum (cont.)

3. HEPA FILTER PROCESSING

Issue	Need	Action	Milestone	Target Date
a. Dispose of HEPA filters.	• Develop criteria for sampling and disposal. • Develop and implement treatment of HEPA filters for disposal.	• Determine what constitutes a representative sample. • Determine criteria for disposal form, content, and location. • Conduct hot tests of HEPA Filter Leaching System. • Evaluate alternative disposal technology, i.e., dissolution or compaction. • Modify an existing facility.	• Complete conceptual design for filter leach system. • Complete advanced conceptual design for filter leach system. • Complete NEPA documentation. • Start construction of filter leach system. • Complete S. O. testing. filter leach system.	09/93 09/94 09/94 01/96 09/97

Regulatory Drivers: 40 CFR 268, 40 CFR 262

Technology Development -- INEL HLW Roadmap Addendum (cont.)

4. SAMPLING & ANALYSIS

Issue	Needs	Actions	Milestones	Target Date
Some ICPP HLW solids and solutions are so highly radioactive that present day requirements for sampling and analysis cannot be met, i.e., hands-on, volume, procedures.	• Develop sampling methods for organics and RCRA constituents for highly radioactive waste (solids & solutions) that meet RCRA and ALARA requirements. • Develop analytical methods for organics and RCRA constituents for highly radioactive waste (solids & solutions) that meet RCRA and ALARA requirements. • Develop methods for remote sampling. • Establish sampling criteria and methods for immobilized waste.	• Continue R&D of analytical and remote sampling of methods for HLW to meet regulatory requirements. • Expand/modify the existing ICPP RAL and the Analytical Laboratory to provide increased capability to characterize HLW and develop remote sampling methods.		

Regulatory Drivers: 40 CFR 261, 40 CFR 264, 40 CFR 264, 40 CFR 265, 40 CFR 268, 40 CFR 270, 40 CFR 272, SW-846, DOE Order 5820.2A, DOE Order 6430.1A

Technology Development -- INEL HLW Roadmap Addendum (cont.)

5. OTHER This category addresses technology development needs directly related to HLW treatment, storage, and disposal.

Issue	Needs	Actions	Milestones	Target Date
a. Off-gas treatment may be necessary to remove toxics from the MWCF stack.	• Develop and implement off-gas sampling and treatment methods to remove toxic contaminants.	• Develop sampling equipment and techniques. • Perform RCRA characterization of stack off-gas. • Evaluate if emission levels require treatment.		
b. Non-aqueous processes are not developed to condition spent fuel (i.e., remove fissile material) for receipt at a federal repository.	• Evaluate the feasibility of recovery of fissile material and other isotopic byproducts from spent fuel to reduce or eliminate long term criticality risks at a federal repository.	• Complete a preliminary performance assessment (waste repository/regulations, WAC). • Evaluate candidate technologies.	• Issue Draft Waste Acceptance Specifications document.	09/93

Regulatory Drivers: Nuclear Waste Policy Act, DOE Order 5820.2A, 40 CFR 261, 40 CFR 264, 10 CFR 60, 40 CFR 191.

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