

INEL Implementation of Waste Acceptance Criteria Under the Federal Facility Compliance Act

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INTRODUCTION

To comply with Section 3021(b) of the Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.) and the Federal Facility Compliance Act (P.L. 102-386), the U.S. Department of Energy (DOE) has evaluated the entire inventory of mixed waste at 40 DOE and naval facilities throughout the United States. This evaluation has identified a significant lack of both treatment capability and capacity at a majority of the sites. The only sites with sufficient capability and capacity to treat DOE's mixed waste are the larger DOE facilities, such as the Idaho National Engineering Laboratory (INEL). The INEL has been identified as a site that has the potential to treat mixed waste for 20 DOE sites.

The DOE Idaho Operations Office (DOE-ID) and the State of Idaho have negotiated an agreement concerning the treatment of both INEL and off-site mixed wastes. The acceptance of off-site waste has been a major issue in these negotiations. In anticipation of this issue, the INEL imposed several assumptions on off-site mixed waste in its Proposed Site Treatment Plan (STP). The assumptions exist as specific obligations that must be met by the off-site DOE facility (generator and/or shipper) regarding transportation, storage and treatment, and eventual waste residue disposition. These assumptions will be addressed within the INEL's Memorandum of Agreement with the off-site facilities.

Implicit in the assumptions imposed on off-site waste shipments is the requirement that the entire process proceed in a logical sequence. The waste acceptance process follows three distinct steps: administration, characterization, and packaging and shipping. Administration includes a negotiation of waste acceptance involving the State of Idaho and the individual off-site generator. Characterization involves initial evaluation of the waste for potential treatment at the INEL, followed by final evaluation of the waste to determine whether it meets the INEL's site-wide waste acceptance criteria (WAC). The application of the INEL's WAC at the characterization stage of the process

imposes uniform criteria on all waste. This approach avoids the generation of multiple WACs based on the specific characteristics of the mixed wastes to be shipped from a particular site. Accordingly, the final step in this process, packaging and shipping, must comply with the regulation and guidelines established by the various governmental authorities and must also reflect the administrative and characterization requirements imposed by the INEL's WAC.

SITE HISTORY MISSION

The INEL was established in 1949 as the National Reactor Testing Station to build, test, and operate nuclear reactors, support facilities, and equipment and, thereby, demonstrate a safe use for atomic power in the generation of electric power. Prototypes for the Nation's major commercial power reactors were first built at the INEL. The INEL has developed the world's largest and most diverse collection of reactors including research, testing, power, and ship propulsion reactors.

The INEL's current mission is to develop, demonstrate, and deploy advanced engineering technology and systems to improve the United States' competitiveness and security, to support the efficient production and use of energy, and to enhance the world-wide quality of life and environment. For more than 45 years, the INEL has made strong technical contributions to energy availability; waste management; environmental restoration; defense systems; and reactor safety, research, and testing.

An inherent part of INEL's mission is to conduct all activities in compliance with applicable environmental, health, and safety laws. Consistent with the laboratory's charge as an environmental research and engineering institution, the INEL places special emphasis on applied research and technology development.

OFF-SITE MIXED WASTES IDENTIFIED FOR TREATMENT AT THE INEL

During DOE's complex-wide planning process, the INEL was designated as having treatment capacity for off-site wastes. The DOE Options Analysis Team, formed to augment the complex-wide site treatment planning process, identified numerous DOE sites that anticipate negotiated agreements with the INEL for off-site treatment of their wastes (DOE 1991). In addition, the INEL has conducted a preliminary evaluation of those waste streams and determined them to be compatible with the INEL treatment capability. Table 1 lists those sites and the waste volumes identified as being appropriate for the treatment technologies available at the INEL. As stated earlier, it should be emphasized that all wastes slated for off-site treatment at the INEL will be subject to the final WAC.

The threshold assumptions implicit in the mixed waste acceptance and transportation criteria developed to evaluate candidate waste streams for treatment at the INEL include:

Table 1. Off-site Waste Volumes Proposed for Treatment at the INEL.

Generator Site Name	Total Volume (m ³)
Bettis Atomic Power Laboratory	13.8
Brookhaven National Laboratory	0.075
Charleston Naval Shipyard	5.96
Energy Technology Engineering Center	16.7
General Atomics	9.37
Knolls Atomic Power Laboratory - Kesselring	10.15
Knolls Atomic Power Laboratory - Windsor	7.05
Knolls Atomic Power Laboratory - Schenectady	12.45
Lawrence Berkeley Laboratory	12.72
Lawrence Livermore National Laboratory	165.94
Los Alamos National Laboratory	381.19
Mare Island Naval Shipyard	34.03
Norfolk Naval Shipyard	9.75
Pearl Harbor Naval Shipyard	0.12
Portsmouth Gaseous Diffusion Plant	22.55
Puget Sound Naval Shipyard	18.95
Rensselaer Polytechnic Institute	5.49
Rocky Flats Plant	157.18
Savannah River Site	2.22
University of Missouri	4.95

- Concentrations of specific contaminants within waste streams will be identified and will satisfy the INEL WAC.
- Before transport, waste stream components not scheduled for treatment at the INEL will be segregated from the wastes shipped.
- Ash resulting from incineration will be characterized to determine the appropriate disposal location.
- The residue from all off-site mixed wastes treated at the INEL will be returned to the generator for disposal.
- Although packaging specifications for waste treated at the INEL have not been established, they will be addressed as the final step in the treatment process.

Figure 1 provides a flow diagram of the INEL's consolidated WAC for off-site waste.

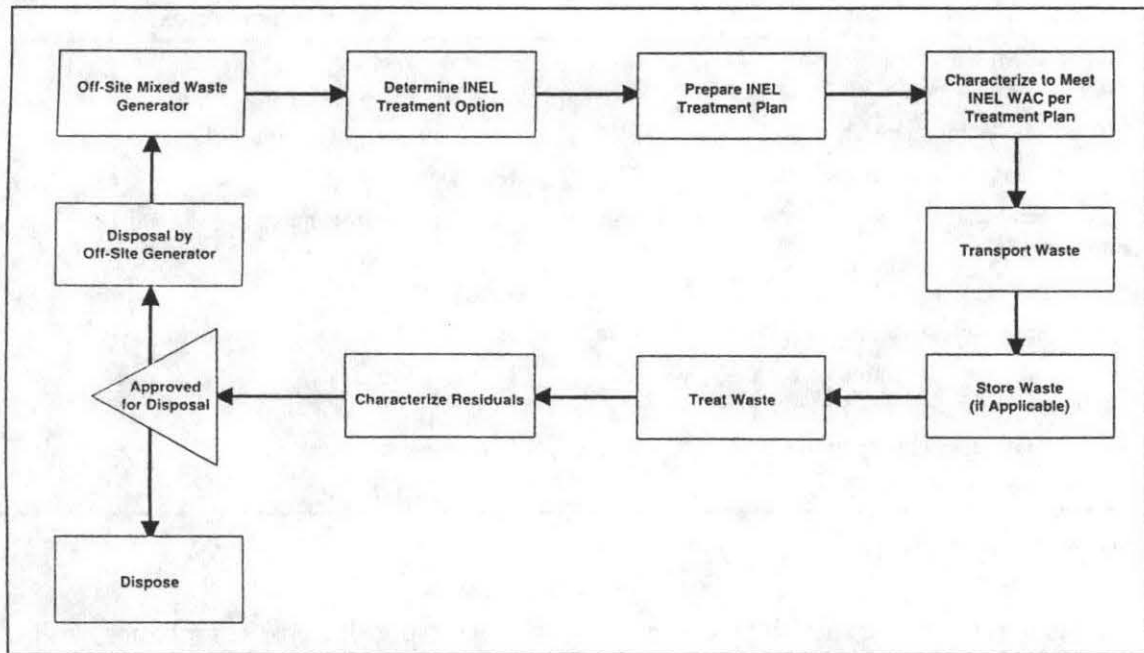


Figure 1. Flow Diagram for WAC.

TREATMENT TECHNOLOGIES

Treatment technologies for mixed waste, when deployed either alone or in combination, must destroy, remove, or immobilize the hazardous component(s) of the waste. In general, mixed waste treatment technologies resemble RCRA hazardous waste treatment technologies; however, the former must not only capture the radioactive contaminants but also shield against the radioactive emissions associated with the contaminants.

Numerous mixed waste treatment technologies have been identified for potential application within the DOE complex. Table 2 identifies INEL facilities and the associated treatment methods available for the various off-site waste matrices. Figure 2 lists the technologies that are associated with each treatment unit identified in Table 2.

Table 2. Proposed INEL Treatment Facilities.

INEL Treatment Facility	Waste Matrix
Advanced Mixed Waste Treatment Project (Adv. MWTP) - Amalgamation	Elemental Mercury
Adv. MWTP - Incineration	Liquid and Solid Organic Debris
Adv. MWTP - Macroencapsulation	Metal Debris
Idaho Chemical Processing Plant - Debris Treatment and Containment	Inorganic, Heterogeneous, and Metal Debris
Sodium Process Facility	Reactive Metals
Waste Experimental Reduction Facility - Incineration	Liquid and Solid Organic Debris
Waste Reduction Operations Complex (WROC) - Amalgamation	Elemental Mercury
WROC - Deactivation-Neutralization	Liquid Characteristic Waste
WROC - Retort	Mercury Debris

TRANSPORTATION

Each generator and transporter to the INEL will be responsible for compliance with all pertinent DOE, DOE-ID, U.S. Environmental Protection Agency (EPA), U.S. Department of Transportation (DOT), U.S. Nuclear Regulatory Commission, tribal and affected states' regulation of the packaging and shipment of off-site mixed wastes. For the convenience of off-site and INEL generators, the INEL has established the Traffic Management Organization. This organization has the responsibility to coordinate shipments of waste on site and off site for all INEL storage and treatment facilities.

The INEL has evaluated the DOT's transportation and packaging requirements for storage and treatment at DOE facilities to prepare the INEL's comprehensive packaging requirements. For nonstandard packaging, INEL will consider the waste on a case-by-case basis.

WASTE ACCEPTANCE

A common practice evolved at many DOE sites that permitted a large volume of mixed waste to be stored, often without the documentation or identification mandated by current law. Further, treatment facilities and technologies have not received adequate oversight, funding, or research and development to address this practice. Consequently, the cost to remediate has escalated. Under law, much of the waste must now be identified, retrieved, often repackaged, sorted, and labeled prior to the required treatment and disposal.

In contrast, the WAC to be implemented at the INEL will require a generator to meet the criteria for each individual shipment to gain acceptance and receive treatment, storage, and disposal (TSD) at any INEL facility. This process entails far more than simply combining several individual facility documents into one format. The INEL

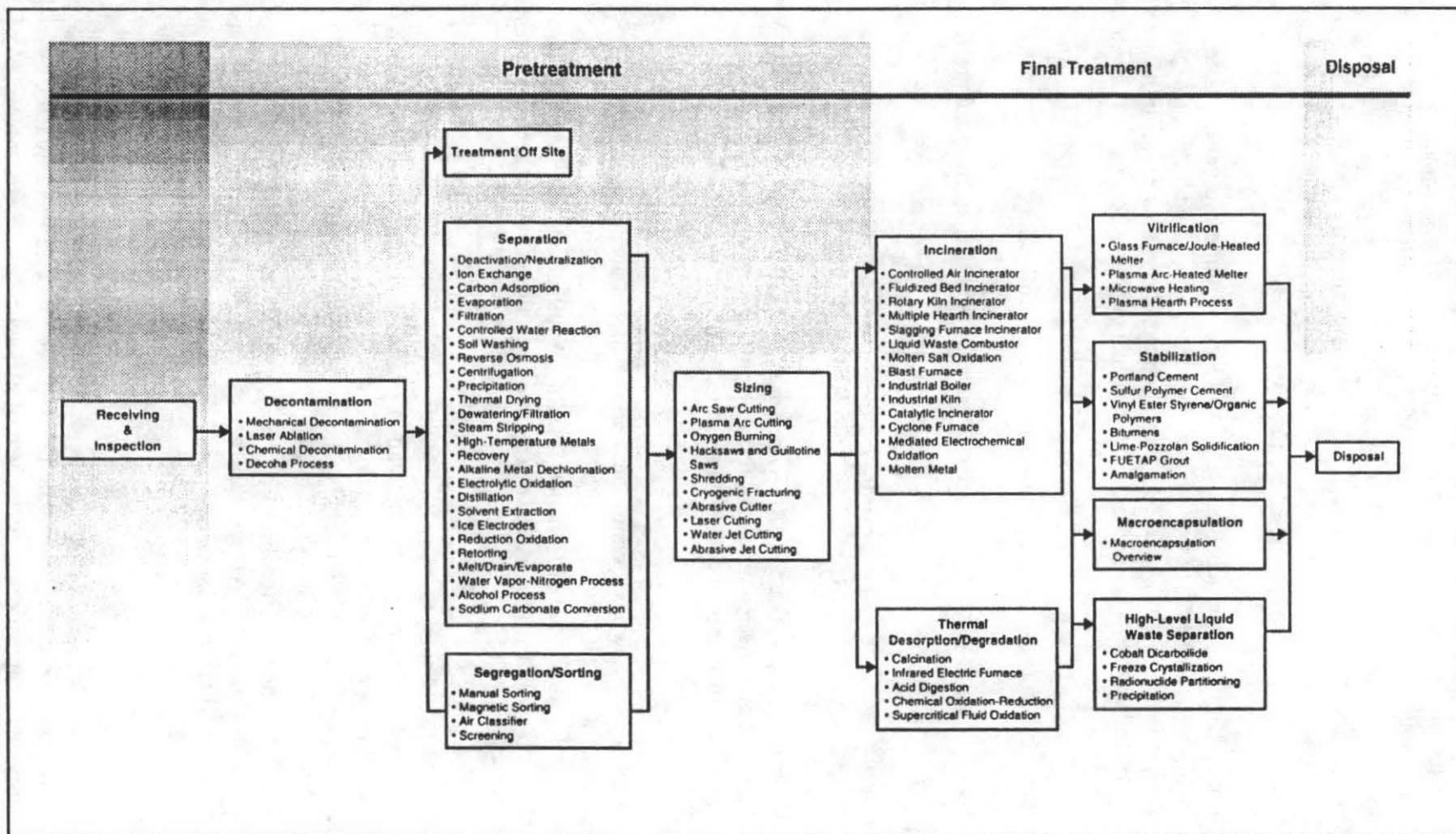


Figure 2. Treatment of Alpha-MLLW and MTRU Waste at the Advanced Mixed Waste Treatment Project (Adv. MWTP) and Waste Engineering Development Facility.

WAC mandates the coordination of TSDs and a streamlining of the waste treatment steps: identifying, sorting, selecting treatment methods, treatment, packaging, shipping, and disposal. In this consolidated WAC, the first steps are to identify the wastes (volumes, forms, and contents), their present status (stable vs. leaking), the needed treatment(s) (whether one or more facility or application may be needed) and their sequence, the status of the treated waste at each step in the application, the final form of the treated waste, and its disposal destination.

By design and intent, the comprehensive INEL WAC will require the generator to characterize all of the described steps, the costs, sequence, and schedule prior to the shipment of off-site wastes. This "cradle-to-grave" approach ensures realization of the goals of efficient handling, cost minimization, and a reduction in the risk of hazardous waste and radiation exposure during the process.

The administrative criteria for the INEL WAC include the following:

- Budgeting for all costs necessary to package and deliver materials to the INEL.
- Ensuring that the material form, package, and documentation adhere to the waste-specific criteria.
- Ensuring quality assurance (QA) requirements have been met before transport and the requirements of any applicable transport plan or certificate of compliance are adhered to before shipment.

The QA of the INEL WAC will be controlled and conducted according to the applicable requirements of DOE Order 5700.6C, "Quality Assurance," and NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications" (ASME 1994). The quality plan will establish a basis for discrepancy resolution, waste certification, and audits.

Specific characterization requirements will also be reflected in the waste-specific WAC. The two basic methods of characterization available are (1) process knowledge, including standard protocols for sampling and laboratory analysis that are not specifically RCRA-based methods and equivalent agency-approved methods; and (2) specialized RCRA sampling and analysis for some RCRA-regulated materials. The Material and Waste Characterization Form (Form ID F-669) and the Shipment Request and Certification (Form ID F-669A) meet all the requirements for material and waste profiling for waste acceptance at the INEL.

SUMMARY

Forty DOE sites, in a nation-wide effort to comply with environmental mandates, have submitted STPs to their respective states and/or the EPA. Due to the absence of complex-wide treatment capacity and need for cost efficiency, the STPs reference off-site mixed waste treatment as the optimal solution for certain waste matrices. The

transportation of these wastes must comply with various environmental, health and safety, nuclear safety, and transportation safety requirements. In addition, before shipment, the wastes must meet requirements, known as WACs, established by the treating facility. This paper summarizes the INEL's response to this compliance program by describing the consolidated WAC proposed for all off-site waste that has the INEL as selected treatment option. This paper includes an identification of off-site waste streams, their volumes, the generator sites, and treatment selections. The proposed streamlining and coordination are highlighted to focus on the efficiency and efficacy of the consolidated WAC. Finally, the INEL's WAC and the associated schedules are referenced to demonstrate an optimized version of DOE's mixed waste treatment planning process.

REFERENCES

American Society of Mechanical Engineers. NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications" (1994).

Public Law (P.L.) 102-386, Section 105, "Federal Facilities Compliance Act of 1992" (1992).

United States Code, 42 USC § 6901 et seq., "Resource Conservation and Recovery Act" (1988).

U.S. Department of Energy. Order 5770.6C, "Quality Assurance" (1991).