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MOUND APPLIED TECHNOLOGIES

Draft Site Treatment Plan

for the Mixed Wastes

at the Mound Facility Miamisburg, Ohio

Background and Plan Volumes

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DRAFT SITE TREATMENT PLAN

BACKGROUND VOLUME

for the

Mixed Wastes

at

Mound Facility

Miamisburg, Ohio

August 24, 1994

1.0 INTRODUCTION

1.1 Purpose and Scope

The Department of Energy (DOE) is required by section 3021(b) of the Resource Conservation and Recovery Act (RCRA), as amended by the Federal Facility Compliance Act (FFCAct or the Act), to prepare Site Treatment Plans (STP's or Plans) describing the development of treatment capacities and technologies for treating mixed radioactive and hazardous waste. The plans will be submitted to the Ohio Environmental Protection Agency (OEPA) for approval, approval with modification, or disapproval. The Mound Facility Draft Site Treatment Plan (DSTP or Draft STP) is the intermediate version of the plan required by the Act and is being provided to the EPA, the U.S. Environmental Protection Agency (USEPA) and others for review.

STPs are required for facilities at which DOE generates or stores mixed waste, defined by the FFCAct as waste containing both a hazardous waste subject to the Resource Conservation and Recovery Act, and a source, special nuclear or by-product material subject to the Atomic Energy Act of 1954 (42 U.S.C. 2011 *et seq.*). On April 6, 1993, DOE published a Federal Register notice (58 FR 17875) describing its proposed process for developing the STP in three phases, including a Conceptual STP, a Draft STP, and a Final Proposed STP. The purpose of this Draft Plan is to identify the currently preferred options for treating the mixed waste at Mound Facility or for developing treatment technologies where technologies do not exist or need modification. The Draft Plan reflects the site-specific preferred options, developed with the State's input and based on existing available information. The options reflect the "bottoms-up" approach and have not been completely evaluated for impacts on other DOE sites and impacts to the overall DOE program. Therefore, changes in the preferred option and associated schedules are possible between the Draft Plan, the Final Proposed Plan, and final approval and issuance of the Order as evaluation of DOE-wide impacts and State-to-State discussions progress.

To the extent possible, the Draft Plan identifies specific treatment facilities for treating the mixed waste and proposes schedules as set forth in the FFCAct. When not possible, schedules for alternative activities such as waste characterization and technology assessment are provided as appropriate. All schedule information presented is preliminary and is subject to change. For new facilities, the schedule is heavily dependent upon decisions made during the design phase and is contingent on funding availability. Assumptions and professional judgments related to the type of treatment technology, location of the treatment facility, contracting mechanism, project approval process, cost, etc. were used to develop the estimated schedule. Any variation from these assumptions will impact the estimated schedule. In addition, cost data used in developing options and schedules and provided in the Draft Plan are planning estimates only and do not reflect a commitment of budgetary resources.

Emerging or new technologies not yet considered may be identified in the future that provide opportunities to manage waste more safely, effectively, and at lower cost than the current technologies identified in the Draft Plan. Working closely with regulators and other interested parties during the implementation of the Draft Plan, DOE will continue to evaluate and develop technologies that offer potential advantages in the areas of public acceptance, risk abatement, and performance and life cycle cost. Should more promising technologies be identified, DOE may request a modification of its treatment plan in accordance with provisions of the final Site Treatment Plan and/or the Order.

The Draft Site Treatment Plan reflects the results of discussion among states, EPA, DOE and others based on the Conceptual Site Treatment Plan submitted to the Ohio EPA in October 1993. The Conceptual Plan presented treatment needs, capabilities, and preliminary options for treating the mixed waste at Mound Facility. The DSTP narrows the broad range of options presented in the Conceptual STP and presents Mound Facility preferred option for treatment of each waste stream. The Conceptual STP is available at Mound Facility's public reading room located at Miamisburg Senior Adult Center Public Reading Room, 305 Central Ave., Miamisburg, Ohio.

This "Background Volume" is one of two volumes that constitute the Draft Site Treatment Plan and provides a detailed discussion of the preferred option or options, including identification of the waste streams the option addresses. It provides the background and explanatory information for the "Plan Volume" which identifies the capacity to be developed and the schedules as required by the Act.

1.2 Site History and Mission

Mound Facility, located in Miamisburg, Ohio, about 16 km. Southwest of Dayton, is operated by EG&G Mound Applied Technologies for DOE. Since 1947, Mound's mission has been the development of processes for the nuclear weapons program, production of non-nuclear components for nuclear weapons, and diagnostic testing of explosive and nuclear components. Other programs include the manufacture of stable isotopes for research, the development and manufacture of small chemical heat sources for the defense program, recovery and purification of tritium from scrap materials, and the development and fabrication of heat sources fueled by plutonium-238 to provide power for satellites and spacecraft. With the DOE consolidation of non-nuclear manufacturing, the current mission assignment for Mound is changing to include clean-up of contaminated buildings and land along with commercial economic development of the site. Mound Facility has 120 buildings on 1.24 square km of land.

1.3 Framework For Developing DOE's Site Treatment Plans

RCRA Land Disposal Restriction (LDR) Requirements require the treatment of hazardous waste (including the hazardous component of mixed waste) to certain standards before land

disposal, and prohibit storage of hazardous wastes that do not meet LDR standards, except for the purposes of accumulating sufficient quantities to facilitate proper recovery, treatment, or disposal of the waste. DOE is currently storing mixed waste inconsistent with the LDR provisions because the treatment capacity for such wastes, either at DOE sites or in the commercial sector, is not adequate or is unavailable at this time.

The Federal Facility Compliance Act, signed on October 6, 1992, waives sovereign immunity for fines and penalties for RCRA violations at Federal facilities. However, a provision postpones that waiver for three years for mixed waste LDR storage prohibition violations at DOE sites and requires DOE to prepare plans for developing the required treatment capacity for all the mixed waste at the site. Each plan must be approved by the State or EPA, after consultation with other affected states and consideration of public comment, and an order issued by the regulator requiring compliance with the plan. The Act further provides that DOE will not be subject to fines and penalties for LDR storage prohibition violations for mixed waste as long as it is in compliance with an approved plan and order.

The Act requires the plans to contain schedules for developing capacity for mixed waste for which identified treatment technologies exist, and, for mixed waste without an identified existing treatment technology, schedules for identifying and developing technologies. The Act also requires the plan provide certain information where radionuclide separation is proposed. The Act states the plans may provide for centralized, regional or on-site treatment of mixed waste, or any combination thereof, and requires the states to consider the need for regional treatment facilities in reviewing the plans.

The "Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site" was published April 6, 1993, in the Federal Register (58 FR 17875). In the Notice, DOE committed to providing the site treatment plans in three phases: a "conceptual plan" completed in October 1993, a "draft plan" no later than August 1994, and a "final proposed plan" no later than February 1995. This process provides opportunity for early involvement by the States and other stakeholders to discuss technical and equity issues associated with the plans.

The Conceptual STP, submitted last October, focused on identifying treatment needs, capabilities, and options for treating the site's mixed waste. This **Draft STP** focuses on preferred options for treating the site's mixed wastes, wherever possible, as well as proposed schedules for constructing capacity. **The Final Proposed STP** will be submitted to the regulatory agency for review and approval, approval with modification, or disapproval, as required by the Act. Each version of the STP will reflect state equity discussions, as well as site-specific input from the individual regulatory agency and other interested parties on the previous submittal. It is DOE's intent that this iterative process, with ample opportunity for input and discussion, will facilitate **approval of the STP and issuance of the compliance order**

required by the Act. DOE's goal is to have all plans and orders in place by October 1995.

1.4 DSTP Organization

Mound Facility's DSTP follows the same format as the DSTP's of the other DOE sites to facilitate cross-site comparisons. The DSTP is organized in two separate, but integrated, volumes: Volume One, the "Background Volume," provides the more detailed discussion of the options, containing information on the waste streams and treatability groups a particular treatment option or options would address, a description of the preferred option and uncertainties associated with that option, as well as the budget status of the option, and regulator and stakeholder input. Volume Two, the "Plan Volume," is a short, focused document identifying the preferred options and schedules for implementing the options and is intended to contain all the information required by the FFCAct. The Plan Volume also contains a mechanism to implement the Plan and milestones to be enforced by the Order. It references, but does not duplicate, details on the option in the Background Volume.

Both Volumes contain relevant introductory material. The Background Volume contains general information on the DSTP and the site in section 1.0 and provides top-level assumptions and a description of the framework used to determine the preferred option in section 2.0.

Sections 1.0 and 2.0 of the Plan Volume propose certain administrative provisions appropriate for the implementation of the plan when finalized. These include provisions such as the approach to setting milestones, updates to the Plan, additions or removals to waste streams covered by the Plan, and funding considerations. These sections are intended to initiate discussion; it is expected that the specific language will be developed in conjunction with the regulator, as would the specific milestones proposed in the Final Proposed STP to be submitted by February 1995. As negotiations on the Final Plan and Order move forward, the Plan for some sites may eventually be expanded to address other administrative provisions; at other sites, some or all of these provisions may be incorporated into a separate consent order.

Sections 3.0 through 5.0 discuss the preferred option or options for low-level mixed waste, mixed transuranic waste, and mixed high-level waste, and are parallel in both volumes. The Background Volume discusses the waste streams, technology needs, and uncertainties and other preferred options. In the Plan Volume, these sections include proposed schedules required under the Act.

Three additional sections are included in the Background Volume that are not included in the Plan Volumes because they are not required by the Act nor are compliance-related.

Section 6.0 discusses mixed wastes expected to be generated in the future to assist in anticipating treatment needs. These waste streams will be incorporated into the Plan Volume and treatment

approaches and schedules developed when the wastes are generated.

Section 7.0 discusses storage capacity needs and how compliant storage will be provided for mixed wastes pending treatment.

Section 8.0 describes a process being followed by DOE for evaluating options for disposal of treatment residues. Although the Act does not require disposal to be covered in the Plans, DOE is including disposal information to be responsive to the States' request and to support equity discussions. Section 8.0 identifies whether Mound Facility is being considered as a disposal site and provides an explanation.

All sites' DSTP's contain a discussion of the options selection in "Appendix A." For each option, the Appendix describes how options from the CSTP were evaluated and why the preferred option or options was selected.

1.5 Related Documents

Other DOE efforts are closely linked to the STP development. These include the Mixed Waste Inventory Report; activities conducted pursuant to the National Environmental Policy Act (NEPA); and compliance and cleanup agreements containing commitments relevant to treatment of mixed waste.

Mixed Waste Inventory Report

The Mixed Waste Inventory Report, required by the Act, provides an inventory of all mixed waste stored or generated, or expected to be generated over the next five years, at each DOE site, and an inventory of treatment capacities and technologies. The Interim Mixed Waste Inventory Report, published by DOE in April of 1993, provided information on a waste stream-by-waste stream basis for each DOE site that generates or stores mixed waste. DOE made updated waste stream and technology data available to the States and EPA in April and May of 1994 and is preparing an Updated Mixed Waste Inventory Summary. The summary represents the best record of DOE's mixed waste inventory at the beginning of 1994.

NEPA Activities

The Programmatic Environmental Impact Statement for Environmental Restoration and Waste Management

DOE is preparing a Programmatic Environmental Impact Statement (PEIS) to support complex-wide integration of environmental restoration, waste management, and technology development

activities that are now often implemented on a site-by-site basis. The PEIS is intended to present to the public, states, EPA, and DOE an understanding of impacts to human health and the environment together with the costs associated with a wide range of alternative strategies for managing the Environmental Management (EM) program. The PEIS is examining all waste types and activities, including impacts associated with mixed waste treatment, which is addressed by the STP process as well.

Development of the EM PEIS is being coordinated with the preparation of the Plans under the FFCAct. Draft information being generated to support the PEIS (e.g., hypothetical configurations, preliminary risk analyses, and cost studies) is shared with states in support of Plan discussions. The draft PEIS will not identify a preferred alternative (i.e., configuration) for mixed waste facilities since this will be evolving in consultation with the states and EPA through the STP process. However, the PEIS analyses of potential environmental risks and costs associated with a range of possible waste management configurations will provide valuable insight as the public, states, and DOE discuss using existing facilities and/or possible location of future mixed waste facilities.

The PEIS is being prepared in conjunction with the Plans to meet the requirements of the National Environmental Policy Act (NEPA) and the FFCAct. The PEIS is scheduled to be published in the fourth quarter of 1994. The final PEIS will be issued after the public comment period, at or near the time of submission of the final STP's to the states or EPA for approval. To remain flexible and accommodate potential changes after submittal of the final STP's to the states and EPA, the Record of Decision for the PEIS will be issued after approval of the Plans by the appropriate regulatory agency.

Mound Facility Final Environmental Impact Statement

The Final Environmental Impact Statement for Mound Facility was published June, 1979 as DOE/EIS-0014. The existing environmental setting was described and the cumulative impact of Mound's mission was evaluated. The EIS concluded that normal plant operations produce no significant offsite air or water pollution and have only a minor impact on the local areas land use by reason of the removal of the plant site from marginal agricultural or residential use. The impact of nuclear operations is that tritium levels have increased in well water in the plant vicinity. A remedial program of induced infiltration has reduced these to acceptable levels. The only appreciable quantity of plutonium-238 found off-site is confined to one localized area in the abandoned Miami-Erie Canal adjacent to the West boundary of the plantsite. This deposition resulted from an onsite underground radioactive waste line break in 1969.

All land ultimately could probably be returned to its original condition for long-term unrestricted use without any residual environmental effects. However, the permanent construction of major buildings does not make such an action feasible from an economic point of view. Likewise, the

costs estimated for decontamination in order to release the facilities for unrestricted use may prove to be quite substantial. Environmental studies are continuing as part of Mound's monitoring, surveillance and environmental protection program. These are published annually.

Compliance Agreements

Mound Facility was placed on the CERCLA (i.e. Superfund) National Priorities List (NPL) in November 1989. Pursuant to that status, a CERCLA Section 120 Federal Facility Agreement (FFA) was signed between DOE and US EPA (EPA Administrative Docket Number OH6 890 008 984). The FFA became effective October 12, 1990. On July 15, 1993 the State of Ohio entered into the agreement by signing the document. The FFA contains both the procedural and substantive requirements for Remedial Investigation/Feasibility Study (RI/FS) work. The RI/FS process at Mound follows the methodology that the Superfund program has established for characterizing the nature and extent of risks posed by uncontrolled hazardous waste sites and for evaluating potential remedial options.

Assessment and possible remediation of Mound Facility will be completed in a comprehensive manner and will be enhanced by the division of the facility into operable units. Each operable unit has a schedule outlining the enforceable agreement milestones which have been approved by the regulatory agencies. The FFA specifies and stipulates fines or penalties that could result if milestones are missed.

2.0 METHODOLOGY

2.1 Assumptions

In order to provide a degree of commonality and consistency in the preparation of the DSTP's, the following assumptions were used.

1. Regarding defense related TRU Waste, the DSTP's should reflect DOE's current strategy that the Waste Isolation Pilot Plant (WIPP) will open and receive a No Migration Variance. The DSTP's should identify characterization, processing, and treatment of TRU waste to meet the WIPP Waste Acceptance Criteria. Consistent with this policy, treatment of mixed TRU waste to meet Land Disposal Restriction (LDR) standards should not be included in the DSTP's at this time.

   However, the STP's will recognize that DOE's policy regarding WIPP is under review and may change in the future. As such, the STP's will contain the flexibility to modify activities and milestones regarding TRU waste to reflect potential future changes in DOE policy.

   Under current DOE policy, non-defense related TRU waste will not be disposed of at WIPP. As such, the DSTP's should reflect LDR treatment of non-defense mixed TRU waste.

2. DOE recognizes some states' preference for treatment of all wastes on-site. Where appropriate, existing on-site capacity will be utilized before new facilities are constructed. When on-site treatment or use of commercial or mobile facilities is not practicable, the use of existing off-site capacity, as well as the construction of new facilities, will be considered.

3. Sites in the same state will investigate the practicality of consolidated treatment facilities.

4. Mixed waste resulting from Environmental Restoration (ER) and Decontamination and Decommissioning (D&D) activities will be factored into planning activities and equity discussions, particularly where utilization of facilities identified in the DSTP's are being considered for managing ER and D&D waste.

5. The DSTP will address all wastes in the updated Mixed Waste Inventory Report (MWIR). Any changes/corrections to the MWIR waste stream and treatment facility

information will be explained in the DSTP.

6. On a volume basis, the large majority of DOE's mixed waste will be treated on-site. Because of transportation concerns and costs, this generally includes process waste water, and some explosives and remote-handled wastes. In addition, other large volume waste streams will generally be treated on-site. At a minimum, Richland (RL), Oak Ridge (OR), Idaho (ID) and Savannah River (SR) will have on-site facilities to treat the majority of their wastes.

7. The Programmatic Environment Impact Statement (PEIS) is being performed in parallel with the development of the STP's. The DSTP process will provide information to the PEIS. The PEIS fulfills the National Environmental Policy Act (NEPA) requirements for development and submittal of the STP's. In general, no additional NEPA documentation will be needed to support development and submittal of the STP's. However, each site will prepare the necessary specific NEPA documentation before proceeding with a given project or facility identified in the STP.

8. The Environmental Management Programmatic Environmental Impact Statement (PEIS) is being prepared in parallel with the development of the STPs. The DSTP process will provide information to the PEIS Each site will prepare any necessary specific NEPA documentation before proceeding with a given project or facility ordered by the State or EPA as a result of the STP process.

2.2 Preferred Option Selection Process

DOE prepared several guidance documents to assist the sites in working through treatment identification and selection of preferred options. The overall process is contained in the *Draft Site Treatment Plan Development Framework* (DSTP Framework). The DSTP Framework establishes common terminology, objectives and values, planning assumptions, and recommended methodology for narrowing the alternatives presented in the Conceptual STP. The *Treatment Selection Guides* provides information on how to select among treatment alternatives by allowing comparisons based on fundamental criteria such as regulatory compliance, environmental health and safety, treatment effectiveness, implementability, stakeholder concerns, life-cycle costs, and technology development. DOE/AL created the Treatment Selection Team (TST) to augment site resources. The Treatment Selection Team was made up of representatives from throughout the DOE/AL.

The team visited Mound to collect information on waste and site capabilities. Waste data was recorded and the waste categorized with common treatment approaches. Information was also gathered for off-site treatment capacity, treatment technologies, and regulations affecting

treatment.

Alternate treatment options were rated for each waste group using the following criteria:

- meet LDR standards and all other regulations, be permittable, and be acceptable to the public;
- treatment must be safe to workers, the public, and the environment;
- minimize risk and show high potential for being implemented in a timely, cost effective manner;
- should be simple, reliable, and easy to implement and operate;
- should be scalable to meet expected volumes;
- volume and toxicity of secondary waste should be minimized and not preclude treatment for final disposition.

Treatment options that rated high or for which there were no practical alternatives were used to formulate the plan of action to create sufficient treatment capacity for the waste. The five Ohio DOE sites have also worked together to use a consistent approach for technology evaluation.

2.3 Coordination with Regulatory Agencies and Other Stakeholders

The Act offers an opportunity for DOE and the state regulators to work cooperatively toward defining mixed waste treatment options, with the states having the key role of approving DOE's STP's. As requested by the states, early in the DOE/state dialogue, DOE signed a cooperative agreement (August 1993) with the National Governor's Association (NGA) to facilitate the DOE-to-State interactions. The Act requires public involvement activity for a review and comment period to be held by the states on the STP's after the Final Proposed Plans are submitted in February, 1995. To date, the NGA has facilitated national meetings between DOE, the states, and the Indian Nations to discuss the development of the STP's. Two working groups have been formed to discuss technical issues related to treatment and disposal of mixed waste.

DOE is using existing public involvement mechanisms for review and awareness of specific issues related to the Act. DOE presented information to the Environmental Management Advisory Board (EMAB) and will continue to provide dialogue with the EMAB as the STP's are developed. Other national level stakeholder involvement will be conducted as appropriate during development of the STP's.

Mound has held meetings with stakeholders on January 27, 1994, March 10, 1994, April 14, 1994, May 12, 1994 and June 7, 1994. The meetings have been used to provide information about the FFCAct and its requirements, the Mixed Waste Inventory Report and a variety of possible treatment technologies. Information on treatment technologies was presented by subject

matter experts. The date and time for each meeting is published in local newspapers several times. The public relations department at Mound maintains a mailing list of all interested parties. Each party is sent notices of upcoming meetings along with agendas and summaries of technology information to be presented. Forms are provided and comments requested at every meeting. To date, no written comments have been received.

2.4 Characterization of Mixed Wastes

To be categorized into the proper treatability group, each waste stream must be characterized either by process knowledge or analysis or a combination of both. In cases where insufficient data exists, steps are outlined in the CSTP logic diagrams contained in Appendix C to provide this data. The first and most difficult step in the process is the design and fabrication of the facility to open the waste containers and remove representative sample aliquots. The design work on this facility is being prepared by Mound Plant Engineering. Once this project is completed, the characterization can proceed.

2.5 Mixed Waste Minimization

Mound Facility has had a general policy of waste minimization for some time which includes mixed waste generation. The logic diagrams in Appendix C contain summaries of waste minimization efforts applied to each waste stream. All current generation of mixed waste must be approved in advance and in writing by the Miamisburg Area Office of DOE (DOE/MB).

3.0 LOW-LEVEL MIXED WASTE STREAMS

The Ohio EPA, as the regulatory oversight body, has expressed a desire to have an organized, orchestrated approach for the development of each DSTP by the five Ohio DOE sites. The treatment ranking hierarchy preferred by the Ohio EPA is (1) modify or build on-site treatment, (2) on-site portable/mobile units, (3) Ohio option (off-site, instate), and last (4) off-site out-of-state. Representatives from each of the five Ohio DOE sites began weekly meetings in March 1994, to discuss existing or planned treatment facilities at each site, strategies for treatment of wastes from individual sites, waste volumes, and potential strategies for combined treatment. The goal of developing a unified approach presented numerous challenges because of each site's differing mission assignment. For example, Mound is the only Ohio site to handle significant quantities of plutonium-238 and tritium. The five Ohio sites report to and receive direction from four different DOE field offices.

The evaluation consisted of listing feasible alternatives, screening the selected technologies, and performing a detailed evaluation of the remaining technologies. The screening criteria used to eliminate technologies from further consideration were: technology was in early development, technology was incompatible with the radionuclides in the waste, or capacity considerations. As a screening criterion, capacity is considered such that the waste stream treatment will be completed for the inventory listed in the MWIR within two years after it begins full operation. This time constraint seems reasonable for the modest quantities of Mound mixed waste requiring treatment. The detailed evaluation is based on the Treatment Selection Guides developed by the FFCAct Task Force. The details and scores of each treatment are given in Appendix A. The scores were based on the best available information at this time. This procedure could produce different preferred options if redone in the future, particularly as new technologies become more mature. This ranking is for the DSTP only and may be subject to change based on negotiations with the Ohio EPA, stakeholder concerns and cost.

3.1 Mixed Waste Streams for which Technology Exists

3.1.1 Scintillation Cocktail in Vials with Tritium and/or Pu-238

Mixed Waste Inventory Number: MD-W0001
Waste Codes: D001A, F003
Treatability group: Toxic Organic
LDR Treatment Standard: Incineration, Xylene 28 ppm
Volume: 43.3 m^3

Scintillation cocktail waste was generated during routine counting operations on bio-assay, environmental and other radioactive samples containing tritium or plutonium-238. The RCRA hazardous materials present are well defined but records of the radionuclide content are inadequate. The RCRA hazardous constituent is xylene, pseudocumene or dioxane. This waste stream is no longer generated because all scintillation cocktail used in the past several years has been changed to a formulation containing no RCRA hazardous material. Plastic or glass scintillation vials of approximately 15 mL volume were packaged in plastic bags in 190 55 gallon drums along with laboratory trash such as booties and smocks.

3.1.1.1 Description of Technology and Capacity Needs

Treatment will begin with separation and repackaging of the vials and lab trash. A repackaging facility scheduled to be completed by February 1995 will be used for this operation. The lab trash will be compacted and repackaged. If the lab trash is contaminated with scintillation cocktail, a treatment scheme similar to that devised for MD-W009 (absorbed organics) will be formulated. The vials will be emptied and the cocktail will be bulked and analyzed for RCRA material and radionuclide content. Bulking of the scintillation cocktail waste will significantly reduce the waste volume. Past experience has shown each drum of waste will yield 5 gallons or less of bulked liquid. A treatment capacity of at least 2 gallons per day would be needed to work off the liquid within two years. Best Demonstrated Available Technology (BDAT) treatment technology is incineration, fuel substitution or recovery of organics.

3.1.1.2 Preferred Option and other Options

The Mound Glass Melter is determined to be the preferred treatment option. In order to begin operation the revised Environmental Assessment must be approved by DOE-HQ and the OhioEPA must approve the Trial Burn Plan. Safety analysis documents and an Operational Readiness Review will require additional time to complete. After the trial burn the Ohio EPA may require modifications to be made to meet additional operational requirements. The secondary wastes from the Glass Melter are radionuclide contaminated glass, scrubber salts, and filters which will be packaged and stabilized if necessary and then placed in interim storage. This material will still carry the F003 mixed waste listing from the xylene in the waste. These secondary wastes will be sampled, if necessary, to meet the requirements of the disposal site waste acceptance criteria. The Glass Melter has received no unfavorable written comments from stakeholders after being presented in a public meeting on March

10, 1994. Funding for the Glass Melter has been included in the DOE/AL Budget Plan.

A secondary, out-of-state, option is a commercial firm such as Diversified Scientific Services, Inc. (DSSI) in Tennessee. At this time, it appears Mound could meet the waste acceptance requirements of the facility. The Inhalation Toxicology Research Institute (ITRI), a DOE site in Albuquerque, New Mexico, has a waste treatment contract in place with DSSI that Mound could possibly utilize. If it becomes necessary to explore this option, Mound will contact ITRI to find out how to proceed.

Biodegradation is being evaluated to determine if the process could meet the requirements to treat this waste stream. The project is in the initial development phase, with a treatability study utilizing pseudocumene and xylene containing wastes being planned for the 4Q 1994. The bacteria will not tolerate the dioxane present in a portion of the scintillation cocktail. Processing rates in the development unit are presently about 5 mL per day.

3.1.2 Waste Oil, Tritium, Pu-238, Contaminated

Mixed Waste Inventory Number: MD-W013
Waste Codes: D001A, F001, F003
Treatability group: Toxic Organic
LDR Treatment Standard: Incineration, F001, F003 varies from 28 ppm to 5.6 ppm
Volume: 27.4 m^3

This waste stream consists of vacuum pump oil, hydraulic oil, and lubricating oil as free liquid from various sources plant wide in 130 30 and 55 gal drums. This material is thought to be radioactively contaminated and has not been characterized for RCRA constituents therefore analysis of the material is required for both RCRA and radioactive constituents before treatment.

3.1.2.1 Description of Technology and Capacity Needs

A repackaging facility scheduled to be completed by December 1994 will be used to sample oils for radionuclide and RCRA analysis. Waste oils which are found to contain no RCRA materials above regulatory limits, or DOE added radioactive contaminants, are not mixed waste and will be transferred to the appropriate low level radioactive or hazardous waste facility for treatment and disposal. A treatment capacity of at least 12 gallons per day would be required to work off the liquid within 2 years. BDAT treatment technology is incineration.

3.1.2.2 Preferred Option and other Options

Treatment requirements for this waste stream are the same as those specified for bulked scintillation cocktail. The preferred option is the Mound Glass Melter with the secondary option being DSSI. Secondary wastes from the Glass Melter are radionuclide contaminated glass, scrubber salts, and filters which will be packaged and stabilized if necessary and then placed in interim storage. Secondary wastes produced by treatment will be low-level radioactive waste if the input waste is mixed waste solely because of the ignitablity characteristic (D001A). Funding for the Glass Melter has been included in the DOE-AL Budget Plan.

The Packed Bed Reactor (PBR) was determined to be not an appropriate choice for this waste because of capacity limitations. The PBR design specifies flow rates of 4 mL/min or about 2L in 8 hours. This would require over 20 years to complete treatment of the waste oils. The evaluation sheets for all technologies considered are shown in Appendix A.

3.1.3 Waste Lead Loaded Gloves

Mixed Waste Inventory Number: MD-W012
Waste Codes: D008
Treatability group: Inherently Hazardous Debris
LDR Treatment Standard: Macroencapsulation
Volume: 0.0204 m^3

Lead loaded gloves have been used on certain glove boxes in plutonium areas. The gloves contain an inner layer of rubber that is compounded with approximately 8% by weight powdered lead oxide. Gloves were removed from service after a specified period of time or if they were damaged in use. The CSTP proposed analysis of gloves to show they would pass TCLP for lead. Previous analysis of the gloves has shown that new gloves will pass TCLP analysis for lead but used gloves will usually fail the analysis. The gloves in storage are used. The gloves will need to be surveyed for plutonium contamination. If they are shown to be uncontaminated they will be disposed of as hazardous waste. If the gloves are plutonium contaminated it is unlikely that they could be satisfactorily decontaminated due to the cracks in the rubber.

3.1.3.1 Description of Technology and Capacity Needs

Macroencapsulation is BDAT. Macroencapsulation makes use of surface coating materials such as polymer resins or a jacket of inert inorganic material such as concrete. The small volume of waste (about 15 lbs.) would allow treatment in an on-site bench scale or treatment unit.

3.1.3.2 Preferred Option and other Options

The DOE site at Pantex in Amarillo, Texas is building a mobile encapsulation unit which will be available to Mound and other DOE sites once constructed and proven. Construction of this unit is in Pantex's budget. This will need to be coordinated with treatment of other Mound secondary wastes requiring stabilization. This waste treatment has not been included in the DOE-AL Budget Plan.

3.1.4 Waste Lead-Acid Batteries Pu-238 Contaminated

Mixed Waste Inventory Number: MD-W007
Waste Codes: D008B
Treatability group: Batteries Lead-Acid
LDR Treatment Standard: Macroencapsulation/Thermal Recovery
Volume: 0.85 m^3

Large lead-acid batteries are used in electric fork lifts in radiation control areas. The two batteries comprising this waste stream are assumed to be contaminated but the plutonium contamination level of this waste is not known. At the end of their service life both batteries were drained and packaged in wooden boxes.

3.1.4.1 Description of Technology and Capacity Needs

The first step in the treatment strategy is to determine whether the repackaging facility described in 3.1.1.1 can be used to examine the contents of the packages. The extent of contamination of the acid drained from the battery will be measured. This measurement will indicate the amount of internal contamination present in the batteries. If the interior is shown to be free of contamination the outside of the battery case will be wiped and decontaminated if needed. If the interior is found to be contaminated, each battery will be disassembled to remove all noncontaminated parts to reduce the amount of mixed waste as much as possible. All lead that is not contaminated will be prepared for recycle or disposal. BDAT treatment for radioactive contaminated lead is macroencapsulation.

3.1.4.2 Preferred Option and other Options

Treatment will be done on-site in a bench scale unit or skid mounted unit. The DOE site at Pantex in Amarillo, Texas is building a mobile encapsulation unit which will be available to Mound and other DOE sites once constructed and proven. Construction of this unit is in Pantex's budget. Uncontaminated lead will be recycled and lead which can be decontaminated will also be recycled.

3.1.5 Waste Lead Shapes

Mixed Waste Inventory Number: MD-W004
Waste Codes: D008B
Treatability group: Elemental Lead
LDR Treatment Standard: Macroencapsulation/Thermal Recovery
Volume: 5.00 m^3

Waste lead in the form of bricks or other shapes were removed from glove boxes and equipment. This waste is contaminated with tritium, cobalt-60, uranium, or plutonium-238. The radionuclide contamination has not been well characterized in most cases. All contamination is on the surface of the lead.

3.1.5.1 Description of Technology and Capacity Needs

The drums will be opened in the repackaging facility if that is determined to be the appropriate location and the radioactivity of the lead surface will be surveyed with portable instruments to determine containment requirements for decontamination.

3.1.5.2 Preferred Option and Other Options

The treatment strategy involves surface abrasion, recycling the clean lead and secondary treatment of the removed material. If the material meets the requirements of the Los Alamos National Laboratory (LANL) lead decontamination trailer for radionuclide containment the trailer will be scheduled to be transported to Mound. The surface layer of lead plus blast grit require further treatment as mixed waste. The cleaned bulk lead can be sent to recycle. If decontamination is not feasible, the lead will be encapsulated directly without surface decontamination. Lead decontamination has received no unfavorable written comments from stakeholders after being presented in a public meeting on May 12, 1994. If decontamination and recycling of the lead is not feasible,

BDAT treatment for this waste is macroencapsulation. The lead decontamination trailer is funded through the LANL budget. A treatment capacity of about 20 lbs. per day would be required to work off the lead inventory in 2 years. The mixture of the lead surface layer and blast grit will be macroencapsulated.

3.1.6 Liquid Mercury, Tritium Contaminated

Mixed Waste Inventory Number: MD-W005
Waste Codes: D009D
Treatability group: Liquid Mercury
LDR Treatment Standard: Amalgamation
Volume: 0.0204 m^3

Mercury metal has been used in various applications in tritium areas. Tritium contamination has not been well characterized and thus must be further defined to determine containment requirements before treatment by amalgamation can proceed. In order to do this the waste package must be evaluated to determine if it can be opened in the drum opening facility or if the facility must be modified to accept the package or another suitable facility found.

3.1.6.1 Description of Technology and Capacity Needs

Tritium levels can be determined while the amalgamation procedure details are being worked out on noncontaminated mercury before proceeding with the contaminated mercury. BDAT treatment requires amalgamation. A bench sized unit on-site would be used to treat the approximately 50 lbs. of mercury in less than one month.

3.1.6.2 Preferred Option and other Options

The DOE site at Pinellas, Florida is assigned to build an amalgamation unit which would be available after proven for use at Mound. Los Alamos National Laboratory has a triple distillation unit which could be used for treatment but it is believed this method would not achieve significant separation from a volatile radionuclide like tritium. Amalgamation has received no unfavorable written comments from stakeholders after being presented in a public meeting on March 10, 1994. The Pinellas unit is in their budget.

3.2 Mixed Waste Streams for Which Technology Exists But Needs Adaptation

3.2.1 Kerosene, PCB, Tritium Contaminated

Mixed Waste Inventory Number: MD-W008
Waste Codes: D001A
Treatability group: Toxic Organics
LDR Treatment Standard: Incineration
Volume: 1.1 m^3

This waste stream consists of hydraulic fluid and rinsate from a tritium contaminated hydraulic press. The material is stored in 30 gallon drums with polyethylene liners. All drums of this material have been sampled and analyzed for RCRA and radionuclide constituents. Investigation of the historical process documents revealed the presence of major amounts of triphenyl phosphate which was not known previously. No further characterization is required for treatment. This waste stream generation was a one time event; no additional waste will be generated in the future.

3.2.1.1 Description of Technology and Capacity Needs

Treatment involves destruction of the PCBs to meet 40 CFR 761 requirements and simultaneous removal of the RCRA ignitability characteristic. This is complicated by the presence of the RCRA nonhazardous triphenyl phosphate which will produce large quantities of phosphoric acid upon oxidation. The regulatory requirement is 99.9999% PCB destruction removal efficiency. A treatment capacity of at least .04 gallons per day would be required to work off the liquid in 2 years.

3.2.1.2 Preferred Option and Other Options

The preferred option is the Packed Bed Reactor/Silent Discharge Plasma (PBR/SDP) technology developed by Los Alamos National Laboratory. Initial test runs at LANL on a small unit have shown that this technology will meet the 99.9999% destruction efficiency required by 40CFR761 and can handle the triphenyl phosphate in the feed. A feed rate of 4 mL/min (0.5 gal/day) for a 6 inch diameter reactor would require about 1.5 years (40 hours per week) to treat the Mound inventory. Secondary waste streams are scrubber salts, filters, charcoal and tritiated water. The tritiated water will be recycled or solidified, the scrubber salts, filters and charcoal will be stabilized, packaged and placed into interim storage. Each secondary waste stream will be analyzed to support an application to ship the material for disposal at the Nevada Test Site. All secondary wastes will be low-level radioactive. The PBR/SDP has received no

unfavorable written comments from stakeholders after being presented in a public meeting on March 10, 1994. Funding for the PBR/SDP has been included in the DOE/AL Budget Plan.

3.3 Waste Streams Requiring Further Characterization or for Which Technology Assessment Has Not Been Done

3.3.1 Absorbed Oil, PCB, Pu-238 Contaminated

Mixed Waste Inventory Number: MD-W009
Waste Codes: D001A(?)
Treatability group: Toxic Organics
Volume: 0.227 m^3

This absorbed oil, which is contained in one 55 gallon drum, was drained from a hydraulic press used in a plutonium area. The oil is known to be mixed with absorbent but has not been sampled and analyzed for RCRA, PCB or radionuclide content. The treatment plan is formulated from the information available and could change if results of the analysis are different than expected.

3.3.1.1 Plan for Characterization or for Technology Assessment

This waste is presumed to contain PCB's and thus must be managed as such. If analysis demonstrates no RCRA hazardous material is present the waste will be considered PCB contaminated low-level radioactive waste. In either case, treatment would consist of a separation step, thermal desorption to remove the organic materials from the absorbant, followed by PCB destruction. Thermal desorption uses an indirectly heated chamber containing the waste through which a stream of nitrogen is passed. The gas stream exiting the chamber is chilled to condense the volatile compounds which are further treated in the same manner as PCB liquids. The waste from the chamber will be low-level radioactive waste. A bench top or trailer mounted unit could be used. Grand Junction Projects Office (GJPO) in Colorado is building a mobile thermal desorption unit that will be available to Mound after built and proven. Construction of the unit is in the GJPO budget. Thermal desorption has received no unfavorable written comments from stakeholders after being presented in a public meeting on May 12, 1994. If this proves not to be a viable approach other options such as super critical carbon dioxide extraction will be evaluated. The treatment requirements for the desorbed liquid are the same as for normal PCB liquids given in section 3.2.1.

3.3.2 Miscellaneous Lab Packs

Mixed Waste Inventory Number: MD-W010,MD-W011
Waste Codes: D001A, D001C, D002B, D004, D007, D010, D011, P015
Treatability group: Lab Packs with and without Metals
Volume: 0.16 m^3

Lab packs are small containers of chemicals ranging from a few grams to a few kilograms in weight packed in absorbant in larger buckets or drums. These are usually generated during laboratory clean-outs in radiation areas. Similar compatible materials are packed together.

3.3.2.1 Plan for Characterization or for Technology Assessment

Sort, Survey and Decontamination is the technique used to deal with these materials. The drums are opened in an appropriate facility, the material is removed from the drum,inner package labels will be visually examined, surveyed for radioactive contamination and sorted according to the results of the survey.

Material which is visually identified by package labels as mixed waste is documented as such and repackaged. Radioactive materials that are not mixed waste are packaged separately.

3.3.3 Newly Discovered Potentially Mixed Waste

Mixed Waste Inventory Number: MD-W014
Waste Codes: Unknown
Treatability group: Unknown
Volume: Unknown

Orphan radioactive sources have been collected for a number of years to facilitate disposal. Recently information became available which indicated some concern that a portion of the sources may contain RCRA hazardous waste. Visual inspection of inner package labels in several drums confirmed this to be the case.

3.3.3.1 Plan for Characterization or for Technology Assessment

This waste stream is the subject of a separate agreement involving characterization with the Ohio EPA. Sort, Survey and Decontamination is the technique used to deal with these materials. The drums are opened in an

appropriate facility, the material is removed from the drum, inner package labels are visually examined, surveyed for radioactive contamination and sorted according to the results obtained.

Material which is visually identified by package labels as mixed waste is documented as such and repackaged. Radioactive materials that are not mixed waste are packaged separately. BDAT treatment requirements can not be determined until the waste is further characterized. Sorting of this material was completed in August 1994.

4.0 TRU MIXED WASTE STREAMS

4.1 TRU Wastes Expected to Go To WIPP

4.1.1 TRU Corrosives

Mixed Waste Inventory Number: MD-W002
Waste Codes: D002B
Treatability Group: Aqueous Corrosives
Volume: $2.0m^3$

This waste stream consists of liquid corrosive waste from Plutonium 238 operations which have been absorbed. This waste is characterized by process knowledge and is contact handled. These wastes are stored in Type B containers without overpack. WIPP will require further characterization and real-time radiography.

4.1.1.1 Preferred Options

The DOE wide strategy for managing defense related TRU wastes is disposed at WIPP which, if successful, will not require TRU waste to meet LDR treatment standards. It is not known at this time whether the final WIPP waste acceptance criteria could place additional treatment requirements on TRU waste. A schedule will be developed when WIPP becomes operational.

4.1.2 TRU Lead

Mixed Waste Inventory Number: MD-W003
Waste Codes: D008
Treatability Group: Inherently Hazardous
Volume: $1.1m^3$

This waste stream is similar to MD-W012. Lead loaded gloves have been used on some glove boxes in plutonium areas. The glove contains an inner layer of rubber that is compounded with approximately 8% by weight powdered lead oxide. This waste is characterized by process knowledge and is contact handled. These wastes are stored in Type B containers without overpack. WIPP will require further characterization and real time radiography.

4.1.2.1 Preferred Option

The DOE wide strategy for managing defense related TRU wastes is disposed at WIPP which, if successful, will not require TRU waste to meet LDR treatment standards. It is not known at this time whether the final WIPP waste acceptance criteria could place additional treatment requirements on TRU waste. A schedule will be developed when WIPP becomes operational.

4.2 TRU Wastes Not Destined for WIPP

Mound does not have or expect to generate any waste in this category.

5.0 HIGH-LEVEL MIXED WASTE STREAMS

High-level mixed waste originates from the nuclear fuel cycle. No activities of this nature have been carried out at Mound. No high-level mixed waste has been or will be generated at Mound.

6.0 FUTURE GENERATION OF MIXED WASTE STREAMS

6.1 Environmental Restoration Waste

No mixed waste has been produced by ER activities in the past. It is unlikely any will be generated in the future, but because of the large volumes of ER generated radioactive waste anticipated, a nominal 200 cubic meters was estimated as the maximum amount of mixed waste which could possibly be generated over the next five years. Neither the RCRA nor radioactive contaminants of this possible waste stream are known at this time. If any mixed waste is in fact generated by ER activities, logic diagrams similar to those in Appendix C will be created to establish the processes required for treatment.

6.2 D&D Wastes

The only D&D generated mixed waste from past operations consists of one piece of contaminated equipment. It is unlikely any will be generated in the future, but because of the large volumes of D&D generated radioactive waste anticipated, a nominal amount was included in the ER generated mixed waste estimate for the next five years. Neither the RCRA nor radioactive contaminants of this possible waste stream are known at this time. If any mixed waste is generated by D&D activities, logic diagrams similar to those in Appendix C will be created to establish the processes required for treatment.

6.3 Other Wastes

6.3.1 Analytical Laboratory Generated Mixed Waste

On-site laboratories are proposing to analyze radionuclide contaminated soil samples for the presence of RCRA hazardous materials in order to meet the disposal site waste acceptance criteria. Use of EPA mandated methods results in the production of small amounts of mixed waste (solvent contaminated and radionuclide contaminated soils and other materials). This material will be treated by the same scheme developed for absorbed oil, PCB, Pu-238 contaminated.

7.0 STORAGE REPORT

DOE is committed to storing waste in compliance with RCRA storage requirements in 40 CFR 264 or 40 CFR 265 pending the development of treatment capacity and implementation of the Site Treatment Plans. Mound Facility mixed waste storage facilities appear to have sufficient capacity for current and future storage requirements.

For mixed waste to be shipped off-site for treatment, storage plans will be arranged on a case-by-case basis between the shipping and receiving sites, in consultation with the affected states. As a general rule, for new mixed waste transfer arrangements established as a result of the STP process, mixed wastes will be stored at the generating site until such time as transfer is needed to support execution of treatment. Variations to this arrangement will be considered in the event of a potential compliant storage situation at the shipping site (for example, where there is insufficient storage capacity at the shipping site), to facilitate closure of the shipping site, or when other arrangements are acceptable to affected sites and states.

8.0 PROCESS FOR EVALUATING DISPOSAL ISSUES IN SUPPORT OF THE STP DISCUSSIONS

8.1 Introduction

This section discusses the overall process developed by DOE for evaluating issues related to the disposal of residues from the treatment of mixed low-level wastes (MLLW) subject to the Act. Mound Facility is among the sites being analyzed further under this process for potential development as a disposal site for residues from the treatment of MLLW subject to the Act.

The Federal Facility Compliance Act requires only that DOE develop a plan for the treatment of mixed wastes. The Act does not impose any similar requirement for the disposal of mixed wastes. DOE recognizes, however, the need to address this final phase of mixed waste management. The following process reflects DOE's current strategy for evaluating the potential options for disposal and, consistent with the purpose of this Background Volume, is provided for informational purposes only.

It is important to note that the ultimate identification of sites that may host mixed waste disposal activities will follow state and federal regulations for siting and permitting and will include public involvement in the decision-making and preparation of the appropriate environmental impact analyses in accordance with the National Environmental Policy Act. Moreover, any recommendations concerning removal of sites from further evaluation under this process do not affect environmental restoration decisions by DOE under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) concerning remediation activities.

Mixed waste subject to the Act includes high level waste (HLW) and mixed-transuranic waste (mixed TRU). However, established processes are already being implemented for studying, designing, constructing, and ultimately operating disposal facilities for these wastes (e.g., HLW repository, Waste Isolation Pilot Project). Currently, however, there are no active permitted disposal facilities operated by DOE for residues from the treatment of MLLW.

Previously, the DOE planning baseline included the development of MLLW disposal facilities at the six DOE sites currently disposing of low-level waste (Hanford Site, Savannah River Site, Oak Ridge, Idaho, Nevada, and Los Alamos). Plans for the development of these facilities are currently on hold pending the results of this process and the Environmental Management Programmatic Environmental Impact Statement (EM PEIS) currently being prepared by DOE. Once the process of acquiring permits for these sites is initiated, along with associated design and radiological performance assessment efforts, some sites may be found to not be desirable for disposal activities. Additionally, some sites which have not been before considered for disposal activities may be suitable for the disposal of some MLLW residues.

Pursuant to discussions between DOE and the States, DOE developed a process for evaluating the potential options for disposal of the residues from treatment of mixed waste subject to the Act. The sites subject to this evaluation are the 49 sites reported to Congress by DOE in the Mixed Waste Inventory Report, April 1993, as currently storing or expected to generate mixed waste.

This chapter outlines the process developed by DOE, in consultation with the States, for evaluating potential options for the disposal of residues from the treatment of MLLW. Importantly, because MLLW disposal sites are not currently being developed by DOE, preferred alternatives or final destinations for disposal of treatment residues may not be known at the time final proposed Site Treatment Plans are submitted to the States and EPA in February 1995. The results of this process are intended to be considered during the discussions about development of the Act Site Treatment Plans, both between DOE and States and among States themselves.

8.2 Disposal Site Evaluation Process to Date

Although the Act does not specifically address disposal of treated mixed wastes, both DOE and the States have recognized that disposal issues are an integral part of treatment discussions. A process was established to evaluate and discuss the issues related with potential disposal of the residues from the treatment of DOE MLLW at the sites subject to the Act. The focus of this process has been to identify, from among the sites currently storing or expected to generate mixed waste, sites that are suitable for further evaluation regarding their disposal capability. Sites determined to have marginal or no potential for disposal activities will be removed or postponed from further evaluation under this process. Remaining sites will be evaluated more extensively. Ultimately, a number of sites are expected to be technically acceptable for disposal activities.

Site Grouping

The initial step in this process was to examine each of the 49 sites to determine which sites, while individually listed in the Mixed Waste Inventory Report, were in such geographic proximity that further analysis could address them as a single site. This grouping reduced the number of sites to 44, as follows:

- The Idaho National Engineering Laboratory and Argonne National Laboratory (West) are located within several miles of each other on a single Federally-owned reservation in Idaho Falls, Idaho, and were considered a single site for further analysis;

- The Sandia National Laboratory, Livermore, and Lawrence Livermore National Laboratory are located on adjoining properties in Livermore, California, and were considered a single site for further analysis;

- The Inhalation Toxicology Research Institute and Sandia National Laboratory, Albuquerque, New Mexico, are located on the same Federally- owned reservation within several miles of each other, and were considered a single site for further analysis; and

- The Oak Ridge National Laboratory, Oak Ridge K-25 Site, and Oak Ridge Y-12 are all located within the Federally-owned Oak Ridge Reservation, in Oak Ridge, Tennessee, and were considered a single site for further analysis.

Initial Site Screening

The remaining 44 sites were screened against three exclusionary criteria. These criteria were developed by reviewing Federal and State laws regarding the siting of waste treatment, storage, and disposal facilities to determine whether any criteria existed which could be considered exclusionary minimum requirements for hosting disposal activities and which could be applied uniformly across sites. It was agreed at a joint DOE/States meeting in Tucson, Arizona on March 3-4, 1994, that in order to be further evaluated for potential disposal activities, a site:

- must not be located within a 100-year floodplain;
- must not be located within 61 meters (200 feet) of an active fault; and
- must have sufficient area to accommodate a 100-meter buffer zone.

Two of the criteria (100-year floodplain and active fault) are derived from regulatory requirements under the Resource Conservation and Recovery Act which restrict the location of waste treatment, storage, and disposal facilities. The third criteria (sufficient area for 100-meter buffer) is derived from guidance from the U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, and U.S. Department of Energy concerning the area required to properly operate such facilities.

Application of the three exclusionary criteria identified 18 sites which did not meet the criteria (see Figure 8-1). The results were presented at a March 30-31, 1994, joint DOE/States meeting in Dallas, Texas. At the meeting, it was agreed to remove the 18 sites from further evaluation and that DOE would collect additional site-specific information on the remaining 26 sites to identify the strengths and weaknesses of the remaining sites for the purpose of disposal activities (see Figure 8-2). It was also agreed that DOE and any affected States may propose additional sites for elimination from further evaluation after review of the site-specific information and further discussions.

26 Site Evaluation

DOE and the States met on July 26-27, 1994, in Denver, Colorado to discuss the site specific information on the 26 sites and to consider proposals for elimination of sites from further

evaluation. The focus of these discussions was to identify sites suitable for further evaluation regarding their disposal capability. It was agreed that sites determined to have marginal or no potential for disposal activities would be removed or postponed from further evaluation under this process. As a result of the meeting, DOE and the States agreed that the following sites would be eliminated from further evaluation due to their limited potential for disposal activities:

SITE	STATE
Energy Technology Engineering Center	California
General Atomics	California
General Electric Vallecitos Nuclear Center	California
Pinellas Plant	Florida
Site A/Plot M	Illinois

Additionally, DOE and the States agreed that due to its geographic proximity, the Knolls Atomic Power Laboratory at Niskayuna, New York, would be merged with the Knolls Atomic Power Laboratory at Kesselring, New York, for further analysis. DOE and the States also agreed that the following sites, while not eliminated from further evaluation, would be given a lower priority for further evaluation:

SITE	STATE
Weldon Spring Remedial Action Project	Missouri
Brookhaven National Laboratory	New York
Mound Plant	Ohio
Bettis Atomic Power Laboratory	Pennsylvania

Sites assigned a lower priority for further evaluation had issues that required further consideration, including whether the technical abilities of the site were adequately known, the volume of mixed waste which may be generated by the site, and whether other arrangements for disposal of the sites' mixed waste were adequate. DOE and the States agreed to further evaluate these sites in terms of their ability to dispose of their own mixed waste on-site only if no other options for disposal of their wastes could be identified through the disposal evaluation process. In no case would these sites be considered as a disposal option for wastes from other sites, and could be eliminated from further analysis if sufficient information suggests that their potential for disposal activities is too limited.

8.3 Next Steps in Disposal Site Evaluation Process

For the sites not eliminated from further evaluation or assigned a lower priority for evaluation, a more technically detailed performance evaluation will be conducted to increase the understanding of the strengths and weaknesses of a site's potential for disposal activities and to better identify what types of disposal activities could or could not occur at a site. A

configuration analysis (risk, cost, transportation) will also be prepared, and a final set of sites will be identified as disposal options which will be technically capable of disposing of some waste. DOE officials, in concert with the public and pursuant to the National Environmental Policy Act, will then identify those sites that will be further evaluated for potential development as disposal sites. Permitting and preparation of performance assessments in accordance with radioactive waste management regulations will then be undertaken collaboratively with States and regulators.

Performance Evaluation

The performance evaluation to be conducted for each of the remaining sites will entail the collection of site-specific data related to the natural surroundings, geotechnical setting, groundwater and surface water characteristics, and other factors related to the disposal capabilities of each site. This information will then be used to evaluate the sites and determine what types and quantities of waste may be able to be disposed at a given site. The performance evaluations will be initiated in August 1994, and will be completed by February 1995. The 16 sites being carried forward for this analysis are:

SITE	STATE
Lawrence Livermore National Laboratory, Site 300	California
Rocky Flats Plant	Colorado
Idaho National Engineering Laboratory	Idaho
Argonne National Laboratory	Illinois
Paducah Gaseous Diffusion Plant	Kentucky
Nevada Test Site	Nevada
Los Alamos National Laboratory	New Mexico
Sandia National Laboratory	New Mexico
Knolls Atomic Power Laboratory - Kesselring	New York
West Valley Demonstration Project	New York
Fernald Environmental Management Project	Ohio
Portsmouth Gaseous Diffusion Plant	Ohio
Savannah River Site	South Carolina
Oak Ridge Reservation	Tennessee
Pantex Plant	Texas
Hanford Site	Washington

Configuration Analysis

Through the Draft EM PEIS currently being prepared by DOE, the potential cost, risks, transportation, and other environmental impacts of using each of the remaining 16 sites for

some level of disposal activity will be analyzed. This analysis is currently scheduled to be released for public review and comment in late 1994/early 1995.

Site Limitations Analysis

Following public comment on the Draft EM PEIS and completion of the performance evaluations on the remaining 16 sites, DOE will work with the States and public to develop estimates of the quantities and types of waste that could be disposed at the 16 sites. It is expected that the results of these two analyses may indicate that some of the remaining 16 sites are not suitable for further analysis.

Final EM PEIS

While the final proposed Site Treatment Plans are being prepared, and following their submission by DOE to the States and other regulators, it is expected that individual States and DOE will enter discussions concerning what wastes will be treated at which sites. It is also expected that as a part of these discussions, some arrangements may be established between DOE sites and States as to how any future disposal activities will be handled. DOE expects that the information supplied throughout this process will be used in those discussions. Likewise, DOE expects that the Final EM PEIS analyses will encompass the range of discussions and arrangements under consideration.

Post-Compliance Order Activities

It is expected that by October 1995, when Compliance Orders are expected to be issued under the Act, discussions among States and DOE sites concerning disposal of the residues from the treatment of mixed waste may not completed. It is therefore expected that a Record of Decision under the EM PEIS relative to disposal activities may be delayed somewhat to allow discussions to continue further. When a Record of Decision is issued, it will identify preferred sites to be recommended for further development as disposal facilities.

Post-Record of Decision Activities

Following the issuance of a Record of Decision under the EM PEIS on disposal activities, DOE sites will, as appropriate, initiate site-specific Environmental Impact Statements on the proposed disposal facilities, initiate performance assessment processes in accordance with radioactive waste management regulations, and collaboratively with the States and other regulators initiate processes for permitting of disposal facilities.

FIGURE 8-1
SITES ELIMINATED IN INITIAL SCREENING

SITE	EXCLUSIONARY CRITERIA		
	100 meter buffer	100-Year Floodplain	Active Fault
California			
Lawrence Berkeley Laboratory	●		
Laboratory for Energy-Related Health Research	●		
Mare Island Naval Shipyard (a)		●	
Colorado			
Grand Junction Project Office		●	
Connecticut			
Knolls Atomic Power Laboratory, Windsor	●		
Hawaii			
Pearl Harbor Naval Shipyard (a)		●	
Iowa			
Ames Laboratory	●		
Maine			
Portsmouth Naval Shipyard (a)		●	
Missouri			
Kansas City Plant		●	
University of Missouri	●		
New Jersey			
Middlesex Sampling Plant	●		
Princeton Plasma Physics Laboratory	●		
New York			

FIGURE 8-1
SITES ELIMINATED IN INITIAL SCREENING

SITE	EXCLUSIONARY CRITERIA		
	100 meter buffer	100-Year Floodplain	Active Fault
Colonie Interim Storage Site	●		
Ohio			
Battelle Columbus Laboratory	●		
RMI Titanium, Inc.	●		
South Carolina			
Charleston Naval Shipyard (a)		●	
Virginia			
Norfolk Naval Shipyard (a)		●	
Washington			
Puget Sound Naval Shipyard (a)		●	

● = Site fails Criteria
(a) = Site Potentially in Coastal High-Hazard Area

FIGURE 8-2
26 SITES REMAINING AFTER INITIAL SCREENING

California
- Energy Technology Engineering Center
- General Atomics
- General Electric Vallecitos Nuclear Center
- Lawrence Livermore National Laboratory, Site 300

Colorado
- Rocky Flats Plant

Florida
- Pinellas Plant

Idaho
- Idaho National Engineering Laboratory

Illinois
- Argonne National Laboratory
- Site A/ Plot M

Kentucky
- Paducah Gaseous Diffusion Plant

Missouri
- Weldon Spring Remedial Action Project

Nevada
- Nevada Test Site

New Mexico
- Los Alamos National Laboratory
- Sandia National Laboratory

New York
- Brookhaven National Laboratory
- Knolls Atomic Power Laboratory - Kesselring
- Knolls Atomic Power Laboratory - Niskayuna
- West Valley Demonstration Project

Ohio
- Fernald Environmental Management Project
- Mound Plant
- Portsmouth Gaseous Diffusion Plant

Pennsylvania
- Bettis Atomic Power Laboratory

South Carolina
- Savannah River Site

Tennessee
- Oak Ridge Reservation

Texas
Pantex Plant
Washington
Hanford Site

APPENDIX A
MOUND FACILITY
TREATMENT ALTERNATIVES EVALUATION

1. INTRODUCTION

This appendix augments the information presented in Section 3 that was used to select the appropriate treatment alternatives to support the Draft Site Treatment Plan. The purpose of the DSTP is to develop plans for treating, storing, and disposing of radioactive and hazardous (mixed) waste currently stored and expected to be generated in the future.

The content of this appendix includes the following:

- a description of the DSTP options evaluation process and methodology,
- the criteria used to evaluate the options,
- the results of the options evaluation and a comparison of the options,
- cost estimates for each option evaluated.

This appendix is divided into two sections: methodology and evaluations. The methodology describes how alternatives were developed, screened, and evaluated. The evaluations were conducted separately for each treatability group using the same categories as those presented in Section 3 of the Background Volume.

2. METHODOLOGY

The methodology employed in evaluating treatment options was a three-step process. First, a list of technically feasible alternatives was developed; second, the technologies selected were screened; and third, a detailed evaluation of the remaining technologies was performed. The initial list of technologies were developed from:

- regulatory requirements,
- alternatives presented in the CSTP,
- alternatives described in the AL Mixed Waste Treatment Plan, March, 1994

These alternatives were screened using best engineering judgement and common sense. For example, a treatment option may not be considered viable if the cost of implementing that option is exorbitant, if implementing the option does not contribute to the goal of meeting LDR standards, or if the technology is incompatible with the radionuclide content of the waste creating significant increase in risk to human health and the environment. These basic screening considerations were supplemented with site-specific limitations or conditions for further

screening analysis. Any treatment options that did not pass this basic screening process were documented and removed from further evaluation.

2.1 Treatment Selection Guides

The purpose of the Treatment Selection Guides is to facilitate the selection, analysis, and evaluation of the preferred treatment options. This selection guidance is representative of those currently in use across the DOE complex and by some key stakeholders (e.g., the Western Governor's Association and the EPA). Criteria established in the selection guides for comparative evaluations are:

- regulatory compliance
- environmental health and safety
- stakeholder concerns
- treatment efficiency
- implementability
- stakeholder concerns
- life-cycle cost
- technology development

These sub-elements have been established to ensure evaluations are conducted in a comparable manner between different waste stream categories and from one DOE site to another. The definitions for these sub-elements are specified in the Treatment Selection Guides, March 1, 1994, and are reproduced here.

Regulatory Compliance

This guide assesses the ease with which process-specific regulations (e.g., federal, state, and local) and commitments in compliance agreements or orders are satisfied. The regulatory requirements include state and local laws, EPA and Department of Transportation (DOT) laws, and other laws that specify requirements or milestones. Treatment systems under consideration should be developed to ensure that, at a minimum, the waste meets the LDR standards. It is anticipated that options not meeting regulatory requirements, either through standard application of regulatory requirements or established variance procedures, will not pass a basic viability screening. This parameter gives high scores to treatment technologies or options that have been previously permitted and are relatively straightforward, and lower scores to technologies or options that require regulatory exemptions or demonstrations of equivalency that may pose additional permitting difficulties.

Environmental Health and Safety

The environmental health and safety guide gives high marks to processes providing little or no additional risk to the industry workers, the public, or the environment in general. This includes

all occupational safety and health issues, pollution issues, and mechanical and electrical hazard issues, as well as legally driven issues.

Environment/Public Health and Safety. This sub-element assesses risk to all off-site populations due to routine operational and potential accidents at a facility with the proposed process. This assessment includes routine emissions (radiological and hazardous) from the facility under normal operating conditions, under less and ideal conditions (e.g., waste streams marginally characterized or overly aggressive production schedules), and all accident scenarios (both high probability/low consequence and low probability/high consequence).

Non-Operational Worker Health and Safety. This sub-element assesses occupational risks to all on-site workers due to activities exclusive of facility operations using the proposed process. Risks include those from construction of the facility, non routine maintenance (substitution of technologies, equipment replacement, etc.), and decontamination/decommissioning of the facility.

Operational Worker Health and Safety. This sub-element assesses the radiological and hazardous risks to all on-site workers during operations at a facility with the proposed process including both routine operations and accidents. Risks due to routine operations include radiological and hazardous exposure during drum handling, waste sorting, primary and/or secondary treatment, packaging of the treatment residuals, and routine equipment maintenance. Risks due to accidents include radiological and hazardous exposure resulting from equipment failure (with possible associated fires or explosions) or worker error.

Transportation Risk. This sub-element assesses the radiological and hazardous risks to workers and the public posed by off-site transportation of mixed waste. Risks include those from additional waste characterization required for transportation, handling of waste containers during certification and loading/unloading, fatalities and accidents due to traffic accidents, and chronic and acute effects of exposure to radiological and hazardous constituents of the waste during both routine operations and as the result of an accident.

Stakeholder Concerns

The stakeholder concerns guide assesses the ability of the treatment option to satisfy concerns of the stakeholders. Recognition of stakeholder's concerns is important to the progress of DOE's waste management program and successful achievement of milestones. Stakeholders may include the local public, public near the intermediate and final destinations of the waste, state and local governments, Indian tribes, Congress, Department of Defense (DOD) and industry.

Treatment Effectiveness

The treatment effectiveness guide assesses how well the proposed process performs technically and what the anticipated advantages are compared to alternatives.

Volume Reduction. This sub-element assesses the ability of the treatment technology or option to reduce the volume of the original waste. Net volume of residuals divided by net input volume

provides a measurable way to express this factor. This sub-element provides a measure of the system's waste minimization as compared to other alternatives under consideration. The determination of volume reduction should include volumes of secondary waste generated during the process.

Secondary Waste Generation. This sub-element assesses the difficulty of managing contaminated material generated during the treatment of primary waste. Secondary waste may have additional chemical or other characteristics providing new problems relating to treatment and disposal. Scrubber effluents are a large portion of typical secondary wastes. Secondary waste may include contaminated filters, contaminated protective equipment, swipes, used oil, and off-gases. The difficulty of meeting any additional treatment requirements for treatment residuals would be accounted for by ranking the sub-element of destruction and removal efficiency. The value of this assessment should be weighed according to the level of difficulty associated with managing the secondary waste.

Destruction, Removal, and/or Immobilization Efficiency. This sub-element assesses the ability of the treatment option to destroy or remove unwanted contaminants from the waste stream or to reduce the potential hazard by isolating or rendering the hazardous constituents immobilized.

Flexibility. This sub-element assesses the system's ability to process a range of inputs with minimal effect on system operations. This includes accommodating the expected waste stream changes and daily variations as well as unanticipated spikes in the waste stream rate and composition. A treatment system that can accept a broad range of treatability groups would be given a high flexibility rating.

Final Waste Form Performance. The treatment systems posed as options for evaluation should at a minimum be able to meet the LDR treatment standards. This sub-element assesses the long-term stability of the treatment residuals or the difficulty encountered in meeting post-treatment acceptance criteria required to comply with disposal requirements. Although disposal WACs have not been developed, the evaluation of this sub-element should represent a first order approximation of the closeness of the treatment residuals to the anticipated disposal requirements. This evaluation may need to include consideration of factors such as:

- compressive strength
- biological stability
- radiation stability
- resistance to thermal cycling
- TCLP analysis results
- radionuclide leachability
- solubility
- radiolytic decomposition

Ability to be Shipped. This sub-element assesses the amount of additional treatment required to make the treatment residuals meet shipping requirements.

Implementability

The implementability guide assesses the ease and likelihood of bringing a treatment facility or technology in operation within the proposed schedule and estimated cost. It gives high scores to existing or proven treatment technologies and options and lower scores to new or unproven technologies. Existing facilities should use this guide to evaluate the availability of capacity to meet the specific treatment requirements. Implementability guides give high scores to technologies that can be designed, built, demonstrated, and put into production while exhibiting high levels of maturity, development, and availability.

System Implementability. This sub-element assesses the ability to build, construct, or implement the treatment option on the site. The demonstrability of the system is assessed by the ratio of the number of process sub-elements previously demonstrated and validated in both actual and similar environments to the total number of sub-elements in the treatment system. The technical analysis of alternatives should not be based on the presumed performance of untested methods. An estimate of the probability of failure, in either qualitative or quantitative terms, should be made for each component technology and for the complete alternative process. The ranking of this sub-element should give preference to technologies proven effective under conditions similar to those anticipated.

Availability. This sub-element assesses the fraction of time the system is available, considering labor and materials as well as the frequency and complexity of necessary maintenance. Availability is decreased by technologies requiring frequent or complex operation and maintenance activities as opposed to technologies requiring straightforward operation and maintenance.

Scalability. This sub-element assesses the ability to transfer the technology from bench-scale or demonstration testing to full-scale operation or vice versa. It also addresses the ease with which a treatment system or technology can be scaled up to a larger capacity or down to a smaller capacity.

Waste Management Schedule. This sub-element assesses the time required to process the waste, including special studies, design, demonstrations, construction, permitting, and any other steps that may be required to complete treatment of the waste. The sub-element is also affected by facility capacity limitations where a waste stream may not be able to be treated for a lengthy period of time.

Public Acceptance. This sub-element assesses the acceptability of the plan and schedules by stakeholders, as well as the adequacy of stakeholder involvement. A potential for political controversy may affect public acceptance and the public's perceptions of a process could affect its use, as could tribal rights and future land uses associated with technology demonstration, deployment, and socioeconomic interests.

Equity Concerns This sub-element assesses the likelihood that equity concerns on the part of the sites regulators will affect the plans for the facility.

Life-Cycle Cost

The life-cycle cost guide includes all factors relating to the life-cycle, maintainability, and the expected lifetime of a proposed system. Factors included in the life-cycle cost estimate are based on draft guidance developed by DOE Headquarters (i.e., Draft Site Treatment Plan Cost Information Guidance, April 21, 1994). To ensure that the life-cycle costs from one facility to another are comparable, all the treatment systems necessary to meet LDR treatment standards for the primary waste are included (i.e., treatment residuals, and all secondary waste generated during the treatment process). The cost estimates must also consider the particular radionuclides present by incorporating the containment, accountability, and special handling requirements posed.

Technology Development

The technology development guides encompass privatization concerns to be considered when evaluating technology development options. This guide assesses the value of a technology development activity or program to the commercial sector.

Market for Technology. This sub-element assesses the market inside and outside of the DOE complex for the option under consideration. This assessment includes a determination of whether the development would be beneficial to others or whether there is a potential for commercialization of the technology or facility.

Private Sector Involvement. This sub-element assesses the potential for private sector involvement in the development and marketing of the proposed process in a teaming arrangement with DOE. The desire of a private company to develop or assist in the development of a process increases the desirability for the development of that process. Technologies and facilities may be developed and privatized by DOE to be operated by the private sector.

Worksheets were developed to summarize, facilitate, and homologize the comparative analysis. These tables were constructed in the same format as the form used for the evaluation process.

3. EVALUATIONS

TREATMENT EVALUATION CRITERIA

W001 - Scintillation Cocktail	ALT ONE: GLASS MELTER	ALT. TWO: BIODEGRAD	ALT THREE: DSSI
Threshold Criteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	3	3	3
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	3	5	3
Non-Operational Worker Health and Safety	3	3	3
Operational Worker Health and Safety	3	3	3
Transportation Risk	5	5	3
AVERAGE	3.50	4.00	3.00
STAKEHOLDER CONCERNS			
Public Acceptance	5	5	5
Equity Issues	5	5	1
AVERAGE	5.00	5.00	3.00
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	5	1	5
Secondary Waste Generation	5	5	5
Destruction, Removal, & Immobilization Efficiency	3	3	3
Flexibility	3	1	3
Final Waste Form	3	1	3
Ability to be Shipped	3	3	3
AVERAGE	3.67	2.33	3.67
IMPLEMENTABILITY			
System Implementability	5	1	5
Availability	3	3	3
Scalability	3	3	5
Schedule for Waste Treatment	5	1	5
AVERAGE	4.00	2.00	4.50
LIFE-CYCLE COST			
Life-cycle cost	5	3	5
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	1
Private Sector Involvement	1	1	1
AVERAGE	1.00	1.00	1.00
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.65	1.05	1.65
Implementability (30%)	1.20	0.60	1.35
Life-Cycle Cost (20%)	1.00	0.60	1.00
Technology Development (5%)	0.05	0.05	0.05
Weighted Average	3.90	2.30	4.05

TREATMENT EVALUATION CRITERIA

W013 - Waste Oils	ALT ONE: GLASS MELTER	ALT. TWO: DSSI	ALT THREE:
Threshold Criteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	5	5	
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	3	5	
Non-Operational Worker Health and Safety	3	3	
Operational Worker Health and Safety	3	3	
Transportation Risk	5	3	
AVERAGE	3.50	3.50	
STAKEHOLDER CONCERNS			
Public Acceptance	5	5	
Equity Issues	5	1	
AVERAGE	5.00	3.00	
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	5	5	
Secondary Waste Generation	5	5	
Destruction, Removal, & Immobilization Efficiency	3	3	
Flexibility	3	3	
Final Waste Form	3	3	
Ability to be Shipped			
AVERAGE	3.80	3.80	
IMPLEMENTABILITY			
System Implementability	5	5	
Availability	3	3	
Scalability	3	3	
Schedule for Waste Treatment	5	5	
AVERAGE	4.00	4.00	
LIFE-CYCLE COST			
Life-cycle cost	5	5	
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	
Private Sector Involvement	1	1	
AVERAGE	1.00	1.00	
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.71	1.71	
Implementability (30%)	1.20	1.20	
Life-Cycle Cost (20%)	1.00	1.00	
Technology Development (5%)	0.05	0.05	
Weighted Average	3.96	3.96	

TREATMENT EVALUATION CRITERIA

W008 - PCB's Kerosene	ALT ONE: Packed Bed Reactor Silent Discharge Plasma	ALT. TWO: DETOX	ALT THREE:
Threshold Criteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	3	3	
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	5	5	
Non-Operational Worker Health and Safety	3	3	
Operational Worker Health and Safety	3	3	
Transportation Risk	5	5	
AVERAGE	4.00	4.00	
STAKEHOLDER CONCERNS			
Public Acceptance	5	5	
Equity Issues	5	5	
AVERAGE	5.00	5.00	
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	3	3	
Secondary Waste Generation	3	3	
Destruction, Removal, & Immobilization Efficiency	5	5	
Flexibility	5	5	
Final Waste Form	3	3	
Ability to be Shipped	3	3	
AVERAGE	3.67	3.67	
IMPLEMENTABILITY			
System Implementability	3	3	
Availability	5	3	
Scalability	3	3	
Schedule for Waste Treatment	3	3	
AVERAGE	3.50	3.00	
LIFE-CYCLE COST			
Life-cycle cost	3	3	
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	
Private Sector Involvement	1	3	
AVERAGE	1.00	2.00	
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.65	1.65	
Implementability (30%)	1.05	0.90	
Life-Cycle Cost (20%)	0.60	0.60	
Technology Development (5%)	0.05	0.10	
Weighted Average	3.35	3.25	

TREATMENT EVALUATION CRITERIA

W005 - Liquid Mercury	ALT ONE: Amalgamation	ALT. TWO: Triple Distill	ALT THREE:
Threshold Criteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	5	3	
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	5	3	
Non-Operational Worker Health and Safety	3	3	
Operational Worker Health and Safety	3	3	
Transportation Risk	5	5	
AVERAGE	4.00	3.50	
STAKEHOLDER CONCERNS			
Public Acceptance	5	3	
Equity Issues	5	5	
AVERAGE	5.00	4.00	
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	1	5	
Secondary Waste Generation	5	3	
Destruction, Removal, & Immobilization Efficiency	5	1	
Flexibility	3	3	
Final Waste Form	5	5	
Ability to be Shipped	3	3	
AVERAGE	3.67	3.33	
IMPLEMENTABILITY			
System Implementability	3	3	
Availability	3	3	
Scalability	3	3	
Schedule for Waste Treatment	3	3	
AVERAGE	3.00	3.00	
LIFE-CYCLE COST			
Life-cycle cost	3	3	
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	
Private Sector Involvement	1	1	
AVERAGE	1.00	1.00	
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.65	1.50	
Implementability (30%)	0.90	0.90	
Life-Cycle Cost (20%)	0.60	0.60	
Technology Development (5%)	0.05	0.05	
Weighted Average	3.20	3.05	

TREATMENT EVALUATION CRITERIA

W007 - Lead-Acid Batteries	ALT ONE: Macroencapsulate	ALT. TWO: Decon/Recycle	ALT THREE:
Threshold Criteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	5	5	
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	5	3	
Non-Operational Worker Health and Safety	5	5	
Operational Worker Health and Safety	5	3	
Transportation Risk	5	5	
AVERAGE	5.00	4.00	
STAKEHOLDER CONCERNS			
Public Acceptance	5	5	
Equity Issues	5	5	
AVERAGE	5.00	5.00	
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	1	5	
Secondary Waste Generation	3	3	
Destruction, Removal, & Immobilization Efficiency	3	5	
Flexibility	5	5	
Final Waste Form	5	5	
Ability to be Shipped	5	5	
AVERAGE	3.67	4.67	
IMPLEMENTABILITY			
System Implementability	3	3	
Availability	3	3	
Scalability	5	5	
Schedule for Waste Treatment	5	5	
AVERAGE	4.00	4.00	
LIFE-CYCLE COST			
Life-cycle cost	3	5	
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	
Private Sector Involvement	1	1	
AVERAGE	1.00	1.00	
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.65	2.10	
Implementability (30%)	1.20	1.20	
Life-Cycle Cost (20%)	0.60	1.00	
Technology Development (5%)	0.05	0.05	
Weighted Average	3.50	4.35	

TREATMENT EVALUATION CRITERIA

W009 - Absorbed PCB/Oil	ALT ONE: Thermal Desorption	ALT. TWO: Super Critical CO2	ALT THREE:
Threshold Criteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	5	5	
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	3	3	
Non-Operational Worker Health and Safety	3	3	
Operational Worker Health and Safety	5	3	
Transportation Risk	5	5	
AVERAGE	4.00	3.50	
STAKEHOLDER CONCERNS			
Public Acceptance	3	3	
Equity Issues	5	5	
AVERAGE	4.00	4.00	
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	3	3	
Secondary Waste Generation	3	5	
Destruction, Removal, & Immobilization Efficiency	3	3	
Flexibility	5	3	
Final Waste Form	1	1	
Ability to be Shipped	1	1	
AVERAGE	2.67	2.67	
IMPLEMENTABILITY			
System Implementability	5	3	
Availability	5	3	
Scalability	3	3	
Schedule for Waste Treatment	3	3	
AVERAGE	4.00	3.00	
LIFE-CYCLE COST			
Life-cycle cost	3	3	
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	
Private Sector Involvement	1	1	
AVERAGE	1.00	1.00	
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.20	1.20	
Implementability (30%)	1.20	0.90	
Life-Cycle Cost (20%)	0.60	0.60	
Technology Development (5%)	0.05	0.05	
Weighted Average	3.05	2.75	

TREATMENT EVALUATION CRITERIA

W012 - Lead Loaded Gloves	ALT ONE: Macroencapsulation	ALT. TWO: Decon/Recycle	ALT THREE:
Threshold Crtiteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	5	5	
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	5	3	
Non-Operational Worker Health and Safety	5	5	
Operational Worker Health and Safety	5	3	
Transportation Risk	5	5	
AVERAGE	5.00	4.00	
STAKEHOLDER CONCERNS			
Public Acceptance	5	5	
Equity Issues	5	5	
AVERAGE	5.00	5.00	
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	1	5	
Secondary Waste Generation	3	3	
Destruction, Removal, & Immobilization Efficiency	3	5	
Flexibility	5	5	
Final Waste Form	5	5	
Ability to be Shipped	5	5	
AVERAGE	3.67	4.67	
IMPLEMENTABILITY			
System Implementability	3	3	
Availability	3	3	
Scalability	5	5	
Schedule for Waste Treatment	5	5	
AVERAGE	4.00	4.00	
LIFE-CYCLE COST			
Life-cycle cost	3	5	
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	
Private Sector Involvement	1	1	
AVERAGE	1.00	1.00	
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.65	2.10	
Implementability (30%)	1.20	1.20	
Life-Cycle Cost (20%)	0.60	1.00	
Technology Development (5%)	0.05	0.05	
Weighted Average	3.50	4.35	

TREATMENT EVALUATION CRITERIA

W004 - Lead Shapes	ALT ONE: Macroencapsulation	ALT. TWO: Decon/Recycle	ALT THREE:
Threshold Criteria			
REGULATORY COMPLIANCE			
Regulatory Compliance	5	5	
ENVIRONMENTAL HEALTH AND SAFETY			
Environmental/Public Health	5	3	
Non-Operational Worker Health and Safety	5	5	
Operational Worker Health and Safety	5	3	
Transportation Risk	5	5	
AVERAGE	5.00	4.00	
STAKEHOLDER CONCERNS			
Public Acceptance	5	5	
Equity Issues	5	5	
AVERAGE	5.00	5.00	
Evaluation Criteria			
TREATMENT EFFECTIVENESS			
Volume Reduction	1	5	
Secondary Waste Generation	3	3	
Destruction, Removal, & Immobilization Efficiency	3	5	
Flexibility	5	5	
Final Waste Form	5	5	
Ability to be Shipped	5	5	
AVERAGE	3.67	4.67	
IMPLEMENTABILITY			
System Implementability	3	3	
Availability	3	3	
Scalability	5	5	
Schedule for Waste Treatment	5	5	
AVERAGE	4.00	4.00	
LIFE-CYCLE COST			
Life-cycle cost	3	5	
TECHNOLOGY DEVELOPMENT			
Market for Technology	1	1	
Private Sector Involvement	1	1	
AVERAGE	1.00	1.00	
SUMMARY OF EVALUATION AND WEIGHTED AVERAGE			
Treatment Effectiveness (45%)	1.65	2.10	
Implementability (30%)	1.20	1.20	
Life-Cycle Cost (20%)	0.60	1.00	
Technology Development (5%)	0.05	0.05	
Weighted Average	3.50	4.35	

APPENDIX B
OHIO MIXED WASTE TREATMENT SCHEME

The five DOE sites in Ohio, listed below, were chartered by DOE in response to comments by the regulatory agency, Ohio Environmental Protection Agency (OEPA), to coordinate efforts for site treatment plan development within the state of Ohio such that DOE presents an integrated strategy to OEPA. The purpose for developing this strategy is to take advantage of existing or planned treatment facilities or capacities located at other DOE sites within Ohio and to provide a coordinated plan for treatment of like wastes from each of the five sites.

The FFCA Ohio Work Group started meeting in March 1994 to discuss the potential waste streams with common matrices and contaminants.

SITE	LOCATION	DOE OFFICE
Fernald	Cincinnati	Fernald Field Office
Portsmouth Gaseous Diffusion Plant	Piketon	Oak Ridge Operations Office
Mound	Miamisburg	Albuquerque Operations Office
Battelle Columbus	Columbus	Chicago Operations Office
Parsons/RMI	Ashtabula	Fernald Field Office

The following pages show a listing of the waste streams at the five Ohio sites. Waste streams unique to a single site are not included since the Ohio Work Group was chartered to examine waste streams with a view toward coordinated treatment plans. The individual waste streams have been grouped according to common chemical characteristics. Treatment options (i.e., on-site, in Ohio and out of state) have been listed for each group.

KEY FOR OHIO WORK GROUP MW TREATMENT SCHEME

The alpha numeric designation above the drums was taken from the "Mixed Waste/Contaminant Treatment Matrix", and was used by all Ohio DOE sites as a means to compare common treatability groups/waste streams.

The treatability groups are organized according to the definitions provided in the CSTP.

Quantities are provided for both current and five year (five year meaning the total quantity of mixed waste expected to be generated in the next five years).

Yr.	Year	
Qty	Quantity	
m^3	cubic meters	
FEMP	(F)	Fernald Environmental Management Project
PORTS	(P)	Portsmouth Gaseous Diffusion Plant
RMI	(R)	RMI Titanium
MOUND	(M)	Mound Plant
BATTELLE	(B)	Battelle Columbus Laboratories

A

ON SITE — A list of possible on-site mixed waste treatment options identified by the Ohio Work Group for one or more of the five Ohio DOE sites.

B

OHIO — A list of possible Ohio mixed waste treatment options identified by the Ohio Work Group for one or more of the five Ohio DOE sites.

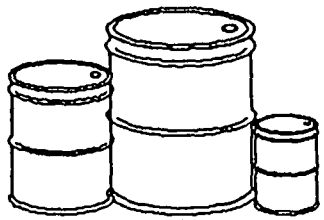
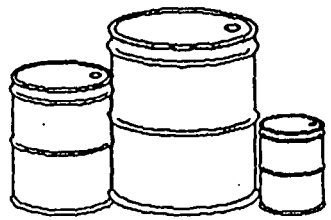
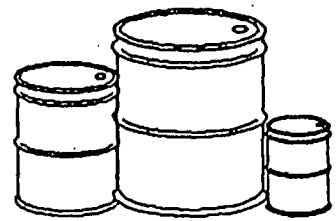
C

OUT OF STATE — A list of possible out-of-state mixed waste treatment options identified by the Ohio Work Group for one or more of the five Ohio DOE sites.

"Mobile" is used to designate either mobile or skid-mounted units.

The preferred option for each site is designated by the alpha character in parentheses at the end of the option. Each treatability group may include more than one FEMP preferred option as waste streams within each treatability group may be treated by different preferred option treatment projects. See Appendix C for further preferred option delineation.

OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	6A	6C	7D
			
	ORGANIC DEBRIS TOXIC ORGANICS	ORGANIC DEBRIS TOXIC ORGANICS TOXIC METALS W/O MERCURY	INORGANIC DEBRIS TOXIC METALS W/O MERCURY

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	10	9.8/9.1
PORTS	2	117.0/36.0
RMI	1	4.93/0.69

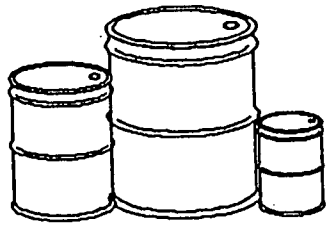
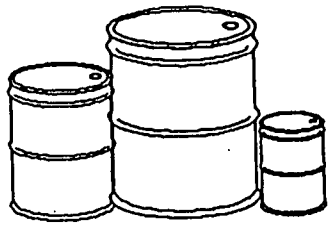
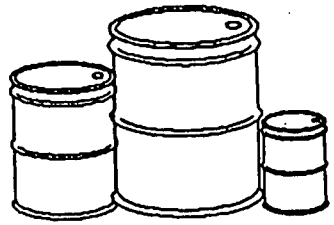
	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	2	1.6/0.0
PORTS	1	0.500/0.500

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	10	25.8/8.6
PORTS	7	186.26/0
RMI	1	5.64/0.23

	6A	6C	7D
A ON-SITE	Mobile Incinerator Low Temp. Thermal Desorp. Washing/Stabilization (P) FEMP Rotary Kiln FEMP MAWS Mobile Chemical Treatment (F) Mobile Stabilization (F)	Mobile Chemical Treatment (F) Washing/Stabilization (P) Mobile Stabilization	Mobile Incinerator Mobile Chemical Treatment (F) Mobile Stabilization (F)(P) Mobile Metals Recovery/Stabl. Low Temp. Thermal Desorp.
B OHIO	FEMP Rotary Kiln FEMP MAWS Mobile Chemical Treatment Mobile Stabilization	FEMP Rotary Kiln/Stabilization FEMP MAWS Mobile Chemical Treatment Mobile Stabilization	Mobile Metals Recovery/Stabl. Mobile Stabilization
C OUT OF STATE	TSCA Incinerator (F) (Liquid Portion Only) Envirocare (R)	TSCA Incinerator (Liquid Portion Only) Envirocare	Envirocare (R)

Rev. 06/06/94

OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	8A	8C	8D
			
	HETEROGENOUS DEBRIS TOXIC ORGANICS	HETEROGENOUS DEBRIS TOXIC ORGANICS TOXIC METALS W/O MERCURY	HETEROGENOUS DEBRIS TOXIC METALS W/O MERCURY
	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 13 12.8/0.0 PORTS 2 3.14/1.7	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 9 9.0/19.1 PORTS 1 10.7/0	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 3 12.0/0.0 PORTS 3 14.9/0 RMI 2 0.23/0.23 MOUND 1 0.02/0
A ON-SITE	FEMP Rotary Kiln Mobile Chemical Treatment (F)(P) Mobile Incineration Low Temp. Thermal Desorp.	FEMP Rotary Kiln Mobile Chemical Treatment (F)(P) Mobile Incineration Low Temp. Thermal Desorp.	Mobile Chemical Treatment (F)(P) Mobile Encapsulation (M) Mobile Incineration Low Temp. Thermal Desorp.
B OHIO	FEMP Rotary Kiln Mobile Chemical Treatment	FEMP Rotary Kiln Mobile Chemical Treatment	Mobile Chemical Treatment
C OUT OF STATE	Envirocare (F)	Envirocare	Envirocare (R)

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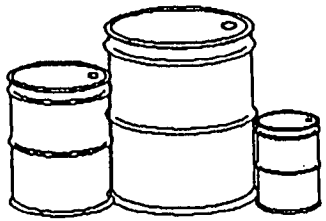
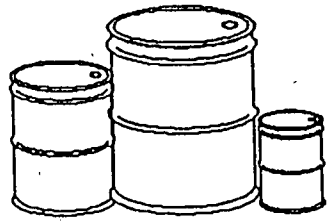
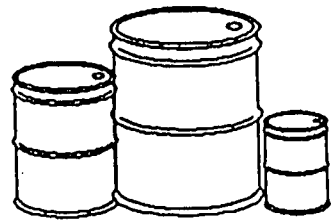
OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	12	15D 15F	16E
			
	LAB PACKS W/O METALS	COMPRESSED GAS	ELEMENTAL MERCURY

	# of Waste Streams	Qty in m^3 Current/5 yr.
BATTELLE	1	0.4/0.0
FEMP	2	0.400
MOUND	2	0.400

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	1	0.2/0.3
PORTS	2	2.3/0

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	2	0.6/1.1
MOUND	1	0.100/0.0072
PORTS	1	1.000/0

	12	15D 15F	16E
A ON-SITE	Further Characterization (M) Mobile Incinerator	Puncture/Capture Unit Mobile Incinerator Segregate/Reuse/Treatment (P) Mobile Chemical Treatment (F)	Mobile (LANL) Amalgamation/Recycling (M) Mobile Chemical Treatment (F)
B OHIO	Mobile Incinerator	Puncture/Capture Unit Mobile Chemical Treatment	Mobile Amalgamation/Recycling Mobile Chemical Treatment
C OUT OF STATE	TSCA Incinerator (F) Hanford Thermal Treatment Facility (B)	Puncture/Capture Unit TSCA Incinerator (Liquid Portion Only)	Y-12/Recycle (P)

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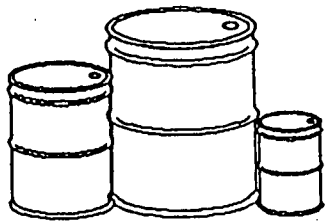
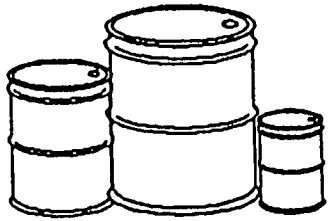
OHIO WORK GROUP MW TREATMENT SCHEME

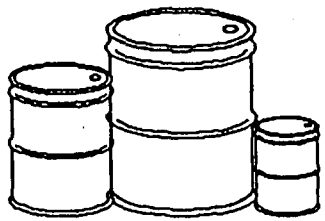
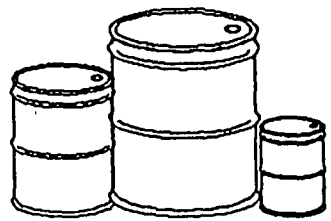
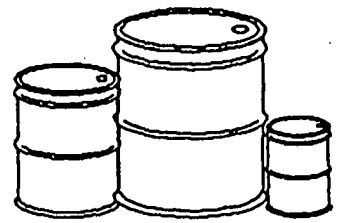
TREATABILITY GROUP	17D	19D
		
	ELEMENTAL LEAD (ACTIVATED AND NON-ACTIVATED)	**BATTERIES (LEAD ACID, CADMIUM) TOXIC METALS W/O MERCURY**

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	4	4.8/20.5
BATTELLE	1	0.407/1.282
MOUND	1	5.0/0

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	2	4.4/14.0
MOUND	1	0.85/0.79
PORTS	1	58.3/0

	17D	19D
A ON-SITE	Mobile Chemical Treatment (F) Decon/Recycle LANL Mobile Decon Trailer	Mobile Chemical Treatment (F) Decon/Recycle (M)(P)
B OHIO	LANL Mobile Decon Trailer Mobile Chemical Treatment	Mobile Chemical Treatment Decon/Recycle
C OUT OF STATE	LANL Mobile Decon Trailer Hanford Wrap II A/B (B)	Commercial Recycler

OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	2A	2B	2C
			
	AQUEOUS LIQUID TOXIC ORGANICS	AQUEOUS LIQUID TOXIC ORGANICS TOXIC METALS W/ MERCURY	AQUEOUS LIQUID TOXIC ORGANICS TOXIC METALS W/O MERCURY

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	5	36.8/4.0
PORTS	1	52.7/83.5
RMI	1	1.3/4.5

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	2	4.0/16.8
PORTS	1	24.3/0

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	4	12.2/13.4
PORTS	2	23.3/0

	2A	2B	2C
A ON-SITE	PORTS Physical/Chemical (P) FEMP Plant 8 VOC PORTS Carbon Treatment FEMP WWTS/AWWT (F) Evaporation Stabilization Mobile Chemical Treatment (F)	PORTS Physical/Chemical (P) FEMP Plant 8 VOC PORTS Carbon Treatment FEMP WWTS/AWWT Evaporation Stabilization	FEMP UNH Trt./Sys. FEMP Plant 8 VOC PORTS Physical/Chemical (P) FEMP WWTS/AWWT Removal/Stabl. of Metals Evaporation Mobile Stabilization (F) Mobile Chemical Treatment (F)
B OHIO	FEMP Plant 8 VOC PORTS WWTS Mobile Incinerator FEMP AWWT Mobile Chemical/Treatment	FEMP Plant 8 VOC PORTS WWTS FEMP AWWT Mobile Incinerator	FEMP Plant 8 VOC PORTS WWTS FEMP AWWT Removal/Stabl. of Metals Mobile Chemical Treatment
C OUT OF STATE	TSCA Incinerator (R)(F)	TSCA Incinerator (F)(P)	TSCA Incineraor (F)

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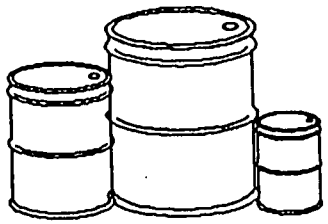
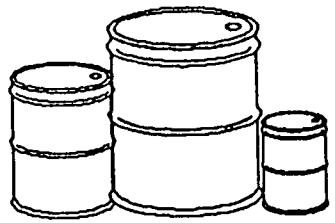
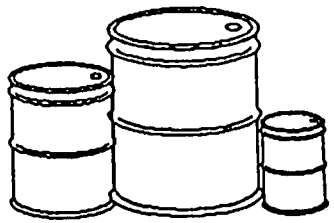
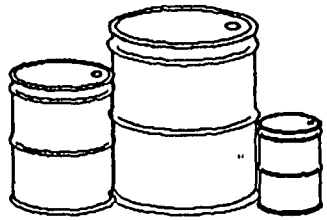
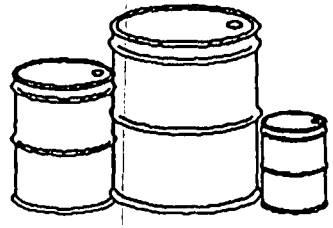
OHIO WORK GROUP MW TREATMENT SCHEME

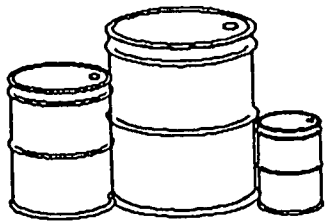
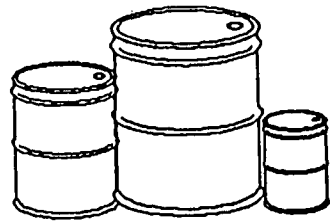
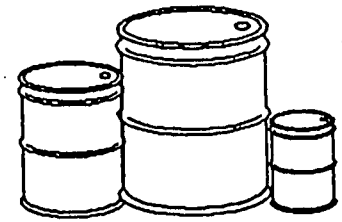
TREATABILITY GROUP	2D	2E	2G
			
	AQUEOUS LIQUID TOXIC METALS W/O MERCURY	AQUEOUS LIQUID TOXIC METALS W/ MERCURY	AQUEOUS LIQUID CORROSIVE ONLY
	# of Waste Streams / Qty in m^3 Current/5 yr.	# of Waste Streams / Qty in m^3 Current/5 yr.	# of Waste Streams / Qty in m^3 Current/5 yr.
	FEMP 8 1043.8/1.3 PORTS 6 31.45/0	FEMP 1 0.2/<0.1 PORTS 1 3.900/12.400	FEMP 3 7.4/0.7 PORTS 3 2.96/0
A ON-SITE	FEMP WWTS/AWWT (F) FEMP UNH Removal Action (F) PORTS Physical/Chemical (P) Evaporation Stabilization Mobile Chemical Treatment (F)	Mobile Chemical Treatment (F) PORTS Physical/Chemical Treatment (P)	FEMP WWTS/AWWT (F) FEMP UNH Trt. Sys. PORTS Physical/Chemical (P) Evaporation Stabilization FEMP HF Neutralization System (F)
B OHIO	FEMP UNH Trt. Sys. PORTS WWTS Mobile Chemical Treatment (F)	Mobile Chemical Treatment	FEMP UNH Trt. Sys. PORTS WWTS
C OUT OF STATE	TSCA Incinerator (F)	TSCA Incinerator	TSCA Incineraor (F)

Rev. 05/06/94

OHIO WORK GROUP MW TREATMENT SCHEME

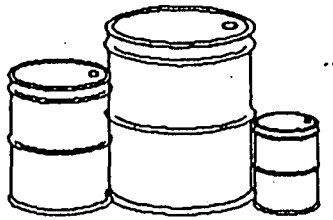
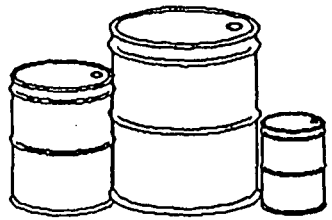
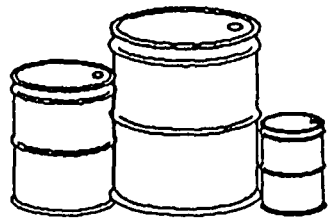
TREATABILITY GROUP	3A	3C
		
	ORGANIC SLUDGES/PARTICULATES TOXIC ORGANICS	ORGANIC SLUDGES/PARTICULATES TOXIC ORGANICS TOXIC METALS W/O MERCURY
	# of Waste Streams / Qty in m^3 Current/5 yr.	# of Waste Streams / Qty in m^3 Current/5 yr.
	FEMP 19 189.6/0.0 PORTS 2 87.1/8.0	FEMP 8 6.4/0.0 PORTS 2 8.88/0
A ON-SITE	Carbon Regeneration/Thermal Desorp. (P) Mobile Incinerator/Stabl. FEMP MAWS Mobile Chemical Treatment (F) FEMP Rotary Kiln	Carbon Regeneration/Thermal Desorp. Mobile Incinerator/Stabl. FEMP MAWS Mobile Chemical Treatment (F) FEMP Rotary Kiln Stabilization
B OHIO	Mobile Incinerator/Stabl. FEMP MAWS Mobile Chemical Treatment FEMP Rotary Kiln	Mobile Incinerator/Stabl. FEMP MAWS Mobile Chemical Treatment FEMP Rotary Kiln
C OUT OF STATE	TSCA Incinerator (P) (Liquid Portion Only) Envirocare (Solids Portion Only)	TSCA Incinerator (P)(F) (Liquid Portion Only) Envirocare (Solids Portion Only)

OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	1D	1E	1F
			
	ORGANIC LIQUID TOXIC METALS W/O MERCURY	ORGANIC LIQUID TOXIC METALS W/ MERCURY	ORGANIC LIQUID IGNITABLE ONLY
	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 8 2.2/0.2 PORTS 1 11.34/0	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 2 2.6/0.8 PORTS 1 1.100/0.953	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 13 13.8/9.2 MOUND 1 0.005 PORTS 1 0.42/0
A ON-SITE	Mobile Incinerator Mobile Chemical Treatment (F) Mound Glass Melter Mound Packed Bed Reactor Wet Air Oxidation Biological Treatment Mobile Stabilization (F) FEMP WWTS/AWWT (F)	Mobile Incinerator Mobile Chemical Treatment Hg Treatment Mobile Stabilization (F)	Mobile Incinerator Mobile Chemical Treatment (F) Mound Glass Melter Mound Packed Bed Reactor Wet Air Oxidation Biological Treatment
B OHIO	Mound Glass Melter Mound Packed Bed Reactor Mobile Incinerator Mobile Chemical Treatment Mobile Stabilization	Mound Glass Melter Mound Packed Bed Reactor Mobile Incinerator Mobile Chemical Treatment Hg Treatment	Mound Glass Melter Mound Packed Bed Reactor Mobile Incinerator Mobile Chemical Treatment
C OUT OF STATE	TSCA Incinerator (P)(F)	TSCA Incinerator (P)(F)	TSCA Incineraor (P)(F)(M) DSSI Envirocare (F)

Rev. 08/20/94

OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	1A	1B	1C
			
	ORGANIC LIQUID TOXIC ORGANICS	ORGANIC LIQUID TOXIC ORGANICS TOXIC METALS W/ MERCURY	ORGANIC LIQUID TOXIC ORGANICS TOXIC METALS W/O MERCURY

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	39	164.1/20.9
PORTS	3	46.9/0
RMI	3	7.5/0.69
MOUND	2	72.0/4.2

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	8	7.2/0.9
PORTS	3	172.5/0

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	25	44.2/16.9
PORTS	4	29.65/0

	1A	1B	1C
A ON-SITE	Mobile Incinerator Mobile Chemical Treatment (F) Mound Glass Melter (M) Mound Packed Bed Reactor Wet Air Oxidation	Mobile Incinerator Mobile Chemical Treatment (F) Hg Treatment Mound Glass Melter Mound Packed Bed Reactor Wet Air Oxidation Biological Treatment	Mobile Incinerator Mobile Chemical Treatment (F) Mobile Stabilization (F) Mound Glass Melter Mound Packed Bed Reactor Wet Air Oxidation Biological Treatment FEMP WWTS/AWWT (F)
B OHIO	Mound Glass Melter Mound Packed Bed Reactor Mobile Incinerator Mobile Chemical/Treatment	Mound Glass Melter Mound Packed Bed Reactor Mobile Incinerator Mobile Chemical Treatment Hg Treatment	Mound Glass Melter Mound Packed Bed Reactor Mobile Incinerator Mobile Chemical Treatment
C OUT OF STATE	TSCA Incinerator (R) (P) (F) DSSI	TSCA Incinerator (P) (F)	TSCA Incineraotr (P) (F)

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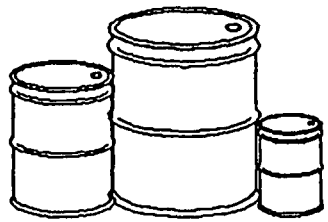
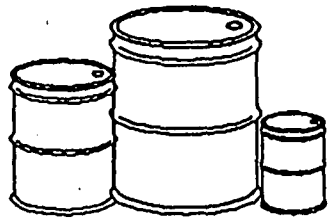
OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	4A	4C
		
	INORGANIC SLUDGES/PARTICULATES TOXIC ORGANICS	INORGANIC SLUDGES/PARTICULATES TOXIC ORGANICS TOXIC METALS W/O MERCURY

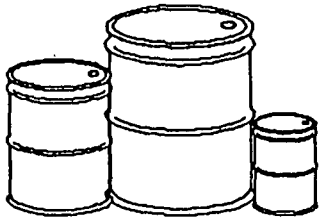
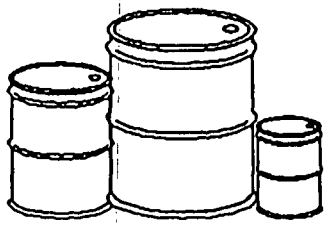
	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	17	698.8/0.0
PORTS	2	27.9/0.0
MOUND	1	0.22/0

	# of Waste Streams	Qty in m^3 Current/5 yr.
FEMP	4	3.4/0.0
PORTS	1	2.1/0

	4A	4C
A ON-SITE	FEMP Rotary Kiln FEMP MAWS Mobile Chemical Treatment (F) Mobile Stabilization (F) Thermal Desorption/Stabl. Mound Packed Bed Reactor (M)	FEMP Rotary Kiln FEMP MAWS Mobile Chemical Treatment (F) Segregation/Stabl.
B OHIO	FEMP Rotary Kiln FEMP MAWS Mobile Chemical Treatment	FEMP Rotary Kiln FEMP MAWS (P) Mobile Chemical Treatment
C OUT OF STATE	TSCA Incinerator (P) TSCA Incinerator (F) (Liquid Portion Only) Envirocare (F)	

Rev. 03/30/94

OHIO WORK GROUP MW TREATMENT SCHEME

TREATABILITY GROUP	4D INORGANIC SLUDGES/PARTICULATES TOXIC METALS W/O MERCURY	4E INORGANIC SLUDGES/PARTICULATES TOXIC METALS W/ MERCURY
		
	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 42 507.8/1.6 PORTS 15 107.05/0	# of Waste Streams / Qty in m^3 Current/5 yr. FEMP 2 0.4/0.0 PORTS 3 382.6/2.0 BATTELLE 1 0.815/3.0
A ON-SITE	Mobile Chemical Treatment (F) Mobile Stabilization (F) FEMP MAWS Mobile Incinerator Metals Washing/Recovery Segregation/Stabl.	Low Temp. Thermal Desorp. Acid Leaching Sludge Blending Mobile Stabilization (P) Mobile Chemical Treatment (F)
B OHIO	Mobile Stabilization FEMP MAWS (P)	Mobile Stabilization Mobile Chemical Treatment
C OUT OF STATE	TSCA Incinerator (F) (Liquid Portion Only)	Hanford Wrap II A/B (B)

APPENDIX C
MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

All Logic diagrams begin with waste generation in order to indicate what steps have been taken to reduce current generation of the waste stream. The diagrams represent the best estimate of the steps currently necessary to treat each waste stream. These steps could change substantially if regulations or interpretation of regulations change or as more characterization data becomes available on a particular waste stream.

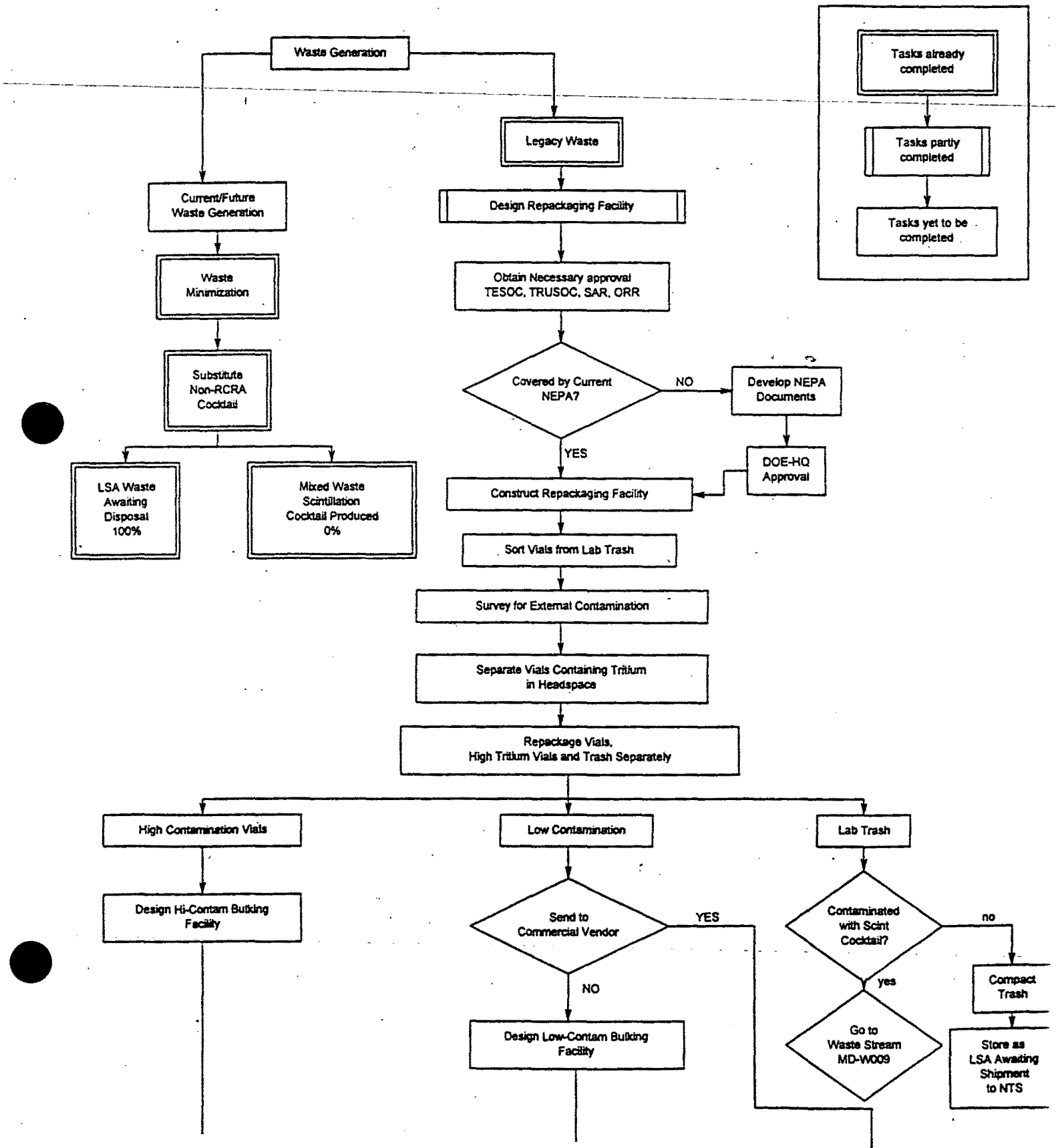
NOTE: Most logic diagrams are several pages in length and should be "patchworked" together to produce the complete logic diagram.

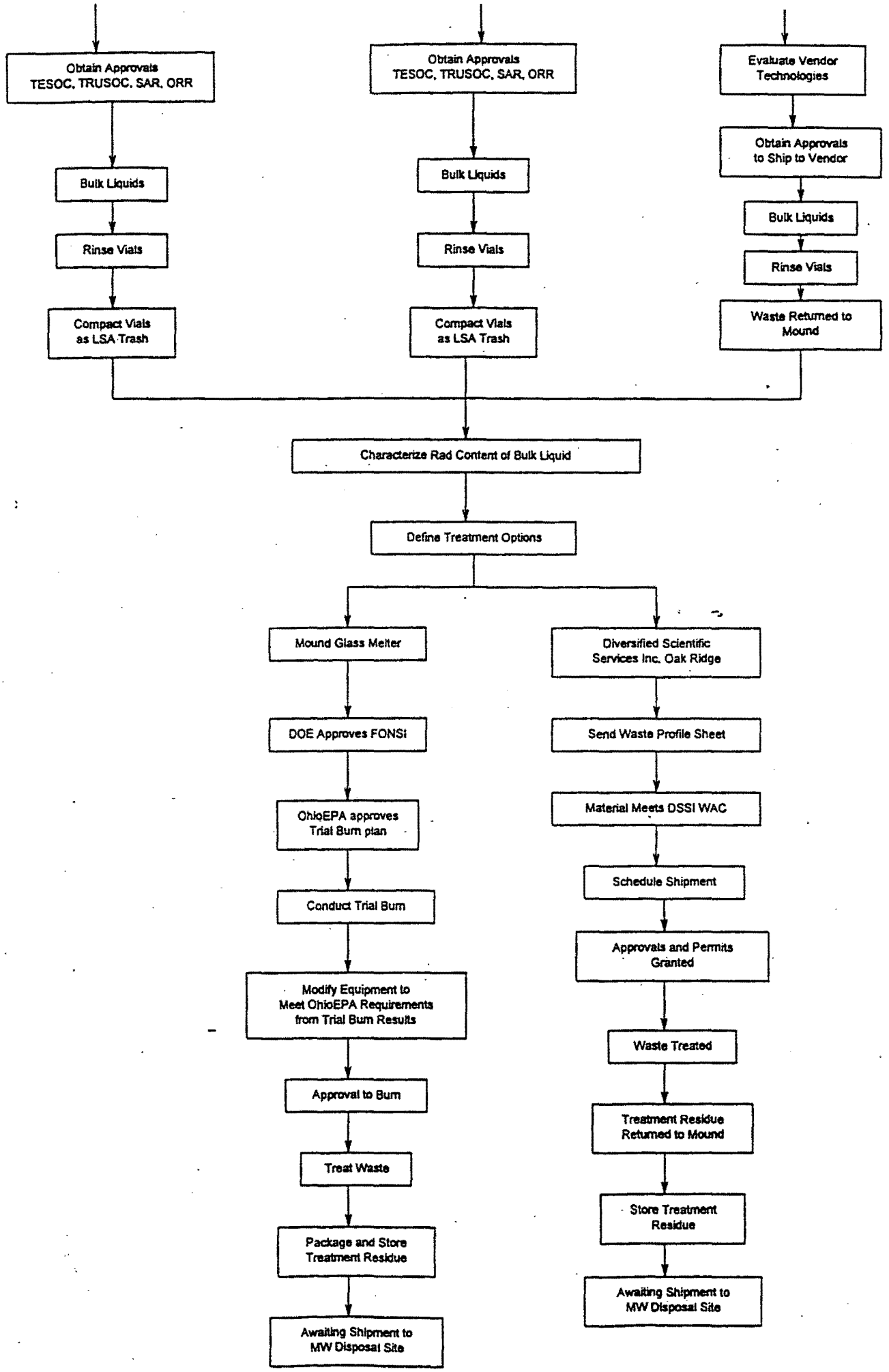
Glossary of Acronyms
Logic Diagrams

CAI	Controlled Air Incinerator
Co-60	Cobalt-60
DOE-HQ	U.S. Department of Energy - Headquarters
DRE	Destruction and removal efficiency
DSSI	Diversified Scientific Services Inc.
DSTP	Draft Site Treatment Plan
EPA	U. S. Environmental Protection Agency
FONSI	Finding of no significant impact
INEL	Idaho National Engineering Laboratory
kg.	kilogram(s)
LANL	Los Alamos National Laboratory
LLW	Low level waste
LSA	Low specific activity
MW	Mixed waste
NE	Nuclear energy
NEPA	National Environmental Policy Act
NTS	Nevada Test Site
ORR	Operational Readiness Review
OSR	Operational Safety Review
PCB	Polychlorinated biphenyls
Pu-238	Plutonium-238
R&D	Research and development
RCRA	Resource Conservation and Recovery Act
SAR	Safety Analysis Report
SDP	Silent discharge plasma
SEG	Scientific Ecology Group, Inc.
TCLP	Toxicity Characteristic Leaching Procedure
TESOC	Tritium Environmental Safety Oversight Committee
TRUSOC	Transuranic Safety Oversight Committee
TSCA	Toxic Substances Control Act
UV	Ultraviolet
WAC	Waste Acceptance Criteria
WERF	Waste Experimental Reduction Facility

MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

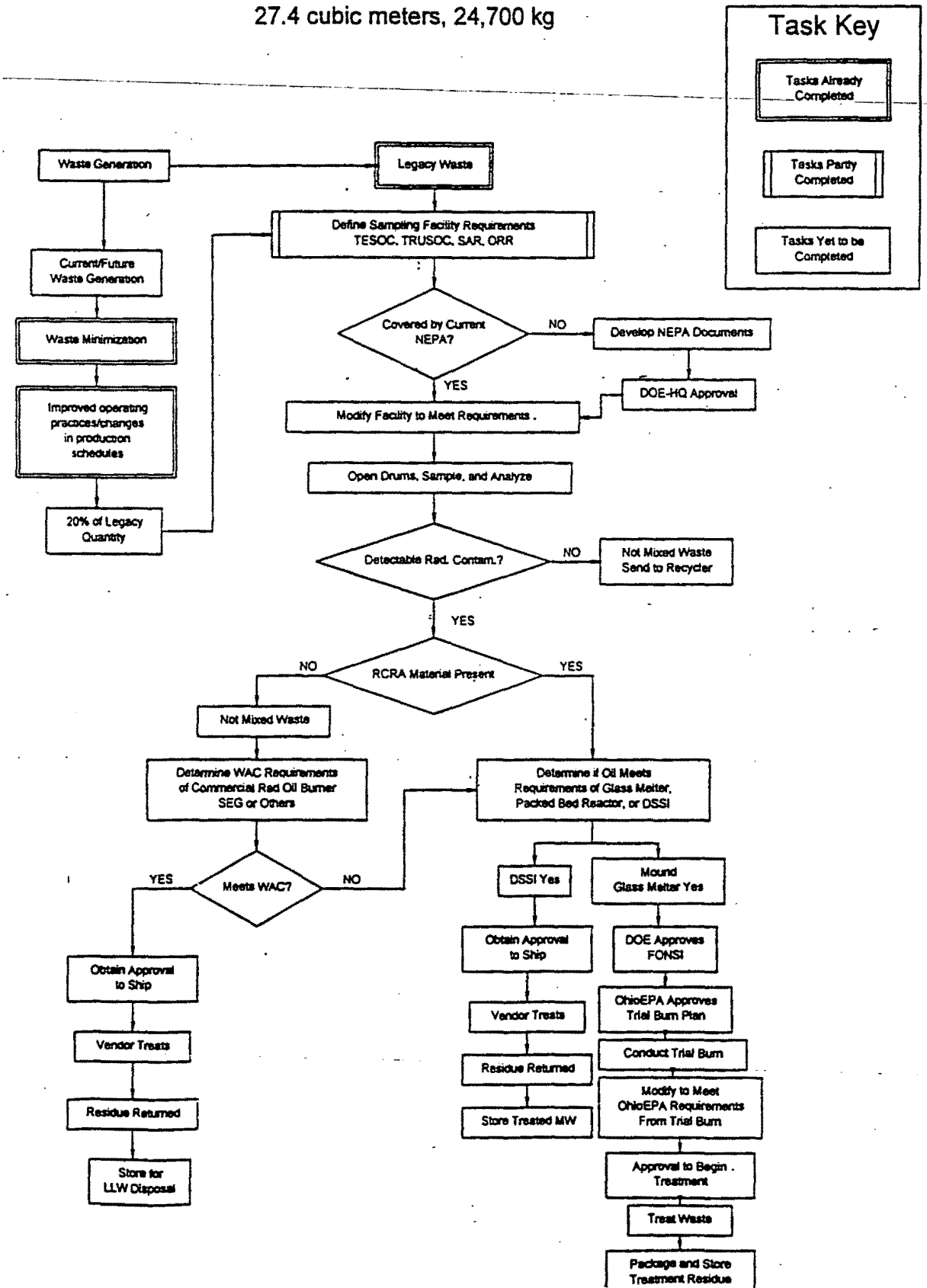
MD-W001
Scintillation Cocktail in Vials, Tritium, Pu-238
34.0 cubic meters; 10,600 kg
Xylene, pseudocumene, and 1,4-dioxane




Obtain Approvals TESOC, TRUSOC, SAR, ORR
Bulk Liquids
Rinse Vials
Compact Vials as LSA Trash
Obtain Approvals TESOC, TRUSOC, SAR, ORR
Bulk Liquids
Rinse Vials
Compact Vials as LSA Trash
Evaluate Vendor Technologies
Obtain Approvals to Ship to Vendor
Bulk Liquids
Rinse Vials
Waste Returned to Mound
Characterize Rad Content of Bulk Liquid
Define Treatment Options
Mound Glass Melter
DOE Approves FONSI
OhioEPA approves Trial Burn plan
Conduct Trial Burn
Modify Equipment to Meet OhioEPA Requirements from Trial Burn Results
Approval to Burn
Treat Waste
Package and Store Treatment Residue
Awaiting Shipment to MW Disposal Site
Diversified Scientific Services Inc. Oak Ridge
Send Waste Profile Sheet
Material Meets DSSI WAC
Schedule Shipment
Approvals and Permits Granted
Waste Treated
Treatment Residue Returned to Mound
Store Treatment Residue
Awaiting Shipment to MW Disposal Site

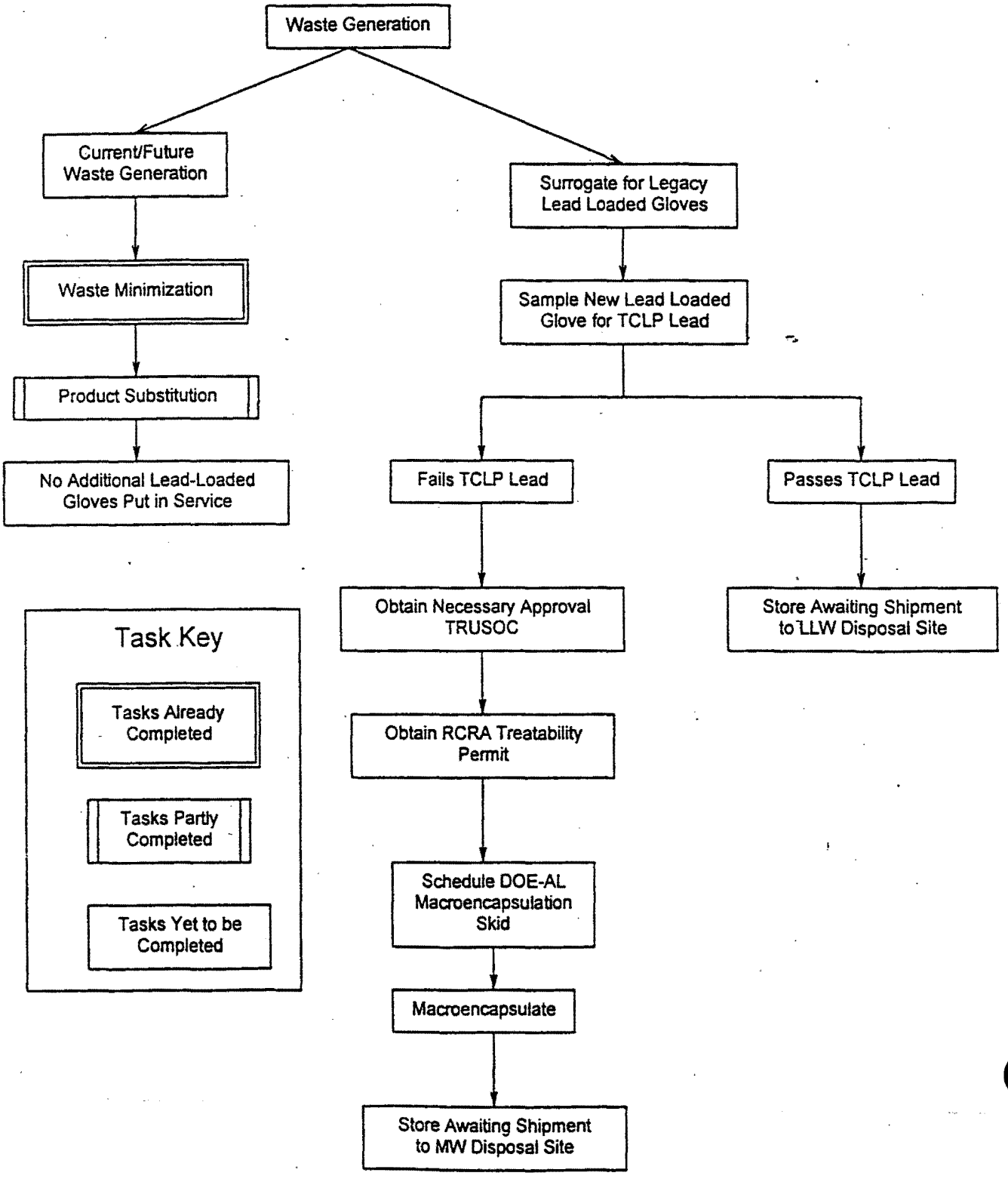
MOUND FACILITY
DRAFT SITE TREATMENT PLAN

MD-W013
Waste Oil Tritium, Pu-238, Contaminated
27.4 cubic meters, 24,700 kg



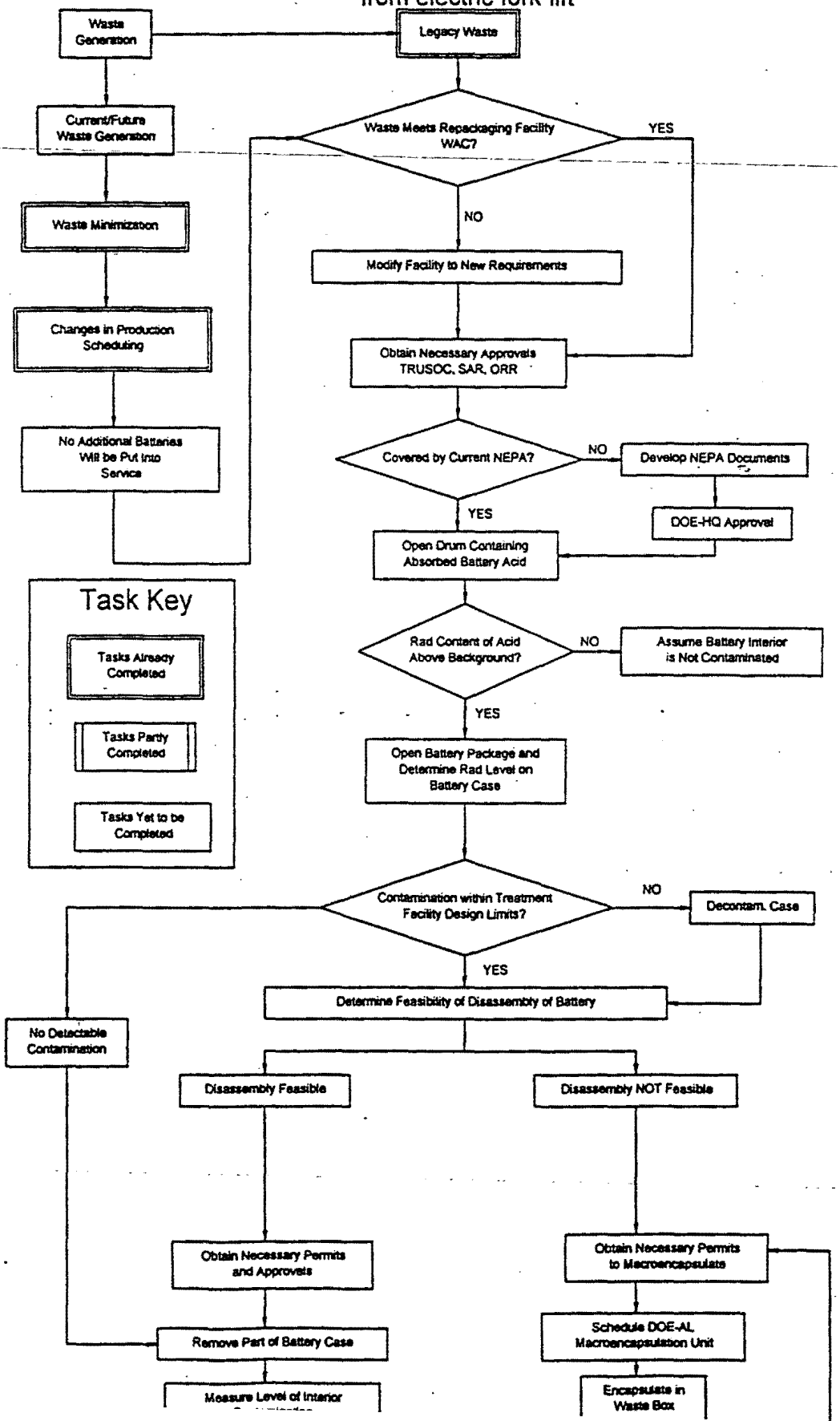
MOUND FACILITY
DRAFT SITE TREATMENT PLAN

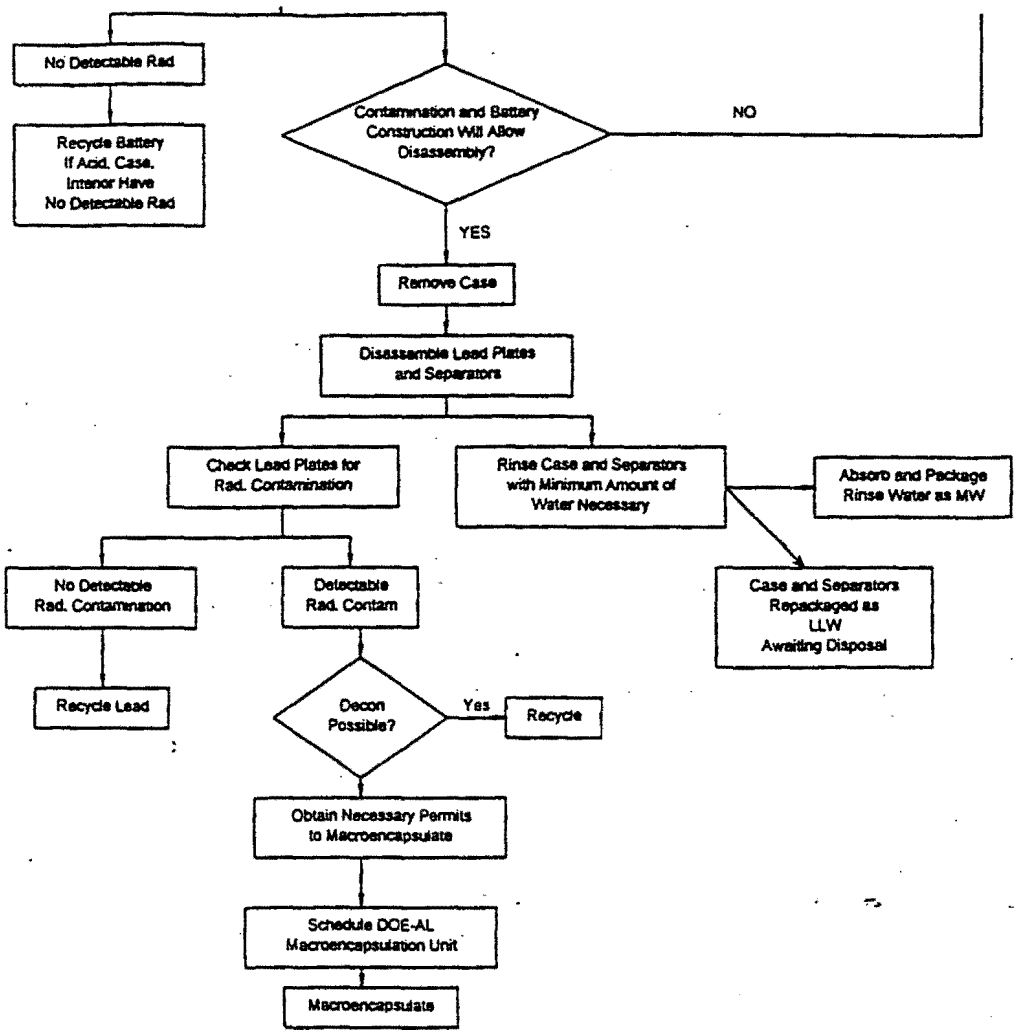
MD-W012
Waste Lead Loaded Gloves
5.9 kg Low-Level



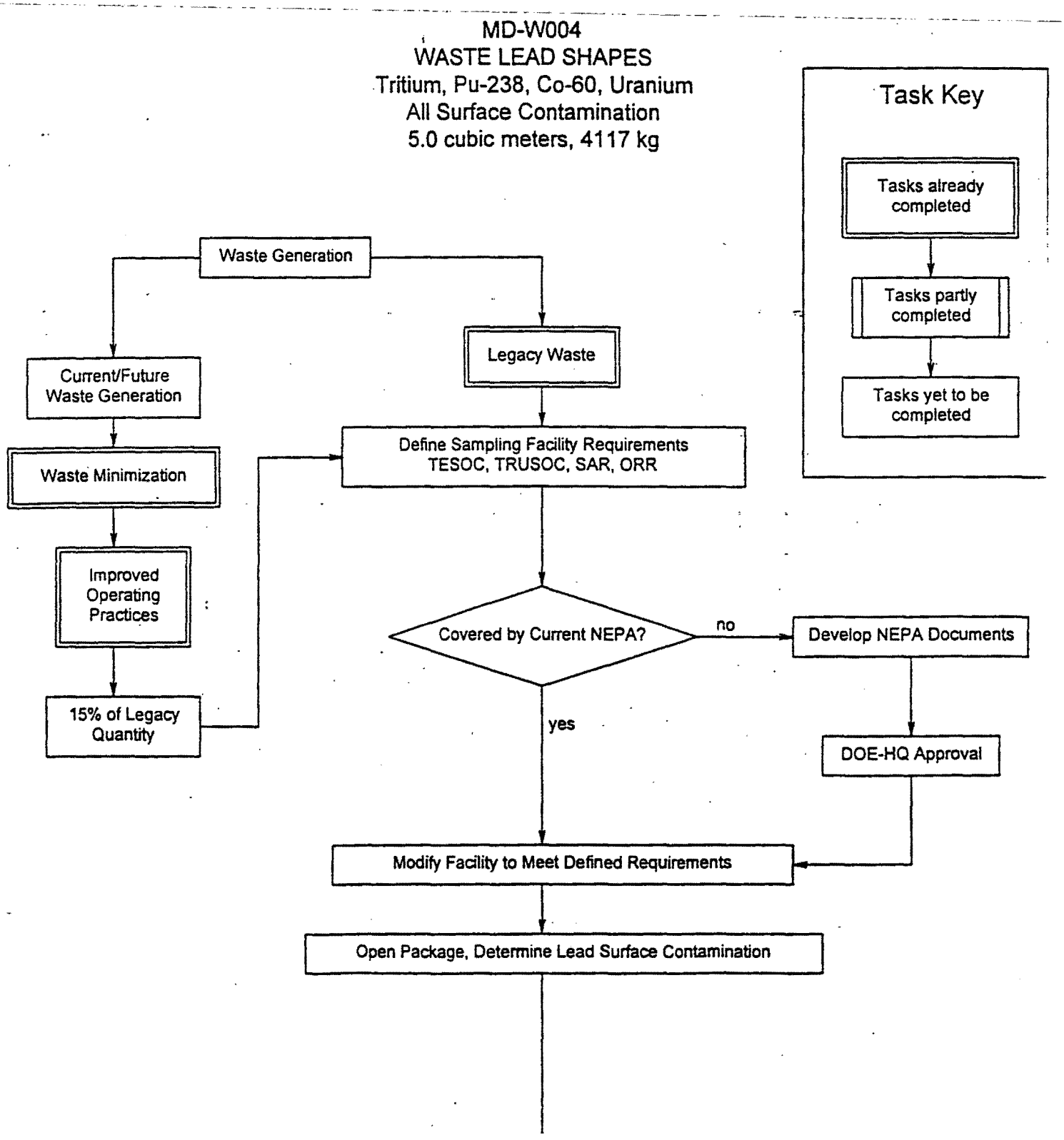
MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

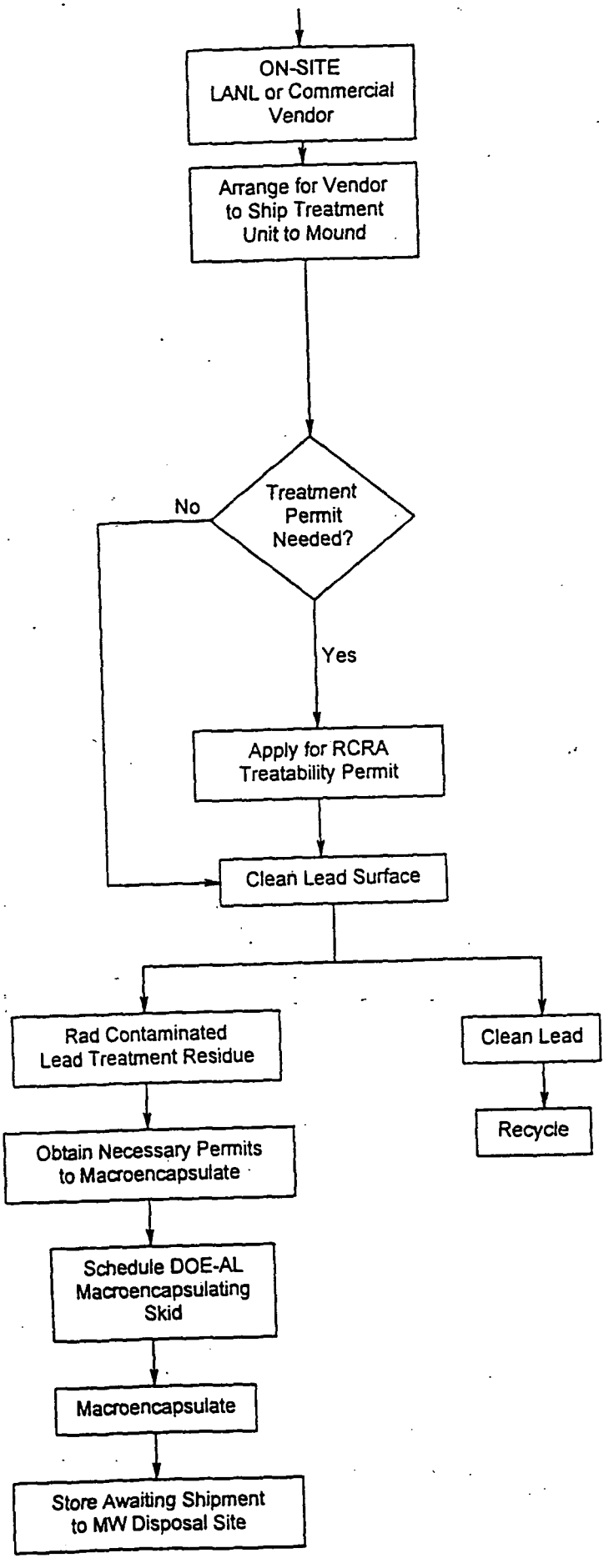
MD-W007
WASTE LEAD-ACID BATTERIES Pu-238 CONTAMINATED
0.850 cubic meters, 1024 kg
from electric fork lift




No Detectable Rad
Recycle Battery If Acid, Case, Interior Have No Detectable Rad
Contamination and Battery Construction Will Allow Disassembly?
NO
YES
Remove Case
Disassemble Lead Plates and Separators
Check Lead Plates for Rad. Contamination
Rinse Case and Separators with Minimum Amount of Water Necessary
Absorb and Package Rinse Water as MW
Case and Separators Repackaged as LLW Awaiting Disposal
No Detectable Rad. Contamination
Detectable Rad. Contam
Recycle Lead
Decon Possible?
Yes
Recycle
Obtain Necessary Permits to Macroencapsulate
Schedule DOE-AL Macroencapsulation Unit
Macroencapsulate

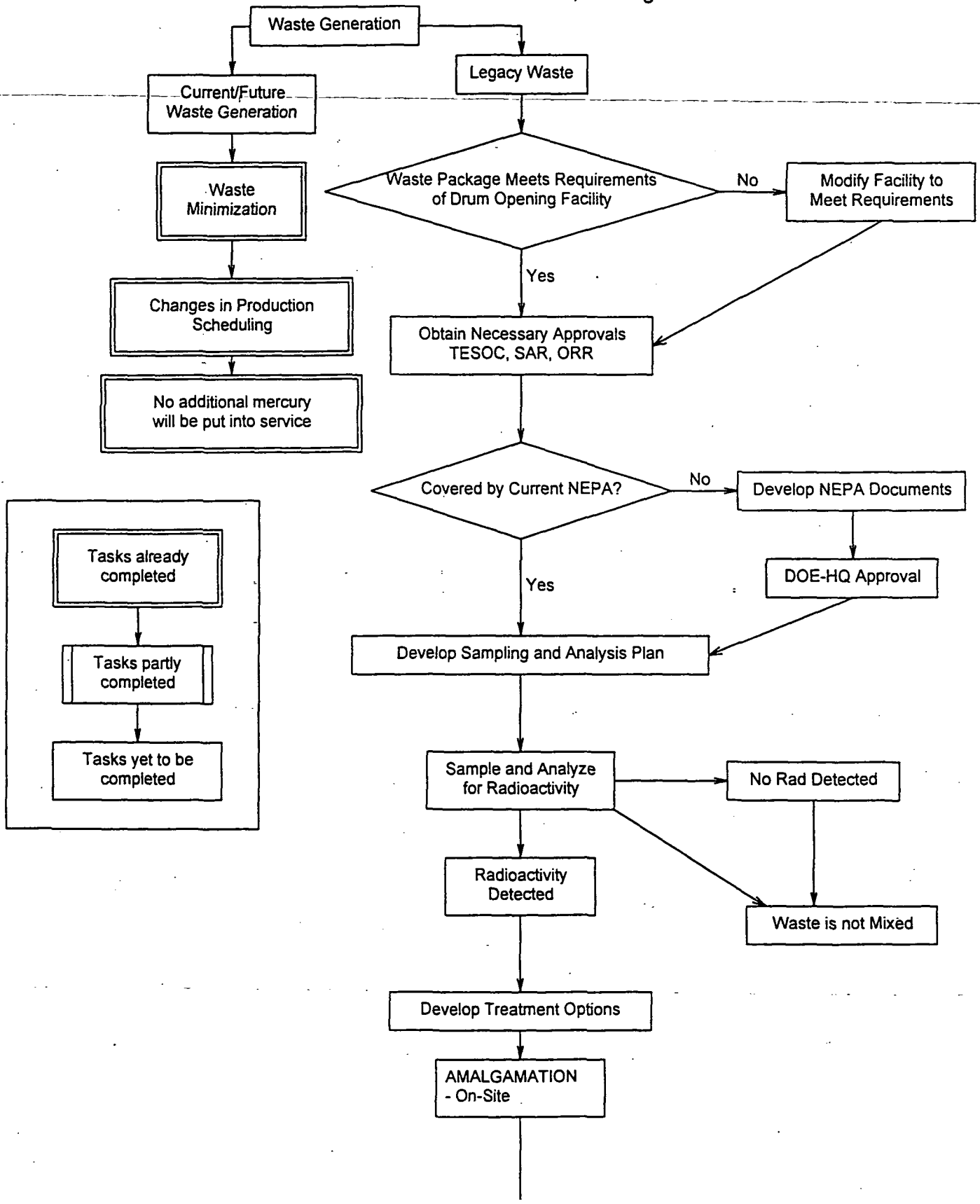
MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

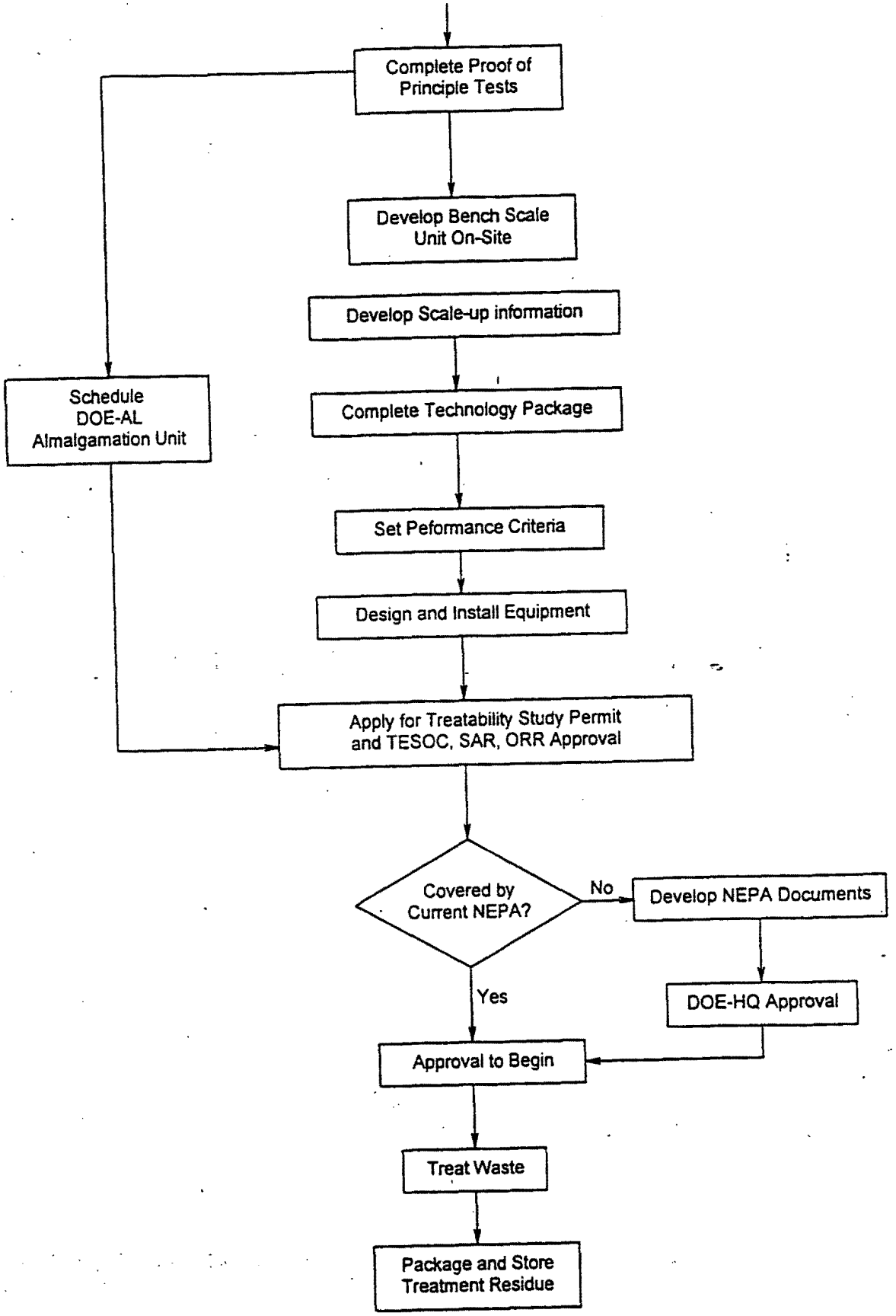



ON-SITE
LANL or Commercial
Vendor
Arrange for Vendor
to Ship Treatment
Unit to Mound
Treatment
Permit
Needed?
No
Yes
Apply for RCRA
Treatability Permit
Clean Lead Surface
Rad Contaminated
Lead Treatment Residue
Clean Lead
Recycle
Obtain Necessary Permits
to Macroencapsulate
Schedule DOE-AL
Macroencapsulating
Skid
Macroencapsulate
Store Awaiting Shipment
to MW Disposal Site

MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

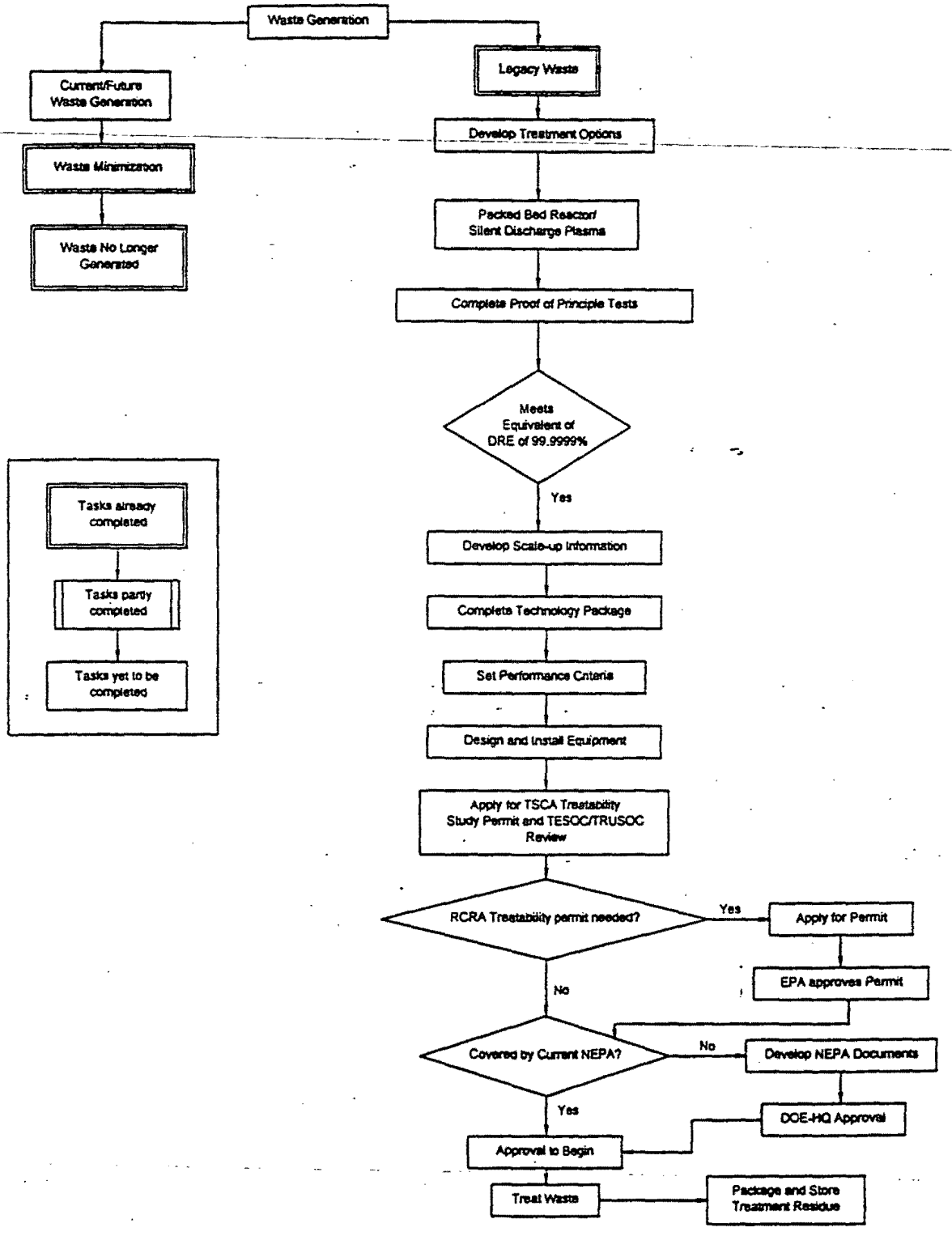
MD-W005
LIQUID MERCURY, TRITIUM CONTAMINATED
0.078 cubic meters, 25.9 kgs.




Complete Proof of Principle Tests
Develop Bench Scale Unit On-Site
Develop Scale-up information
Schedule DOE-AL Almalgamation Unit
Complete Technology Package
Set Peformance Criteria
Design and Install Equipment
Apply for Treatability Study Permit and TESOC, SAR, ORR Approval
Covered by Current NEPA?
No
Develop NEPA Documents
DOE-HQ Approval
Yes
Approval to Begin
Treat Waste
Package and Store Treatment Residue

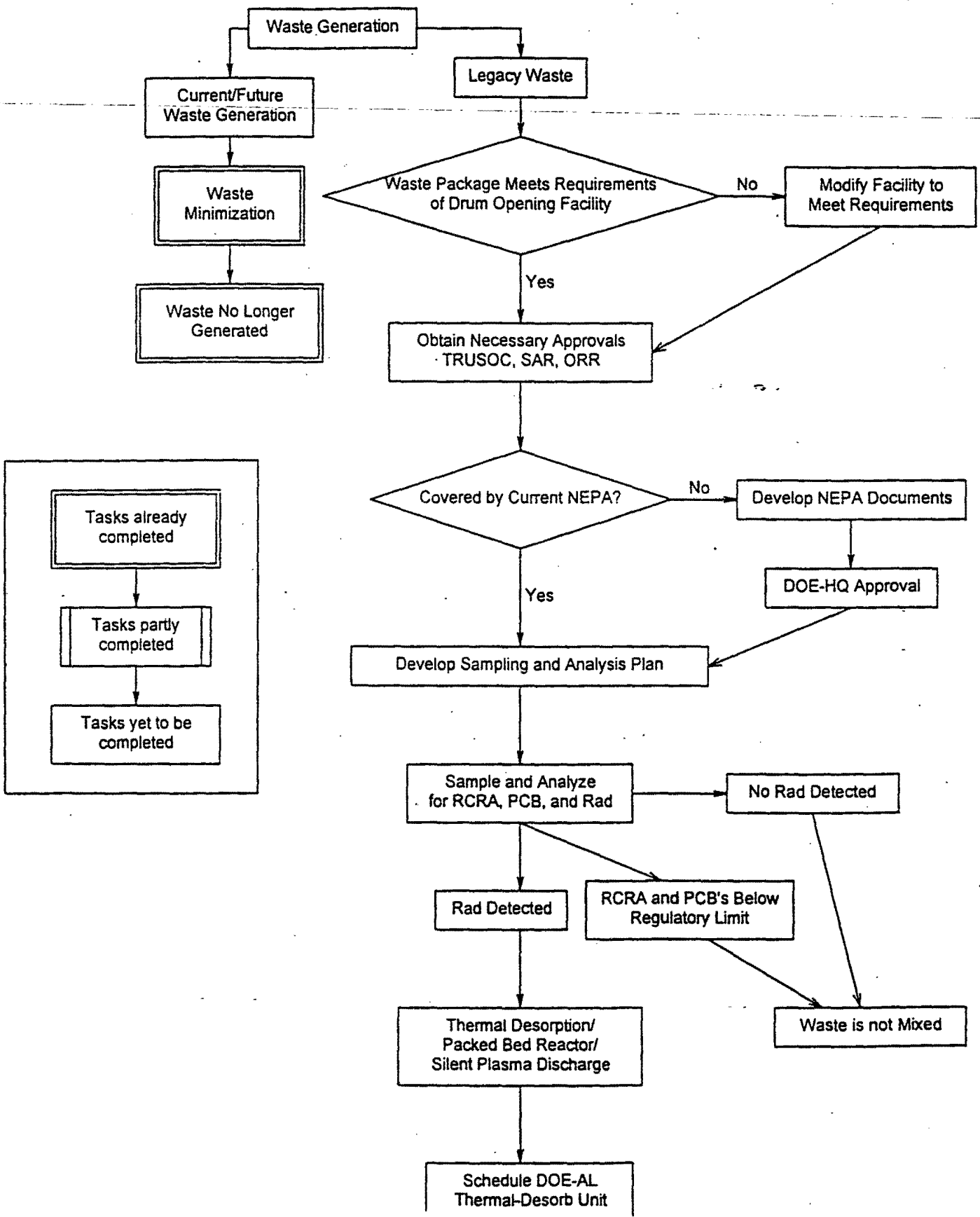
MOUND FACILITY
DRAFT SITE TREATMENT LOGIC DIAGRAMS

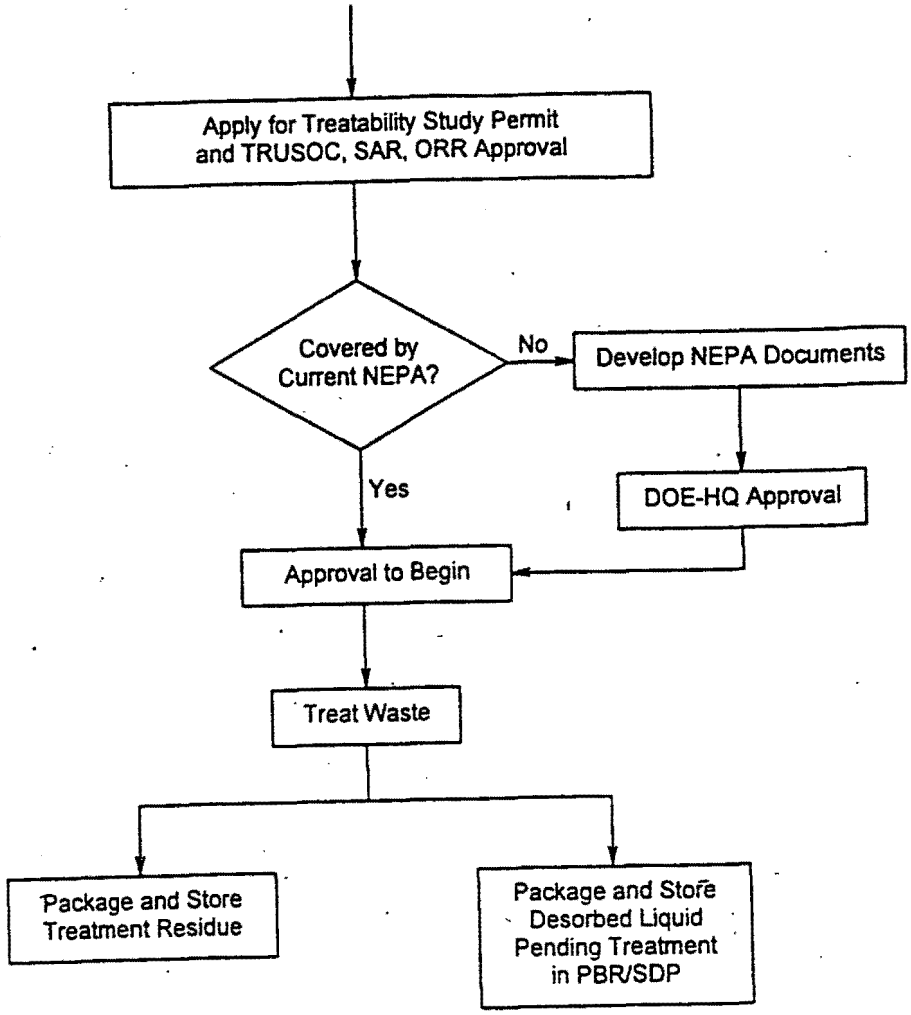
MD-W008
KEROSENE, PCB, TRITIUM CONTAMINATED
1.1 cubic meters, 1700 kg
analyzed for RCRA, rad, and PCB content
D001, ignitable



MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

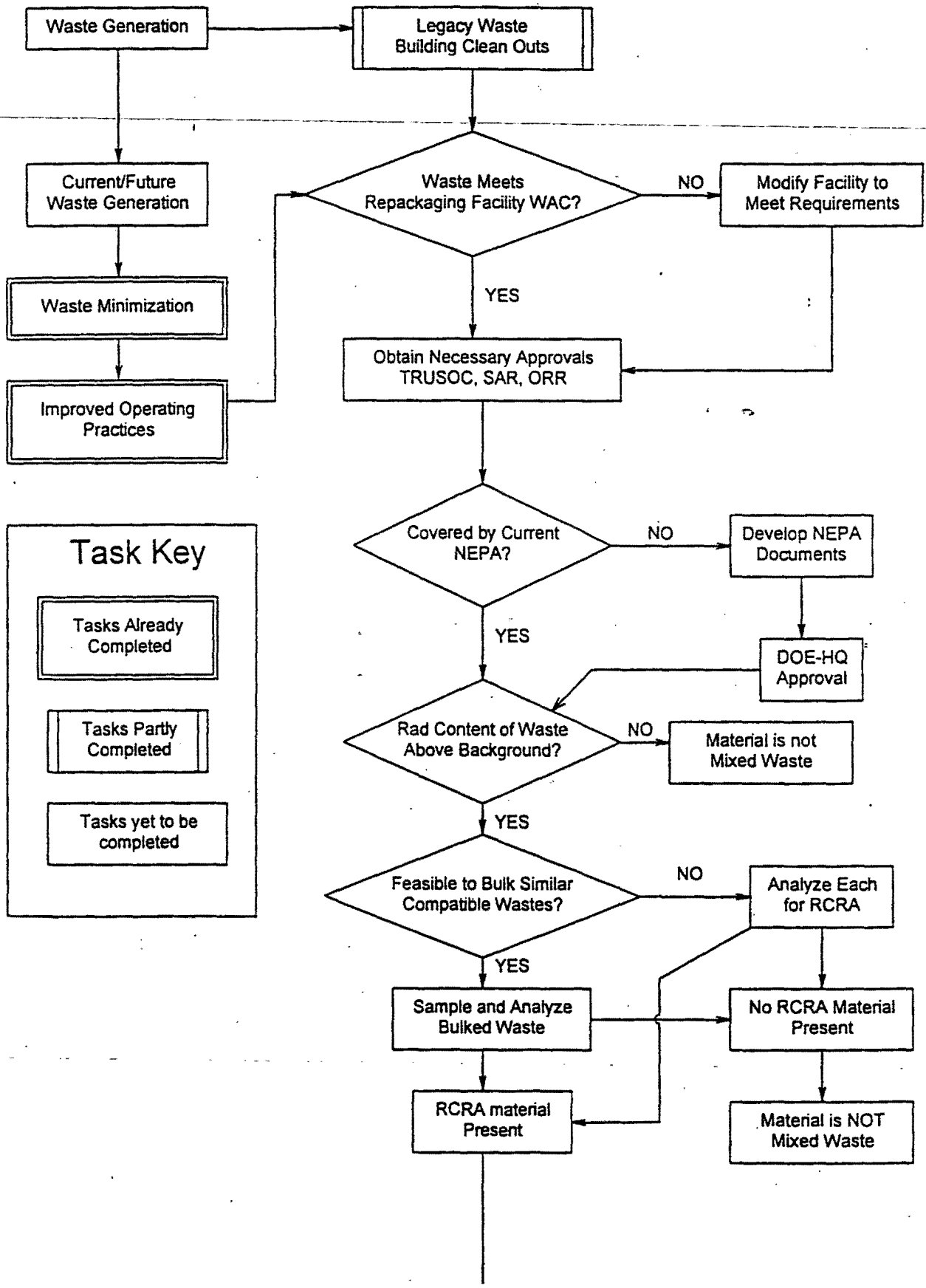
MD-W009
ABSORBED OIL, PCB, Pu-238 CONTAMINATED
0.227 cubic meters, 181 kg

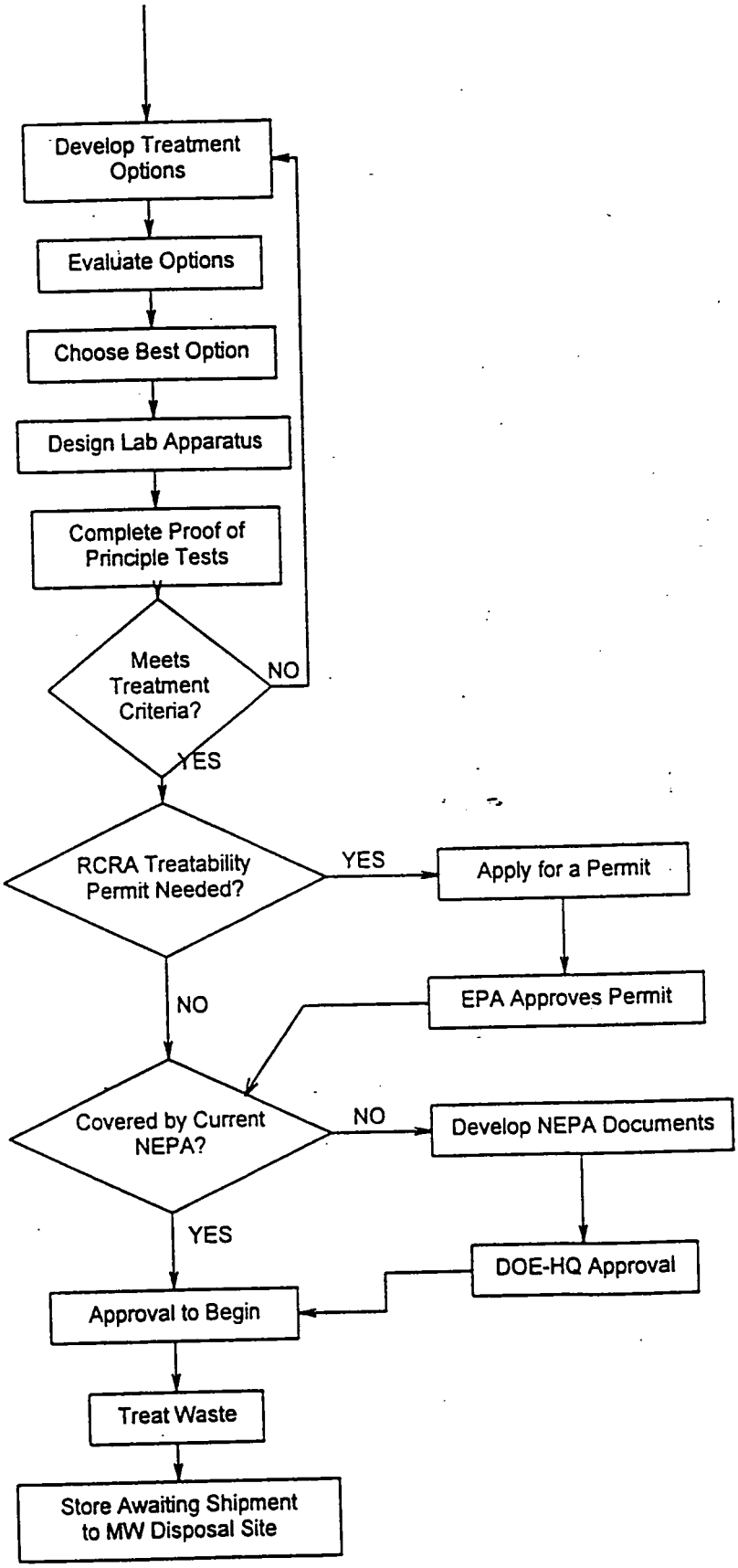



Apply for Treatability Study Permit and TRUSOC, SAR, ORR Approval
Covered by Current NEPA?
No
Develop NEPA Documents
DOE-HQ Approval
Yes
Approval to Begin
Treat Waste
Package and Store Treatment Residue
Package and Store Desorbed Liquid Pending Treatment in PBR/SDP

MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

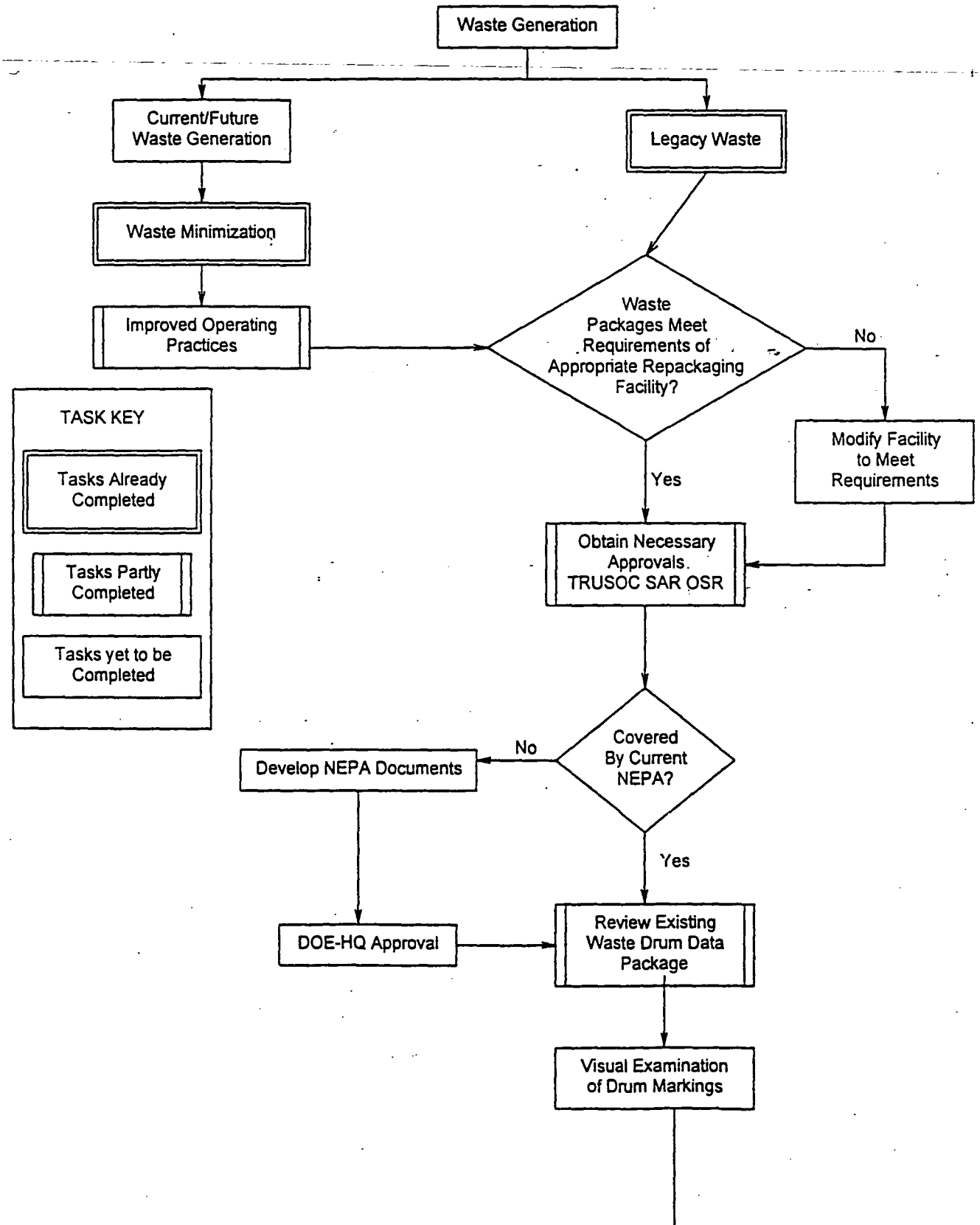
MD-W010 ; MD-W011
Miscellaneous Lab Packs

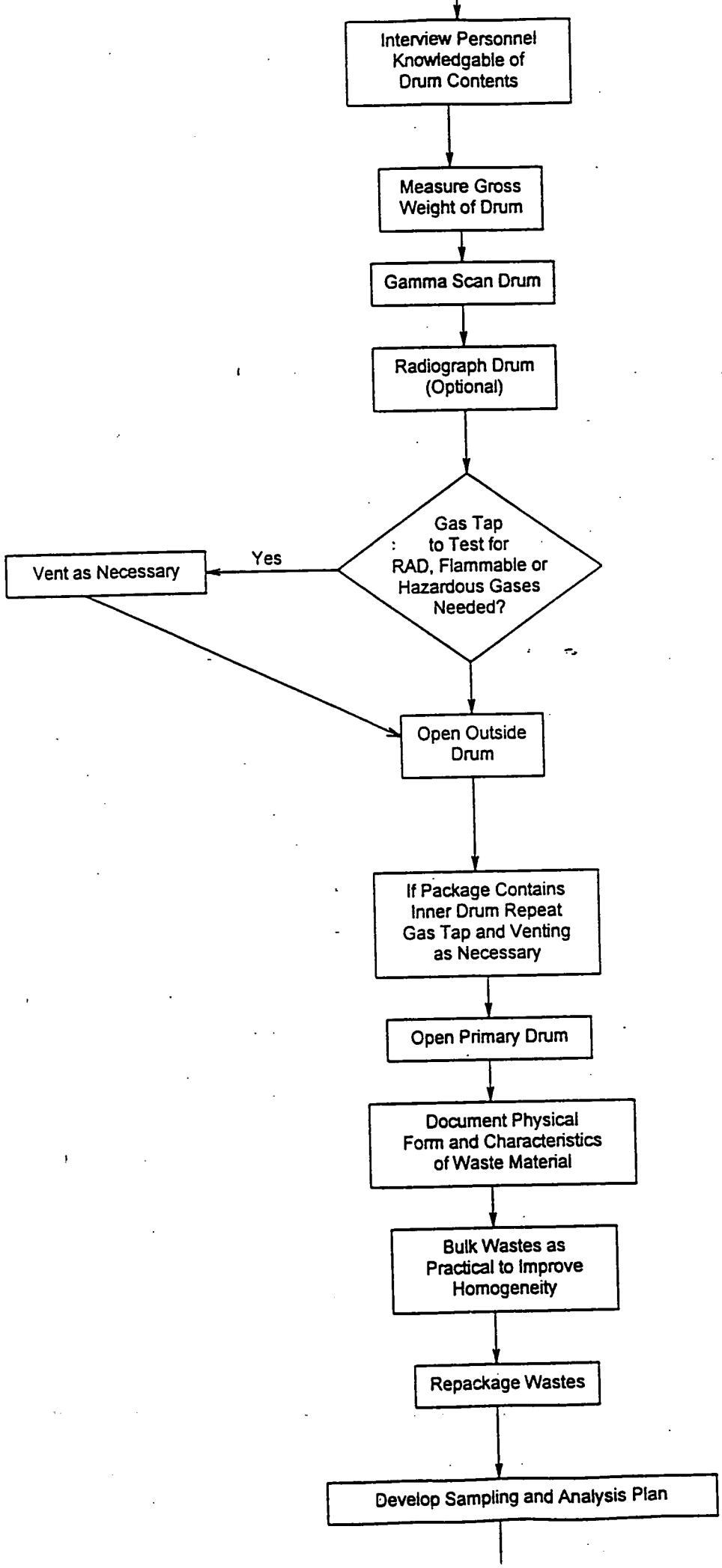


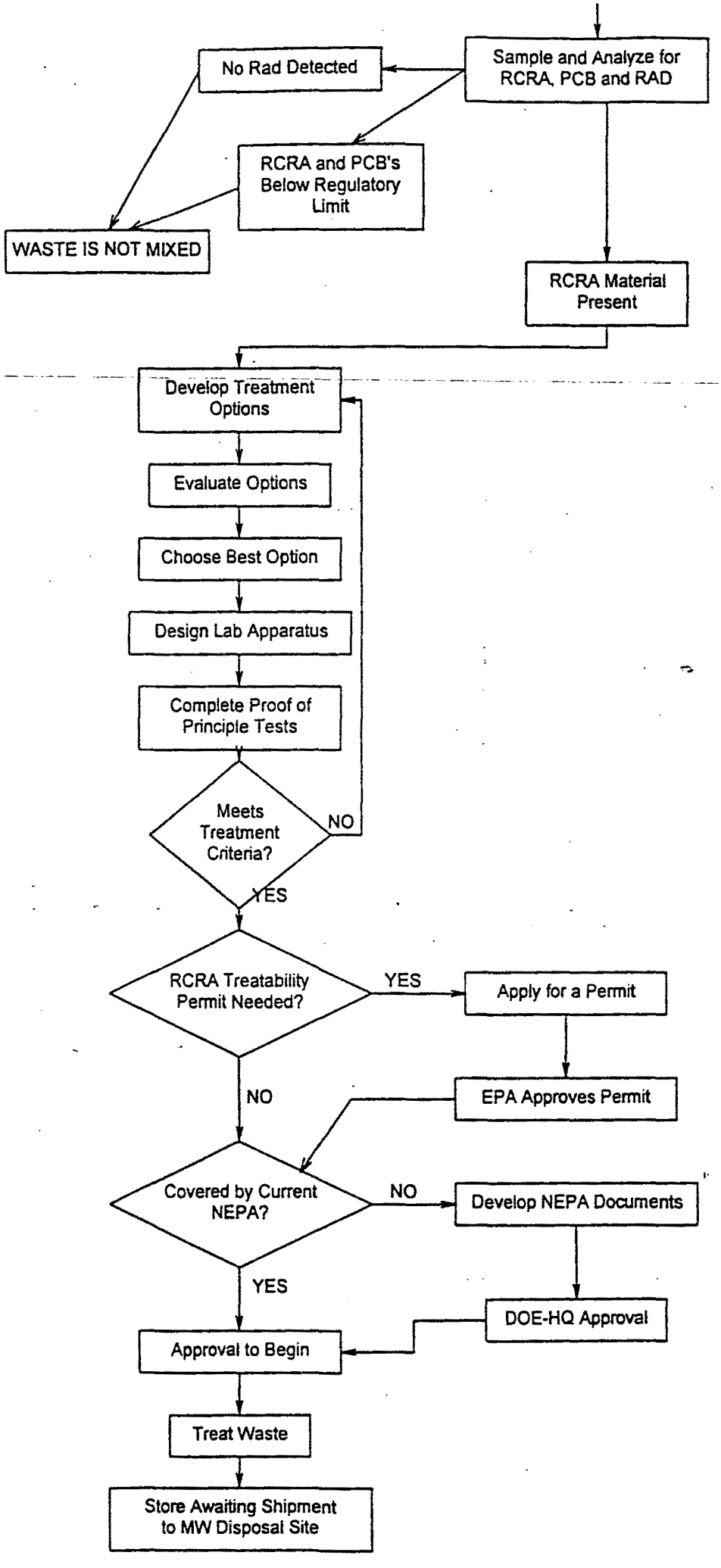

Develop Treatment Options
Evaluate Options
Choose Best Option
Design Lab Apparatus
Complete Proof of Principle Tests
Meets Treatment Criteria?
NO
YES
RCRA Treatability Permit Needed?
YES
Apply for a Permit
EPA Approves Permit
NO
Covered by Current NEPA?
NO
Develop NEPA Documents
YES
DOE-HQ Approval
Approval to Begin
Treat Waste
Store Awaiting Shipment to MW Disposal Site

MOUND FACILITY
DRAFT SITE TREATMENT PLAN LOGIC DIAGRAMS

MD-W014
Newly Discovered Potentially Mixed Waste (NE Waste)




Interview Personnel Knowledgable of Drum Contents
Measure Gross Weight of Drum
Gamma Scan Drum
Radiograph Drum (Optional)
Gas Tap to Test for RAD, Flammable or Hazardous Gases Needed?
Yes
Vent as Necessary
Open Outside Drum
If Package Contains Inner Drum Repeat Gas Tap and Venting as Necessary
Open Primary Drum
Document Physical Form and Characteristics of Waste Material
Bulk Wastes as Practical to Improve Homogeneity
Repackage Wastes
Develop Sampling and Analysis Plan


Sample and Analyze for RCRA, PCB and RAD
No Rad Detected
RCRA and PCB's Below Regulatory Limit
WASTE IS NOT MIXED
RCRA Material Present
Develop Treatment Options
Evaluate Options
Choose Best Option
Design Lab Apparatus
Complete Proof of Principle Tests
Meets Treatment Criteria?
NO
YES
RCRA Treatability Permit Needed?
YES
Apply for a Permit
EPA Approves Permit
NO
Covered by Current NEPA?
NO
Develop NEPA Documents
DOE-HQ Approval
YES
Approval to Begin
Treat Waste
Store Awaiting Shipment to MW Disposal Site

APPENDIX D
MOUND PUBLIC PARTICIPATION PLAN

PUBLIC PARTICIPATION PLAN

MOUND PLANT
SITE TREATMENT PLAN
UNDER FEDERAL FACILITY COMPLIANCE ACT OF 1992

1.0 Plan Overview

The purpose of this plan in relationship to Site Treatment Plan will be to coordinate Public Participation activities and input from stakeholders in the community concerning plans and actions for the treatment of mixed waste generated at Mound.

Much of the public participation activities will be based upon Mound's current Community Relations Plan for CERCLA (January 1993, revision 4) which has been approved by both the Ohio and U.S. EPA.

Milestones of the public participation aspect of Mound's Site Treatment Plan program would be as follows:

January 1994 - Input from stakeholders on their desired involvement in Site Treatment Plans;

March 1994 - Public meeting on input and further stakeholder comment;

May 1994 - Public comment period on Site Treatment Plans Public Participation Plan;

August 1994 - Draft Plan submitted to the Ohio EPA, including public comment;

November 1994 - Public Meeting on Final Draft Plan for Public Participation

2.0 Roles and responsibilities

Public Participation activities will be the responsibility of the EG&G Mound Office of Public Affairs , which currently coordinates public participation activities for the CERCLA program at the site and other programs requiring public participation.

The role of the Ohio EPA will be to review and comment on all printed matter for public dissemination and to interact during public participation activities including workshops, public meetings, seminars, and tours.

Communication with EM-4 and EM-30 will come through updates on the public involvement calendars and schedules and any site advisory board meetings.

With the advent of Mound's transition and decreasing funding, staffing for this area will be important under regulated requirements by the FFCAct and to keep the stakeholders involved. Another potential impediment will be cross over issues involving STP, CERCLA, and transition of the facility.

3.0 Issue identification

The following are some of the issues that have been raised at CERCLA and Five-Year Plan public meetings conducted by Mound:

- Are the methods for treating waste safe for the citizens and the environment?
- How will the glass melter be utilized?
- Will the packed-bed process being used at Los Alamos be tried at Mound?
- What kind of potential contamination can we get from stored mixed waste?
- Where have these technologies been tried and where can we get information on them?
- Will DOE have full and complete funding to do the job and not in segments that take years to complete?
- What is the role of the Ohio and U.S. EPA, Ohio Department of health, and Agency for Toxic Substances and Disease registry? Will they be able to do what they want or bow to DOE's decisions?
- What are the health risks for this effort for employees?
- Will anything be shipped off the site, by what means, and when? Will it be safe to do?
- Will air monitoring take place during treatment? At the location or at the plant boundary?
- What kinds of chemicals and radioactive materials are to be treated?
- What are the cancer risks when these materials are combined? What is the risk to me if I live just across the street?
- Will there be independent oversight during the treatment operations or just in startup for approval?
- Who sets the priorities - DOE, the public regulators?
- If mixed waste cannot be treated, will it be buried at Mound?

4.0 Planned activities

4.1 Decision Points/Milestones

January 1994 - Information on input into how stakeholders want to be involved in Site Treatment Plans;

March 1994 - Public meeting on input and further stakeholder comment;

May 1994 - Public comment period on Site Treatment Plans Public Participation Plan;

August 1994 - Draft Plan submitted including public comment;

November 1994 - Public Meeting on Final Draft Plan for Public Participation

4.2 Objectives

Gaining stakeholder input into the role that they should play in the Site Treatment Plan is the primary objective with a secondary objective being of incorporating any significant new roles into existing CERCLA-type public participation programs. The main expectation is to inform, educate and allow stakeholders participate in decision-making based upon facts, not misinformation. All information in connection with the FFCAct and Mound would be available in the Public Repository located at the Miamisburg Senior Adult Center, 305 E. Central Avenue, Miamisburg, OH 45342

4.3 Stakeholders

Stakeholders would include local elected and appointed officials, regulators, employees, unions, local business and community leaders, special interest groups, Indian Tribes, and any interested citizen. Feedback to stakeholders actively involved would be through special newsletter-type updates, public meetings and one-on-one discussions.

4.4 Program coordination

The basis for activities under FFCAct would be the Mound Community Relations Plan for the CERCLA Program (January 1993, Revision 4 and subsequent updates). This Community Relations Plan was initially developed in 1990, revised in 1991 and has been implemented.

4.5 Schedule

See section 4.1.

5.0 Evaluation

Based upon stakeholder input, methods of communication and stakeholder interaction would be used to determine the level of success of the program. This would include evaluations by active participants in the Stakeholder process of the degree to which public input is contributing to the effectiveness of the Site Treatment Plan development.

APPENDIX E
COST ESTIMATE

DRAFT SITE TREATMENT PLAN
ALBUQUERQUE OPERATIONS OFFICE
COST ESTIMATE

Introduction

The order-of-magnitude cost estimate prepared for the Albuquerque Operations Office (AL) Draft Site Treatment Plan is contained herein. The estimate is for the treatment, by the nine sites that report to AL, of mixed low-level waste on-site and off-site. The on-site treatment capacity is provided by mobile treatment units. The off-site treatment capacity is provided by commercial treatment facilities. Engineering design has just begun on the mobile treatment units and future waste stream quantities are uncertain. Because of these unknowns, this order-of-magnitude cost estimate should not be used for budgeting purposes as the accuracy of the estimate is between +50 percent and -30 percent.

This estimate was prepared according to the reporting format in the Draft Site Treatment Plan Cost Information Guide, April 21, 1994, and, with the exception of operating labor and maintenance, the estimating values are presented consistently with the report format.

The operating labor and maintenance estimate was time-phased following the fabrication of the mobile treatment unit. Fabrication of the units occurs annually from FY97 through FY99. The staggering of unit fabrication causes fluctuations in the annual labor and maintenance values. To accommodate the reporting format, total operating labor and maintenance were provided for the respective work breakdown structure (WBS) elements. The sum of those values was divided by the number of years covered by the estimate to calculate an "Average O&M" rather than an "Annual O&M."

Excluded from this cost estimate are the costs to treat all waste generated by the Environmental Restoration (ER), Decontamination and Decommissioning (D&D) programs, D&D of mobile treatment units and on-site treatment/storage facilities, and annual utilities and materials.

The wastes from D&D and ER were included in waste quantities when the waste was adequately defined. The treatment capacity estimated does not exclude the addition of these wastes, and they may be included later.

The D&D of mobile treatment units and on-site treatment/storage facilities was excluded on the basis of immateriality. The mobile treatment unit D&D will take one or two days maximum. The on-site treatment/storage facilities will not be

decontaminated and will continue to be used for treatment/storage purposes in the future.

The annual utility and material costs were not included in the estimate on the basis of immateriality and unavailable historical data. The mobile treatment units are powered by 50 horsepower motors, which consume small amounts of electricity. Utility and material costs are not broken out in the baseline documentation used to prepare this estimate. These costs are generally captured in site overhead rates and costed through direct labor estimates.

buquerque Operations Office - On-site Mobile Treatment Unit Option Cost Estimate

Option Name: On-site Mobile Treatment

odule Name	Mobile Treatment Units		Transportation of MTUs		Frnt end/Bck end Spt.		Interim Storage		TOTAL OPTION	
odule Location Albuquerque Operations Office Sites										
aste Type MLLW,non-alpha,contact handled										
odule Status New,Small Generator,On-site,Portable										
BS ELEMENT	($ x 1000) SUB $	($ x 1000) ELEMENT $	($ x 1000) SUB $	($ x 1000) ELEMENT $	($ x 1000) SUB $	($ x 1000) ELEMENT	($ x 1000) SUB $	($ x 1000) ELEMEN	($ x 1000) SUB $	($ x 1000) ELEMENT
0 Pre-Operations										
1.1 Studies and Bench Scale Tests	$4,545		$0		$0		$0		$4,545	
1.2 Demonstration Costs			$0		$0		$0		$0	
1.3 Operations Budget Funded Activities									$0	
1.3.1 Conceptual Design	$405		$0		$0		$0		$405	
1.3.2 Safety Assurance Documentation	$7,942		$0		$0		$0		$7,942	
1.3.3 Permitting	$12,216		$0		$0		$0		$12,216	
1.3.4 Preparation for Operations	$5,377		$0		$0		$0		$5,377	
1.3.5 Project Management	$7,192		$0		$0		$0		$7,192	
TOTAL PRE-OPERATIONS		$37,677		$0		$0		$0		$37,677
0 Facility Construction Costs										
2.1 Design (Title I and II)	$4,455		$0		$0		$0		$4,455	
2.2 Inspection	$0		$0		$0		$0		$0	
2.3 Project Management	$0		$0		$0		$0		$0	
2.4 Building Construction (inc. Indirect)	$180		$0		$0		$0		$180	
2.5 Equipment	$9,664		$0		$0		$0		$9,664	
2.6 Construction Management	$0		$0		$0		$0		$0	
2.7 Contingency	$0		$0		$0		$0		$0	
TOTAL FACILITY CONSTRUCTION COSTS		$14,299		$0		$0		$0		$14,299
10 Operating and Maintenance										
3.1 Operating Labor	$82,580		$0		$11,204		$1,667		$95,652	
3.2 Annual Utilities	$0		$0		$0		$0		$0	
3.3 Annual Materials	$50		$0		$0		$0		$50	
3.4 Maintenance	$23,367		$0		$0		$0		$23,367	
3.5 Annual Contingency	$0		$0		$0		$0		$0	
AVERAGE O&M	$8,833		$0		$934		$156		$9,922	
X NUMBER OF YEARS OF OPER.	12				12		12		12	
TOTAL O&M COSTS		$105,996		$0		$11,204		$1,667		$119,069
4.0 Decontamination and Decommissioning	See Assumtions									
4.1 Facility D&D									See Assumptions	
4.2 Closure, Post-Closure, Monitoring										
TOTAL DECON. AND DECOM.		$0								
5.0 Contracted Services										
5.1 Commercial Treatment/Disposal										
5.1 Mobile Treatment			$5,665		$0		$0		$5,665	
TOTAL CONTRACT SERVICES		$0		$5,665		$0		$0		$5,665
6.0 Off-site Treatment (DOE)		$0		$0		$0		$0		$0
7.0 Transportation		$0		$0		$0		$0		$0
Total Cost for On-site MTU Module	(1994 Dollars)	$157,974	(1994 Dollar	$5,665	(1994 Dollar	$11,204	(1994 Dollar	$1,667	(1994 Dollars)	$176,710

DSTP OPTION YEARLY COST ESTIMATE

Option Name: On-site Mobile Treatment Units

Option Location: Albuquerque Operations Office

Total Cost of Option (thousands):

FY 1994 Dollars	$176,708
Escalated Dollars	$209,926

FISCAL YEAR	ANNUAL FUNDING (FY 1994 DOLLARS Capital	Operating	ANNUAL FUNDING (Escalated Dollars) Capital	Operating	ACTIVITIES
1994	$234	$6,481	$234	$6,481	Benchscale studies, Operation labor at existing facilities
1995	$1,930	$17,583	$1,986	$18,093	Upgrade CIA, assemble benchscale units, Pre operation activities
1996	$0	$12,225	$0	$12,959	Pre operation activities
1997	$1,500	$13,366	$1,638	$14,596	Fabricate three MTUs, Pre operation activities
1998	$2,000	$13,731	$2,252	$15,461	Fabricate four MTUs, Pre operation activities
1999	$4,000	$14,901	$4,638	$17,270	Fabricate eight MTUs, Pre operation activities
2000	$0	$14,252	$0	$17,017	Operate MTUs
2001	$0	$14,901	$0	$18,328	Operate MTUs
2002	$0	$14,901	$0	$18,880	Operate MTUs
2003	$0	$14,901	$0	$19,446	Operate MTUs
2004	$0	$14,901	$0	$20,027	Operate MTUs
2005	$0	$14,901	$0	$20,623	Operate MTUs
TOTAL	$9,664	$167,044	$10,746	$199,180	

treatment capacity, inventory project manager	mtu description		design and permitting cost	fabrication cost
DJPO				
	Thermal Desorption			
	1 Skid		$900 0	$500 0
	1 Bench Scale Unit		$450 0	$50 0
	Evap. Ox.			
	1 Skid		$900 0	$500 0
	Treated Water Evap.			
	1 Skid		$900 0	$500 0
	1 Bench Scale Unit		$450 0	$50 0
KCP				
	Offsite Treatments		$0 0	$0 0
	Plating Wastes,			
	1 Bench Scale Unit		$450 0	$50 0
	SCCOR (EM-50)		$0 0	$0 0
LANL				
	Gas Cylinder			
	1 Skid		$900 0	$500 0
	Plating Waste			
	1 Skid		$900 0	$500 0
	Reactive Metal			
	1 Skid		$900 0	$500 0
	Uranium Chips			
	1 Skid		$900 0	$500 0
	Pb Dross Fraser		$0 0	$0 0
	Triple Distill. of Hg		$0 0	$0 0
	DETOX			
	1 Skid		$900 0	$500 0
	1 Bench Scale Unit		$450 0	$50 0
	CAV		1753 0	$0 0
	Chelating fb STABIL			
	1 Drum Size Unit		$800 0	$500 0
	Hydrothermal Processing			
	1 Skid		$800 0	$500 0
MIND				
	Tritium Capture			
	1 Skid		$900 0	$500 0
	1 Bench Scale Unit		$450 0	$50 0
	1 Drum Size Unit		$800 0	$500 0
	PBR/SDP			
	1 Skid		$900 0	$500 0
	Glass Maker		$0 0	$0 0
PP				
	Amal.			
	1 Bench Scale Unit		$450 0	$50 0
PR				
	STBL			
	1 Skid		$900 0	$500 0
	1 Bench Scale Unit		$450 0	$50 0
	1 Drum Size Unit		$800 0	$500 0
	Sulfate Proc. of Barium			
	1 Skid		$900 0	$500 0
	Macroencap.			
	1 Drum Size Unit		$800 0	$500 0
	Metal Matrix (EM-50)		$0 0	$0 0
	Site (EM-50)		$0 0	$0 0
SNL/NM				
	Steam Reforming			
	1 Skid		$900 0	$500 0
	Retorting fb AMLGN			
	of Hg salts			
	1 Bench Scale Unit		$450 0	$50 0
Total				
	Skid Units	11	$9,900 0	$5,500 0
	Drum Units	4	$3,600 0	$2,000 0
	Bench Scale Units	8	$2,250 0	$250 0

description	Intake Operation	cost specific wbs (000 omitted)	fy94	fy95	fy96	fy97	fy98	fy99	fy2000	fy01	fy02	fy03	fy04	fy05	total
Bench Scale Units	5 units in FY 96	1.1 Studies/Benchscale Test	$342.5	$1,687.5											$2,030.0
		2.5 Equipment		$250.0											$250.0
		3.1 Annual Operating Labor			$412.2	$412.2	$412.2	$412.2		$412.2	$412.2	$412.2	$412.2	$412.2	$3,779.0
		3.4 Annual Maintenance			$7.5	$7.5	$7.5	$7.5		$7.5	$7.5	$7.5	$7.5	$7.5	$67.5
Drum Units	4 units cold start in FY 99	1.1 Studies/Benchscale Test			$412.0										$412.0
		1.3.1 Conceptual Design			$100.0										$100.0
		1.3.2 Safety Docs.			$300.0	$300.0									$792.0
		1.3.3 Permitting				$792.0									$792.0
		1.3.4 Prep for Ops					$100.0								$100.0
		2.1 Design (Tasks I and II)					$1,100.0								$1,100.0
		2.5 Equipment						$2,000.0							$2,000.0
		3.1 Annual Operating labor						$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$7,192.5
		3.4 Annual Maintenance						$60.0	$60.0	$60.0	$60.0	$60.0	$60.0	$60.0	$420.0
Solid Units	4 units cold start in FY 99	1.1 Studies/Benchscale Test			$412.0										$412.0
		1.3.1 Conceptual Design			$100.0										$100.0
		1.3.2 Safety Docs			$300.0	$300.0									$792.0
		1.3.3 Permitting				$792.0									$792.0
		1.3.4 Prep for Ops.					$100.0								$100.0
		2.1 Design (Tasks I and II)					$1,100.0								$1,100.0
		2.5 Equipment						$2,000.0							$2,000.0
		3.1 Annual Operating labor						$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$7,192.5
		3.4 Annual Maintenance						$60.0	$60.0	$60.0	$60.0	$60.0	$60.0	$60.0	$420.0
	4 units cold start in FY 98	1.1 Studies/Benchscale Test		$412.0											$412.0
		1.3.1 Conceptual Design		$100.0											$100.0
		1.3.2 Safety Docs.		$300.0	$300.0										$792.0
		1.3.3 Permitting			$792.0										$792.0
		1.3.4 Prep for Ops				$100.0									$100.0
		2.1 Design (Tasks I and II)				$1,100.0									$1,100.0
		2.5 Equipment					$2,000.0								$2,000.0
		3.1 Annual Operating labor					$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$1,027.5	$8,220.2
		3.4 Annual Maintenance					$60.0	$60.0	$60.0	$60.0	$60.0	$60.0	$60.0	$60.0	$480.0
	3 units cold start in FY 97	1.1 Studies/Benchscale Test	$229.5	$229.5											$459.0
		1.3.1 Conceptual Design		$81.0											$81.0
		1.3.2 Safety Docs.		$304.0											$304.0
		1.3.3 Permitting			$304.0										$304.0
		1.3.4 Prep for Ops.			$81.0										$81.0
		2.1 Design (Tasks I and II)			$221.0	$660.3									$881.0
		2.4 Building Construction				$100.0									$100.0
		2.5 Equipment				$1,300.0									$1,300.0
		3.1 Annual Operating labor				$370.0	$770.6	$770.6	$770.6	$770.6	$770.6	$770.6	$770.6	$770.6	$6,743.1
		3.4 Annual Maintenance				$33.0	$43.0	$43.0	$43.0	$43.0	$43.0	$43.0	$43.0	$43.0	$393.0
Project Management	GJPO	1.3.9 Project Management	$682.0	$1,800.0											$2,482.0
	9 Sites		$300.0	$300.0	$400.0	$400.0	$400.0	$400.0	$400.0	$400.0	$400.0	$400.0	$400.0	$400.0	$4,700.0
CIA	end of FY 1995	1.3.2 Safety Docs.	$304.0	$373.5	$370.0	$360.5	$403.5	$417.5	$417.5	$417.5	$417.5	$417.5	$417.5	$417.5	$4,972.0
		1.3.3 Permitting	$229.0	$2,006.0	$336.0	$370.0	$363.0	$414.0	$414.0	$414.0	$414.0	$414.0	$414.0	$414.0	$6,246.0
		1.3.4 Prep for Ops.	$304.0	$373.5	$370.0	$360.5	$403.5	$417.5	$417.5	$417.5	$417.5	$417.5	$417.5	$417.5	$4,978.0
		2.5 Equipment	$234.0	$1,080.0											$1,314.0
		3.1 Annual Operating labor		$437.0	$1,032.0	$1,034.0	$1,711.0	$1,700.0	$1,700.0	$1,700.0	$1,700.0	$1,700.0	$1,700.0	$1,700.0	$13,797.0
		3.4 Annual Maintenance	$3,044.0	$4,100.0	$1,300.0	$1,130.0	$1,177.0	$1,217.0	$1,217.0	$1,217.0	$1,217.0	$1,217.0	$1,217.0	$1,217.0	$21,566.0
Load Down Trailer	Third Quarter FY 1995	3.1 Annual Operating labor	$0.0	$90.0	$197.0	$197.0	$197.0	$197.0	$197.0	$197.0	$197.0	$197.0	$197.0	$197.0	$2,074.0
Sort, Survey and Decon	FY 94	3.1 Annual Operating labor	$150.0	$137.5											$287.5
		3.3 Annual Materials	$25.0	$25.0											$50.0
Glass Melter	Start up in FY 94; Treat in FY 96														
		3.1 Annual Operating labor	$101.0	$406.0	$730.0	$1,437.0	$2,100.0	$2,067.0	$2,067.0	$2,067.0	$2,067.0	$2,067.0	$2,067.0	$2,067.0	$23,934.0
Triple Distill of Hg	3rd Qtr. FY 96	3.1 Annual Operating labor		$64.0	$100.4	$100.4	$100.4	$100.4	$100.4	$100.4	$100.4	$100.4	$100.4	$100.4	$1,340.0
		subtotal	$6,715.0	$10,960.5	$10,936.3	$13,561.7	$14,337.9	[illegible]	$12,326.2	$12,073.0	$12,073.0	$12,073.0	$12,073.0	$12,073.0	$137,973.5

transportation module summary back-up

Bench Scale Units	5 units in FY 96	5.2 Mobile Treatment			$19.0	$19.0	$19.0	$19.0	$19.0	$19.0	$19.0	$19.0	$19.0	$19.0	$19.0	$190.0
Drum Units	4 units cold start in FY 99	5.2 Mobile Treatment						$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$761.6
								$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$761.6
Skid Units	4 units cold start in FY 99	5.2 Mobile Treatment						$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$761.6
								$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$761.6
	4 units cold start in FY 98	5.2 Mobile Treatment						$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$761.6
								$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$761.6
	3 units cold start in FY 97	5.2 Mobile Treatment					$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$108.8	$870.4
Lead Decon Trailer	Third Quarter FY 1995	5.2 Mobile Treatment			$12.0	$0.4	$0.4									$12.8
Triple Distill of Hg	3rd Qu. FY 95	5.2 Mobile Treatment			$12.6	$9.7										$22.3
		Total	$0.0	$0.0	$43.6	$29.1	$128.2	$760.6	$760.6	$760.6	$760.6	$760.6	$760.6	$760.6	$760.6	$5,665.1

front end/back end support and interim storage module summary back-up

front end/back end spt	MTU crews	3.1 Annual Operating labor		$533.5	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$1,067.0	$11,203.8
Interim Storage	MTU crews	3.1 Annual Operating labor		$88.9	$177.8	$177.8	$177.8	$177.8	$177.8	$177.8	$177.8	$177.8	$177.8	$177.8	$177.8	$1,867.3
		total	$6,715.0	$19,513.0	$12,224.9	$14,865.7	$15,731.0	$16,901.4	$14,251.7	$14,901.4	$14,901.4	$14,901.4	$14,901.4	$14,901.4	$14,901.4	$176,708.8

ON-SITE TREATMENT ASSUMPTIONS

I. GENERAL ASSUMPTIONS

A. The operating labor and maintenance estimate is time-phased based on the fabrication of MTUs. These units are fabricated during FY97-99. Therefore, annual labor and maintenance fluctuate with the MTU fabrication schedule. On the module estimate worksheet, total operations labor and maintenance are provided instead of annual values. An average "O&M" value is calculated based on the estimate schedule of 12 years (FY94 to FY 2005).

B. Standard size for skids

3 sizes of units
Skid - 6 modules: the dimensions for each module 5 ft(w) x 10 ft(l) x 12 ft(h) lay side by side.
Drum size - single or dual module: 5 ft(w) x 10 ft(l) x 12 ft(h) each module
Bench scale - Fit on lab table

C. The operating cycle for the units is based on the following assumptions:

50% Run Time
15% Decon/Restart
35% Travel/Storage

MTUs will be stored at site the that designed it. Annual treatment capacity is defined by operating MTUs plus commercial off-site treatment. MTUs will rotate from site to site.

D. Bench scale

Fabricate all units in FY95.
$50K Engineering estimate for fabrication costs: VWR Lab Equipment Catalog if part pricing is required for estimate back-up.

E. Drum size units

Fabricate four units per year starting in FY99.
Each unit costs $500K to fabricate (equal to skid fabrication cost estimate).

F. Skids

Fabrication cost of $500K for each skid per cost estimate in LANL LLMW treatment skid PMP. Fabricate three in FY97 and four in FY98 and FY99.

G. We will always choose commercial off-site treatment option when more than one option is identified for waste stream treatment.

H. Decon trailer to sites 3rd quarter FY95.

I. How much waste can MTU treat per hour?

Lead decon - 3½ Ton of Lead / week (40 hours/wk)
Drum size unit - assume one drum / day (8 hour shift)
Skid size - 3 drums / day (8 hours)
MTU crew for skid operation - 2 FTEs / 8 hour day
Health Physicist (HP) tech / 8 hour day
Drum scale operating crew - same FTEs as skid
Bench scale - 1 FTE, Operator, ½ FTE, HP

II. MOBILE TREATMENT UNIT MODULE

A. Pre-operations And Design (Title I and II)

1. Design and permitting assumptions per telecon with Mona (5/10/94). The WBS elements in the LANL treatment skid PMP that have already been completed by the sites or AL/FFCA Treatment Team are:

   1.1 Waste Sampling
   1.2 Waste Characterization
   1.3 Identifying Treatment Technology
   1.4 Process Selection

   Removing these items from the treatment skid PMP schedule and the cost estimate provided by Stan Zygmunt ($1.2M) has the following impact:

   a. Shorten design and permitting schedule by one year.
   b. Reduces design and permitting costs by the following:

      - Total design and permitting was 50 months at $1.2M.
      - New design and permitting will be ¾ of this estimate or 38 months and $900K.
      - Use 36 months and $900K for pre-operations and design estimate of skids and drum sized units.

   Design and permitting costs for bench scale units is estimated at 50% of the skid/drum sized units design and permitting costs. This assumption is based on the fact that 48% of the LANL treatment skid PMP schedule for design and permitting is allocated to studies and bench scale development test.

   Allocation of Design/Permitting into cost estimate WBS:

		Mos.	%
1.0	Pre-operations		
1.1	Studies/Bench Scale Tests	6	17
1.2	Demo	0	0
1.3.1	CDR	1	3
1.3.2	Safety Documents	9.5 (8.0)	22
1.3.3	Permitting	8	22
1.3.4	Prep for Operations	1.5 (1.0)	3

2.0	Facility Construction Costs		
	2.1 Design	12	33
	TOTAL	38 (36) (Use 36)	100%

B. Pre-operations, Design, and Fabrication Schedule

1. For skids fabricated in FY97, assume design and permitting is 3 months effort in FY94, 12 months effort each in FY95 and FY96, and 9 months effort in FY97.

   For units fabricated in FY98, allocate estimate to WBS as described below:

FY95	100%	of	1.1 and 1.3.1	(7 mos)
	50%	of	1.3.2	(4 mos)
FY96	50%	of	1.3.2	(4 mos)
	100%	of	1.3.3	(8 mos)
FY97	100%	of	1.3.4	(1 mos)
	100%	of	2.1	(12 mos)

   For skids and drum size units fabricated in FY99, adjust above assumption to start one year later.

FY96	100%	of	1.1 and 1.3.1	(7 mos)
	50%	of	1.3.2	(4 mos)
FY97	50%	of	1.3.2	(4 mos)
etc.				

2. Bench scale units schedule

   a) ¼ of design completed in FY94
   b) Design completed end of 3rd quarter FY95
   c) All units assembled in 4th quarter FY95
   d) Following WBS 1.1 (Studies/Bench scale) activities use WBS 2.5 Equipment. Following Pre-operations (WBS 1.1), bench scale parts will be ordered and assembled by project manager site. Replace units after 20 years.

3. Drum sized units - all four units will be fabricated in FY99. Design life of 20 years.

4. Skid sized units - three skids will be fabricated in FY97 and four skids will be fabricated in FY98 and four in FY99.

C. Project Management, Inspection, and Building Construction

1. Project Management

Estimate all in Pre-operations 1.3.5.
GJPO - For FY94 used $692K from GJPO baseline and for FY95 used $150K per month (See pages 11 and 12 from GJPO FY94/95 baseline).

Site Project Management:

• One FTE for LANL	1.0
• .5 FTE for each site: SNL/NM, KC, PX, MD	2.0
• .25 FTE for each site: PP, SNL/CA	.5
• 0 FTE for ITRI	
TOTAL	3.5

Total Site FTE = 3.5 @ $100K per FTE including travel and support = $350K per year.

GJPO Site Project Management:

- .5 FTE or $50K/year starting in FY96.

2. 2.2 Inspection. No construction inspection activities has been estimated in support of equipment fabrication. WBS 2.5, Equipment, has estimate for inspection of unit.

3. 2.4 Building Construction. Each site will require $20K to refurbish/construct facility to accommodate MTU. Construction will begin in FY97 to coincide with the fabrication of the first three skids.

D. Operating Labor and Maintenance

1. Bench Scale: Annual operating labor - each unit will use one waste operator ($45/hr) for 2,080 hours and one HP ($100/hr) for 1,040 hours per year. (See FY94 site baseline data that was used to calculate $45/hr. $100/hr is LANL average rate per Stan Zygmunt). Unit will be operating 50% of the time plus 15% of the time for decon and restart activities. Annual maintenance was estimated at 3% of equipment cost per AACE Skills and Knowledge of Cost Engineering.

2. Drum sized units: Design, permitting, and fab cost and schedule estimate same as skid units.

3. Skid Unit: Operating crew is two waste operators @ $45/hr for 2,080 hour per year and one HP @ $100/hr for 2,080 hours per year. Assume operating crew runs cold start for one year per LANL treatment skid PMP schedule. Waste treatment begins one year after fabrication.

4. Controlled Air Incinerator: Cost estimate from LANL FY94 baseline, WBS 3.1.3.9.1.05.

5. Lead Decon Trailer: Start operation at LANL the beginning of the 3rd quarter FY95. Crew size equal to skid crew size.

6. Sort, Survey, Decon: $50K in miscellaneous monitoring equipment. Estimate as materials at $25K per year for FY94 and FY95. Effort completed August 1995 per GJPO schedule baseline.

7. Glass Melter: Estimate from FY94 MD baseline: Used FY99 value for FY 2000 - FY 2005.

8. Triple Distill of Hg - O&M estimated as bench scale, one waste operator @ $45/hr for 2,080 hours; 1 HP @ $100/hr for 1,040 hours. Unit already exists, no pre-operations activities. Begin operations 3rd quarter FY95 (after final STP submitted in February 1995).

III. TRANSPORTATION MODULE ASSUMPTION

A. Skid and Drum Units

35% 18 weeks travel time and set-up
65% 34 weeks operation / decon restart

Use $4 per mile - price of shipping contact handled waste from EG&G report (EG&G-WM-10877, Jan-1994). Distance of sites from LANL is 6,759 miles (use 6,800). Assume each skid and drum size unit travels to every site once per year. 6,800 miles x $4 per mile = $27,200/skid or drum unit per year. Skid and drum units will not move to other sites until one year after cold start test (per LANL treatment skid PMP schedule).

B. Bench Scale Units

Assume a bench scale unit will travel average distance of site from LANL (950 miles) once per year @ $4 per mile = $3,800 / bench scale unit per year.

C. Lead Decon Trailer

From LANL to ITRI: 100 miles
MD: 1,519 miles
SNL/NM: 0 (come from ITRI)

Send trailer to MD in FY96 and treat all their waste. Return unit to LANL in FY96 (3,000 miles x $4/mile). Send trailer to ITRI and SNL/NM in FY97 and return to LANL at end of FY98. Split mileage and cost equally between FY97 and FY98 for ITRI and SNL/NM trip.

D. Triple Distill of Hg

MD 1,519 miles (26Kg)
SNL/CA 1,213 miles (1 lb)
SNL/NM 100 miles (30 ml)

Skid to MD (3,040 miles x $4/mile) and SNL/NM; return to LANL (100 miles x $4/mile) in FY96. Skid to SNL/CA in FY97 (2,430 miles x $4/mile) and returned to LANL. Unit treats waste in LANL when not at other sites.

IV. FRONT END/BACK END SUPPORT AND INTERIM STORAGE MODULES

A. Skid size MTU crews will spend 65% of their time running, cleaning, and restarting MTUs. The remaining 35% of their time will be spent working in the front end/back end support facility (30%) and interim storage facility (5%).

1. Each site (9 sites) will have these crew operating front end/back end support and storage facilities starting in the 3rd quarter FY95 (after final STP is issued in February 1995).

Albuquerque Operations Office - Commercial Off-site Treatment Option Cost Estimate

Option Name:Off-site Commercial Treatme

Module Name:	Packaging		Interim Storage		Cert. for Shipment		Transportation		Commercial Treatment		TOTAL OPTION	
Module Location:Albuquerque Operations Office Sites												
Waste Type:MLLW,non-alpha,contact handled												
Module Status:New,Small Generator,On-site,Portable												
WBS ELEMENT	($ x 1000) SUB $	($ x 1000) ELEMENT $	($ x 1000) SUB $	($ x 1000) ELEMENT $	($ x 1000) SUB $	($ x 1000) ELEMENT	($ x 1000) SUB $	($ x 1000) ELEMEN	($ x 1000) SUB $	($ x 1000) ELEMENT	($ x 1000) SUB $	($ x 1000) ELEMENT
1.0 Pre-Operations												
1.1 Studies and Bench Scale Tests	$0		$0		$0		$0		$0		$0	
1.2 Demonstration Costs									$0		$0	
1.3 Operations Budget Funded Activities									$0		$0	
1.3.1 Conceptual Design	$0		$0		$0		$0		$0		$0	
1.3.2 Safety Assurance Documentation	$0		$0		$0		$0		$0		$0	
1.3.3 Permitting	$0		$0		$0		$0		$0		$0	
1.3.4 Preparation for Operations	$0		$0		$0		$0		$0		$0	
1.3.6 Project Management	$0		$0		$0		$0		$0		$0	
TOTAL PRE-OPERATIONS		$0		$0		$0		$0		$0		$0
2.0 Facility Construction Costs												
2.1 Design (Title I and II)	$0		$0		$0		$0		$0		$0	
2.2 Inspection	$0		$0		$0		$0		$0		$0	
2.3 Project Management	$0		$0		$0		$0		$0		$0	
2.4 Building Construction (inc. indirect)	$0		$0		$0		$0		$0		$0	
2.5 Equipment	$0		$0		$0		$0		$0		$0	
2.6 Construction Management	$0		$0		$0		$0		$0		$0	
2.7 Contingency	$0		$0		$0		$0		$0		$0	
TOTAL FACILITY CONSTRUCTION COSTS		$0		$0		$0		$0		$0		$0
3.0 Operating and Maintenance												
3.1 Operating Labor	$2,089		$503		$264		$0		$0		$2,875	
3.2 Annual Utilities	$0		$0		$0		$0		$0		$0	
3.3 Annual Materials	$0		$0		$0		$0		$0		$0	
3.4 Maintenance	$0		$0		$0		$0		$0		$0	
3.5 Annual Contingency	$0		$0		$0		$0		$0		$0	
AVERAGE O&M	$190		$46		$26		$0		$0		$261	
X NUMBER OF YEARS OF OPER.	11		11		11		11				11	
TOTAL O&M COSTS		$2,089		$503		$264		$0		$0		$2,875
4.0 Decontamination and Decommissioning	See Estimate Intro./Assmpts.		See Estimate Intro./Assmpts		See Estimate Intro./Assm		See Estimate Intro./Ass					
4.1 Facility D&D									See Assumptions		See Assumptions	
4.2 Closure, Post-Closure, Monitoring												
TOTAL DECON. AND DECOM.		$0		$0		$0		$0				
5.0 Contracted Services												
5.1 Commercial Treatment/Disposal									$1,995		$1,995	
5.1 Mobile Treatment									$0		$0	
TOTAL CONTRACT SERVICES		$0		$0		$0		$0		$1,995		$1,995
6.0 Off-site Treatment (DOE)		$0		$0		$0		$0		$0		$0
7.0 Transportation		$0		$0		$0		$994		$0		$994
Total Cost for Commercial Off-site Treatment	(1994 Dollars)	$2,089	(1994 Dollar	$503	(1994 Dollar	$264	(1994 Dollar	$994	(1994 Dollars)	$1,995	(1994 Dollars)	$5,845

DSTP OPTION YEARLY COST ESTIMATE

Option Name: Commercial Off-site Treatment

Option Location: Albuquerque Operations Office

Total Cost of Option (thousands):

FY 1994 Dollars	$5,865
Escalated Dollars	$6,776

FISCAL YEAR	ANNUAL FUNDING (FY 1994 DOLLARS Capital	Operating	ANNUAL FUNDING (Escalated Dollars) Capital	Operating	ACTIVITIES
1994	$0	$0	$0	$0	
1995	$0	$577	$0	$594	Eight shipments: DSSI(3), Envirocare(3),Quadrex(2)
1996	$0	$804	$0	$852	Nine shipments: DSSI(5), Envirocare(3),and Quadrex(1)
1997	$0	$804	$0	$878	Nine shipments: DSSI(5), Envirocare(3),and Quadrex(1)
1998	$0	$804	$0	$905	Nine shipments: DSSI(5), Envirocare(3),and Quadrex(1)
1999	$0	$815	$0	$945	Ten shipments: DSSI(5), Envirocare(3), and Quadrex(2)
2000	$0	$804	$0	$960	Nine shipments: DSSI(5), Envirocare(3),and Quadrex(1)
2001	$0	$250	$0	$308	Six shipments: DSSI(2), Envirocare(3), and Quadrex(1)
2002	$0	$249	$0	$315	Six shipments: DSSI(2), Envirocare(3), and Quadrex(1)
2003	$0	$249	$0	$325	Six shipments: DSSI(2), Envirocare(3), and Quadrex(1)
2004	$0	$249	$0	$334	Six shipments: DSSI(2), Envirocare(3), and Quadrex(1)
2005	$0	$260	$0	$360	Seven shipments: DSSI(2), Envirocare(3) and Quadrex(2)
TOTAL	$0	$5,865	$0	$6,776	

		fy94	fy95	fy96	fy97	fy98	fy99	fy2000	fy01	fy02	fy03	fy04	fy05	total
	shipments													
	DSSI													
	LANL(1066dms)		2	4	4	4	4	4	1	1	1	1	1	27
	GJPO(4dms),MND(75dms),													
	PX(74dms),SNL/CA(1dm),													
	ITRI(14dms).		1	1	1	1	1	1	1	1	1	1	1	11
	ENVIROCARE													
	LANL(843dms)		2	2	2	2	2	2	2	2	2	2	2	22
	KCP(1dm)MND(1dm),													
	PX(16dms),SNL/CA(1dm),													
	SNL/NM(35dms).		1	1	1	1	1	1	1	1	1	1	1	11
	QUADREX													
	ITRI(38dm)						1						1	2
	SNL/CA(1dm),SNL/NM(1dm).		2	1	1	1	1	1	1	1	1	1	1	12
	total shipments		8	9	9	9	10	9	6	6	6	6	7	85
	estimate specific wbs (000 omitted)													
packaging module														
	3.1 Annual Operating Labor		$244	$319	$319	$319	$319	$319	$50	$50	$50	$50	$50	[illegible]
interim storage module														
	3.1 Annual Operating Labor		$50	$69	$69	$69	$74	$69	$19	$19	$19	$19	$19	$503
certification for shipping module														
	3.1 Annual Operating Labor		$32	$42	$42	$42	$41	$42	$6	$6	$6	$6	$6	$264
commercial treatment module														
	5.1 Commercial Treatment		$153	$275	$275	$275	$275	$275	$93	$93	$93	$93	$96	$1,995
transportation module														
	7.0 Transportation													
	DSSI		$48	$59	$59	$59	$69	$59	$39	$39	$39	$39	$39	$635
	Envirocare		$28	$26	$26	$28	$26	$28	$28	$28	$28	$28	$28	$305
	Quadrex		$19	$12	$12	$12	$20	$12	$12	$12	$12	$12	$20	$154
	subtotal Transportatoin		$93	$99	$99	$99	$107	$99	$78	$78	$78	$78	$87	$994
		total	$577	$804	$804	$804	$815	$804	$250	$249	$249	$249	$260	$5,665

off-site inventory site	waste stream		matrix	current quantity (dm)	facility	future	future quantity (dm)	total quantity (dm)
GJPO	Solvents, Halogenated	Solvents/Clear	6-1	1.0	DSSI	n	0.0	
	Solvents, nonhalogenated	Solvents/Clear	7-1	0.5	DSSI	y	2.4	
	Solvents, nonhalogenated	Solvents/Clear	7-1	in 7-1 above	DSSI	n	0.0	
ITRI	Scintillation Liquids	Vials w/H3 & C14	4-11	1.0	Q/D	y	37.2	
	Scintillation Liquids	Vials w/actindes & other	4-111	14.0	DSSI	n	0.0	
KCP	Inorganic Debris	Large item w/Pb	10-V	1.0	Env	n	0.0	
LANL	Scintillation Liquids	Vials w/H3 & actindes	4-111	20.0	DSSI	y	89.1	
	Solvents, Halogenated	Solvents/Clear	6-1	33.0	DSSI	y	151.5	
	Solvents, Halogenated	Solvents/Clear	6-1	1.0	DSSI	n	0.0	
	Solvents, Halogenated	Solvents/Clear: Bulked	6-11	40.0	DSSI	y	178.2	
	Solvents, nonhalogenated	Solvents/Clear	7-1	150.0	DSSI	y	668.3	
	Inorganic Debris	Metal w/Cd	10-V	17.0	ENV.	y	843.5	
MND	Scintillation Liquids	Vials w/actindes & other	4-111	64.0	DSSI	n	0.0	
	Solvents, Halogenated	Solvents/Clear	6-1	1.0	DSSI	?	0.0	
	Solvents, nonhalogenated	Solvents/Clear	7-1	10.0	DSSI	?	0.0	
	Lead	Leaded gloves	11-11	1.0	ENV.	?	0.0	
PX	Scintillation Liquids	Vials w/H3 & actindes	4-111	26.0	DSSI	n	0.0	
	Solvents, Halogenated	Solvents/Clear	6-1	21.0	DSSI	y	23.3	
	Solvents, Halogenated	Solvents/Clear: Bulked	6-11	2.0	DSSI	y	2.3	
	Organic Debris	Trash w/solvents, metals	15-11	16.0	NTS	y	1.0	
	Organic Debris	Trash w/Pb	15-1V	16.0	ENV.	?	0.0	
SNL/CA	Scintillation Liquids	Vials w/H3 & C14	4-11	1.0	Q/D	n	0.0	
	Solvents, nonhalogenated	Solvents/Clear	7-1	1.0	DSSI	n	0.0	
	Inorganic Debris	Tellurium metal, sus. H3, U	10-V	1.0	ENV.	?	0.0	
SNL/NM	Scintillation Liquids	Vials w/H3 & C14	4-11	1.0	Q/D	?	0.0	
	Inorganic Debris	Metals w/elec. parts	10-V	35.0	ENV.	n	0.0	
Total				474.5			1996.8	2471.3

Quantity (dms)	
Envirocare	914.0
Q/D	39.0
NTS	16.0
DSSI	1502.3

Shipments (dms/40)	
Envirocare	22.9
Q/D	1.0
NTS	1.0
DSSI	37.6

COMMERCIAL OFF-SITE TREATMENT ASSUMPTIONS

1. Commercial off-site locations

   DSSI - Kingston, TN (Near O.R.)
   Envirocare - Salt Lake City, UT
   IT Corp - Knoxville, TN
   NFS - Erwin, TN
   NTS - NTS, NV
   Quadrex - Gainesville, FL
   RAMP Industries - Denver, CO

2. Quantities are expressed in drum units (dm). If drum is not used on W_S data sheet, 1 dm will be assumed.

3. LLMW quantity was calculated by multiplying 2.4 by the five year quantity projection from the Mixed Waste Inventory Report to arrive at a 12 year (FY94-00) quantity projection. Cubic meters was converted to drum equivalent by dividing the total cubic meters by .2m^3/drum.

   For LANL, added all quantities for Organic liquids from Site-Waste Matrix. Calculated waste stream percentage from total waste stream quantities and multiplied percentage by five year projection.

4. From the Waste Management Facilities Cost Information for Transportation of Radioactive Materials EG&G-WM-10877 Report, January 1994, an unshielded truck can haul 40 drums (55gal/drum) of contact handled MLLW.

5. Shipments to DSSI

Site	Quantity (dm)	Trips
GJPO	4	11
KCP	0	0
LANL	1,086	27
MD	75	11
PX	74	11
SNL/NM	0	0
SNL/CA	1	11
ITRI	14	11
TOTAL	1,254	36 (Annual shipments for sites with 11 trips. 36 trips = 27 LANL trips + 11 annual trips)

Following issuance of Final STPs and beginning in the 3rd quarter of FY95, the following travel schedule to DSSI is assumed. All sites' shipments, excluding LANL, will be made at the middle and end of the 12 year schedule (FY94-05).

LANL will ship quarterly starting in the third quarter of FY95 through FY 2000. Annual shipments will occur from FY 2001 through FY 2005.

GJPO, SNL/CA, and ITRI combined will ship a total of two drums annually from FY95 through FY01 and 1 drum from FY02 through FY05 to DSSI. MD and PX will ship all their projected waste volumes to DSSI annually from FY95 through FY05.

6. Envirocare and Quadrex Shipments.

Each site ships individually to Quadrex.

SNL/CA will ship two drums annually to Quadrex and PX will ship 2drums annually to Envirocare.

Shipments to Envirocare from KCP, MND, SNL/CA, and SNL/NM will be made annually.

The labor supporting shipments to Envirocare for LANL is included in the labor estimate associated with DSSI shipments.

The labor supporting FY99 and FY 2005 shipments to Envirocare for the other sites is included in the labor estimate associated with DSSI shipments.

Estimated one month of labor in FY95 for the other sites to support the shipments to Envirocare (5 shipments) and Quadrex (2 shipments).

The labor supporting the ITRI shipments to Quadrex in FY99 and FY 2005 are included in the labor estimate associated with DSSI shipments.

6. Crews that support commercial off-site shipment are assumed to be:

LANL - 4 waste operators at $45/hr. for 2,080 hrs. each operator. 1 fork lift driver at $24/hr. for 160 hrs. per year (40 hrs/quarter) from the 3rd quarter FY95 through FY 2000. From FY 2001 through FY 2005, 2 waste operators will work 364 hours/year and the forklift driver will work 80 hours/year.

All other sites will use 2 waste operators @ $45/hr. and 1 fork lift driver @ $24/hr. per the following assumptions.

GJPO, SNL/CA, and ITRI will use 173 hours (1 month) per year for each crew member for FY99 and FY 2005 only. Forklift drivers will work 40 hrs./year in FY99 and FY 2005.

MD and PX will use 346 hours (2 months) per waste operator, per year for FY99 and FY 2005 only. Forklift drivers will work 80 hrs./year in FY99 and FY 2005.

7. Packing Module

Waste operators are estimated to spend 75% of their time packing wastes.

8. Interim Storage Module

Waste operators spend 15% of their time arranging waste in storage area. Fork lift operator spends all his time moving waste in and out of storage facility.

9. Certification for Shipping Module

Waste operators spend 10% of their time certifying shipments.

10. Transportation Module

Per EG&G-WM-10877 Report, transportation charge is $4.00 per mile plus $880 per shipment to cover fixed transportation costs such as demurrage and shipment hardware used when loading and unloading.

Distance of sites from DSSI (per EG&G-WM-10877 Report).

Site	Miles
GJPO	1,612 (250 miles to Denver + RF)
KCP	730
LANL	1,485

MD	341
PX	1,103
SNL/NM	1,389
SNL/CA	2,512
ITRI	1,389

See assumptions in item 5, Shipments.

11. Commercial Treatment - 5.1

The generic unit treatment costs from the DSTP Cost Guidance-Revision 1 were used. The unit cost used for all shipments was the midpoint of the organic liquids category; $4.00/lbs.

Assumed 55 gal. drum weighs 375 lbs. (85% of the weight of water @ 8 lbs./gal) when filled with organic liquids. Use of 85% provided by Rick Dotson, hydrologist.

APPENDIX F
DEFINITIONS

The terms defined below have been collected or derived from documentation for regulatory agencies, and DOE sites, as well as from environmental and other sources of regulations and documents, and some have been written by 180 day report team members. The words and phrases are listed alphabetically. Common abbreviations, if any, follow the term.

Amalgamation (AMLGM) - A process applicable to radioactive wastes containing mercury and particularly to wastes containing radioactive mercury isotopes. Mercury compounds are converted into a solid mercury-zinc alloy, which is more easily managed and less mobile than solutions containing radioactive mercury. Amalgamation provides a significant reduction in air emissions of mercury and provides a change in mobility from liquid mercury to a paste-like solid, potentially reducing leachability. Amalgamation may be performed using any of the following elements: zinc, copper, nickel, gold, and sulfur.

Aqueous Liquids (as a waste matrix) - Liquids/slurries with a total organic carbon (TOC) content less than 1 percent. Slurries must be pumpable (e.g. suspended/settled solids can be up to approximately 35-40 percent). Only liquids/slurries packaged/stored in bulk form (i.e., tank stored, drummed bulk free liquids) are included in this category. Liquids packaged in lab pack-type configuration are categorized as lab packs.

Batteries (as a waste matrix) - This category includes lead acid, cadmium, and miscellaneous batteries.

Best Available Technology (BAT) or Best Demonstrated Available Technology (BDAT) - (1) The preferred technology for treating a particular process liquid waste, selected from among others after taking into account factors related to technology, economics, public policy, and other parameters. As used in DOE Order 5400.5, BAT is not a specific level of treatment, but the conclusion of a selection process that includes several treatment alternatives. (2) Treatment technologies that have been shown through actual use to yield the greatest environmental benefit among competing technologies that are practically available.

Biodegradation (BIODG) - The degradation of organics or non-metallic inorganics (i.e. inorganics that contain the elements of phosphorous, nitrogen, and sulfur) in units operated under either aerobic or anaerobic conditions such that a surrogate compound or indicator parameter has been substantially reduced in concentration in the residuals (e.g., Total Organic Carbon can often be used as an indicator parameter for the biodegradation of many organic constituents than cannot be directly analyzed in wastewater residues).

Capacity (of a facility) - The annual process throughput, in m^3/yr under normal operating conditions. "Normal operating conditions" are defined as the shift schedule under which the facility normally operates; i.e., one 8-hour shift/day, 5 days a week; two shifts/day, 5 day a week; 24 hours a day, 7 days a week.

Characterization - The determination of waste contents and properties, whether by review of process knowledge, NDE/NDA, or sampling and analysis.

Chemical Fixations - Any waste treatment process that involves reactions between the waste and certain chemicals, and results in solids that encapsulate, immobilize, or otherwise tie up hazardous components in the waste to minimize the leaching of such components and to render the waste nonhazardous and more suitable for disposal.

Chemical Oxidation (CHOXD) - Chemical or electrolytic oxidation utilizing the following oxidation reagents (or waste reagents) or combinations of reagents: (1) hypochlorite (e.g. bleach); (2) chlorine; (3) chlorine dioxide; (4) ozone or UV (ultraviolet light) assisted ozone; (5) peroxides; (6) persulfates; (7) perchlorates; (8) permanganates; and/or (9) other oxidizing reagents of equivalent efficiency, performed in units operated such that a surrogate compound or indicator parameter has been substantially reduced in concentration in the residuals (e.g. Total Organic Carbon can often be used as an indicator parameter for the adsorption of many organic

constituents that cannot be directly analyzed in wastewater residues). Chemical oxidation specifically includes what is commonly referred to as alkaline chlorination.

Cleanup - (1) Actions undertaken during a removal or remedial response to physically remove or treat a hazardous substance that poses a threat or potential threat to human health and welfare, the environment, and/or real and personal property. Sites are considered cleaned up when removal or remedial programs have no further expectation or intention of returning to the site and threats have been mitigated or do not require further action. (2) Actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and/or the environment. The term "cleanup" is sometimes used interchangeably with either remedial action, removal action, response action, or corrective action.

Closure - Operational Closure: Those actions that are taken upon completion of operations to prepare the disposal site or disposal unit for custodial care (e.g., addition of cover, grading, drainage, erosion control). **Final Site Closure:** Those actions that are taken as part of a formal decommissioning or remedial action plan, the purpose of which is to achieve long-term stability of the disposal site and to eliminate to the extent practical the need for active maintenance so that only surveillance, monitoring, and minor custodial care are required.

Compliance Agreements - Legally binding agreements between regulators and regulated entities that set standards and schedules for compliance with environmental statutes. Include Consent Order and Compliance Agreements, Federal Facilities Agreements, and Federal Facility Compliance Agreements.

Concentration Based Standard - A restricted waste for which a concentration based standard has been developed for an extract of the waste or treatment residue, or the constituent concentration in the waste or treatment residue. These standards were based on best demonstrated available technology (BDAT) and the waste or waste extract or treatment residue must not exceed these concentrations if the waste is to be land disposed.

Contact-Handled Waste (CH Waste) - Waste or waste containers whose external surface dose rate does not exceed 200 mrem per hour at surface of container.

Corrosive/Corrosivity - (1) A solid waste exhibits corrosivity if (a) a sample of the waste is either aqueous and has a Ph less than or equal to 2 or greater than or equal to 12.5, or it is a liquid and corrodes steel at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55° (130°F). (2) A chemical agent that reacts with the surface of a material causing it to deteriorate or wear away. (3) Identifies waste that must be segregated because of its ability to extract and solubilize toxic contaminants (especially heavy metals) from other waste; identifies waste that requires the use of corrosion-resistant containers for disposal.

CSTP Logic Diagrams or Logic Diagrams - A pictorial depiction of the thought process which defines the activities required to treat a particular waste stream and describes the relationships between those activities.

Deactivation (DEACT) - The removal of the hazardous characteristics of a waste due to its ignitability, corrosivity, and/or reactivity.

Debris - Materials that are primarily nongeologic in origin such as grass, trees, stumps, and man-made materials such as concrete, clothing, partially buried whole or empty drums, capacitors, and other synthetic manufacturing items, such as liners. (It does not include synthetic organic chemicals, but may include materials contaminated with these chemicals.)

Decommissioning - (1) Actions taken to reduce the potential health and safety impacts of DOE contaminated facilities, including activities to stabilize, reduce, or remove radioactive materials or to demolish the facilities. (2) Preparations taken for retirement of a nuclear facility from active service, accompanied by the execution of a program to reduce or stabilize radioactive contamination. (3) The process of removing a facility or area from

operation and decontaminating and/or disposing of it or placing it in a condition of standby with appropriate controls and safeguards.

Decontamination - The removal of unwanted material (typically radioactive material) from facilities, soils, or equipment by washing, chemical action, mechanical cleaning, or other techniques.

Department of Energy Waste - Radioactive waste generated by activities of the DOE (or its predecessors), waste for which DOE is responsible under law or contract, or other waste for which the DOE is responsible.

Derived-From Rule - This rule states that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste is itself a listed hazardous waste (regardless of the concentration of hazardous constituents). For example, ash and scrubber water from the incineration of a listed waste are hazardous wastes on the basis of the derived-from rule. Solid wastes derived from a characteristic hazardous waste are hazardous wastes only if they exhibit a characteristic.

Designated Facility - A hazardous or mixed waste treatment, storage, or disposal facility that has received an EPA permit (or facility with interim status) in accordance with the requirements of Parts 270 and 124 of 40 CFR, a permit from a state authorized in accordance with Part 271 of 40 CFR, or that is regulated under §261-6(c)(2) or Subpart F of Part 266 of 40 CFR, and that has been designated on the manifest by the generator pursuant to §262.20.

Disposal - The permanent isolation of waste with no intent of recovery.

Disposal Facility - (1) The land, structures, and equipment used for the disposal of waste. (2) A facility or part of a facility at which waste is intentionally placed into or on the land or water, and at which waste will remain after closure.

Effluent - (1) Airborne and liquid wastes discharged from a DOE site or facility following such engineering waste treatment and all effluent controls, including onsite retention and decay, as may be provided. This term does not include solid wastes, wastes for shipment offsite, wastes that are contained (e.g., underground nuclear test debris) or stored (e.g., in tanks) or wastes that are to remain onsite through treatment or disposal. (2) Wastewater (treated or untreated) that flows out of a treatment plant, sewer, or industrial outfall. May refer to wastes discharged into surface waters.

Elemental Lead (Activated and Non-Activated) (as a waste matrix) - Both surface contaminated and activated elemental lead. Activated lead includes lead from accelerators or other neutron sources that may result in irradiation. Surface contaminated lead materials include bricks, counterweights, shipping casks, and other shielding materials.

Environmental Impact Statement (EIS) - (1) A document prepared in accordance with the requirements of §102(2)(C) of NEPA. (2) A tool for decision making; it describes the positive and negative effects of the undertaking and lists alternative actions. The draft document (DEIS) is prepared by the EPA, or under EPA guidance, and attempts to identify and analyze the environmental impacts of a proposed action and feasible alternatives, and is circulated for public comment prior to preparation of the final environmental impact statement.

Environmental Restoration (ER) - Measures taken to clean up and stabilize or restore a site to pre-violation conditions that has been contaminated with hazardous substances during past production or disposal activities.

Environmental Restoration Waste - Waste generated by environmental restoration program activities.

Existing Facility - (1) Any equipment, structure, system, process or activity that fulfills a specific purpose. Examples include accelerators, storage areas, fusion research devices, nuclear reactors, production or processing

plants, coal conversion plants, magnetohydrodynamics experiments, windmills, radioactive waste disposal systems and burial grounds, testing laboratories, research laboratories, transportation activities, and accommodations for analytical examinations of irradiated and unirradiated components. (2) Buildings and other structures; their functional systems and equipment, including site development features such as landscaping, roads, walks and parking areas; outside lighting and communications systems; central utility plants; utilities supply and distribution systems; and other physical plant features. (3)(a) Any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or (b) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel.

Facilities - Buildings and other structures; their functional systems and equipment, including site development features such as landscaping, roads, walks and parking areas; outside lighting and communications systems; central utility plants; utilities supply and distribution systems; and other physical plant features.

Federal Facility Compliance Agreement (FFCA) - An agreement between the DOE and a host state with respect to how and/or when some waste-related activity will be conducted to achieve compliance with applicable regulations in a timely manner. A major driver or constraint on activities that a particular site must undertake for waste operations.

Generation - Includes the wastes resulting from new production, rework operations, wastes generated from D&D operations, and wastes resulting from environmental restoration operations, including the recovery of pre-1970 wastes, should their recovery be determined to be necessary.

Generator - Refers to current or previously operated facilities of the DOE that have produced or are producing waste.

Glass Melter or Mound Glass Melter - Consists of a melt chamber lined with refractory material with an outer shell of stainless steel connected to an off-gas emission control system. During cold start-up soda-lime/silica glass cullet will be heated in the melt chamber by a propane burner. After the glass melts, electrical resistance heating will maintain the glass in a molten state. When the melt has reached a temperature of 1,000 to 1,333 °C., waste will be introduced into the melt chamber through a feed port. A small amount of combustion air is introduced through valved ports. Radiant heat from the glass pool ignites the waste stream. Nonvolatile residues combine with the glass. Periodically the glass containing these residues is drained into molds.

Hazardous Substance - (1)(a) Any substance designated pursuant to §311(b)(2)(A) of the FWPCA; (b) any element, compound, mixture, solution, or substance designed pursuant to §102 of CERCLA; (c) any hazardous waste having the characteristics identified under or listed pursuant to §3002 of the SWDA; (d) any toxic pollutant listed under §307(a) of the FWPCA; (e) any hazardous air pollutant listed under §112 of the CAA; and (f) any imminently hazardous chemical substance or mixture with respect to which the Administrator of EPA has taken action pursuant to §7 of TSCA. (2) Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive. Any substance designated by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or if otherwise emitted into the environment. (3) §101(14) of CERCLA, as amended, defines "hazardous substance" chiefly by reference to other environmental statutes, such as the SWDA, FWPCA, CAA, and TSCA. The term excludes petroleum, crude oil or any fraction thereof, natural gas, natural gas liquids, or synthetic gas usable for fuel. Under the Act, OERR also may include other substances that it specifically designates as "hazardous".

Hazardous Waste (HW) - (1) Those wastes that are designated hazardous by EPA [or state] Regulations. (2) Byproducts of production or operation that can pose a potential hazard to human health or the environment when improperly managed and that possess at least one of four characteristics (ignitability, corrosivity, reactivity, toxicity), or that appear on special EPA lists. (3) A solid waste or combination of solid waste, that, because of its quantity,

concentration, or physical, chemical, or infectious characteristics, may (a) cause, or significantly contribute to, an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. (4) Those wastes listed by EPA or meeting characteristics specified by EPA in their criteria pursuant to the RCRA. Disposal treatment or storage of hazardous wastes can only take place in a site or facility issued a permit by EPA or a state. Note: Source, special nuclear material, and byproduct material, as defined by the AEA of 1954 as amended, are specifically excluded from the term hazardous waste.

Heterogeneous Debris (as a waste matrix) - Wastes with matrices meeting the definition of debris per the 8/18/92 LDR debris rulemaking (57 FR 37194, 8/18/92). This category includes debris that do not meet the criteria for categorization as either Organic Debris or Inorganic Debris. This category also includes mixtures of debris and solid progress residues or soil, provided debris comprises no more than 50 percent of the waste.

High-Level Radioactive Waste (HLW) - (1) The highly radioactive waste 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 TRU waste and fission products in concentrations requiring permanent isolation. (2)(a) Irradiated reactor fuel, (b) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (c) solids into which such liquid wastes have been converted. (3) As defined by the NWPA, high-level waste is (a) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including the 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 NRC, consistent with existing law, determines by rule to require permanent isolation. (4) Waste generated in the fuel of a nuclear reactor, or waste found at nuclear reactors or nuclear fuel reprocessing plants. These wastes are a serious threat to anyone who comes near them without shielding.

Ignitability - A waste property describing waste with a flash point lower than 140°F.

Immobilization - Treatment of waste through macroencapsulation, microencapsulation, or sealing to reduce surface exposure to potential leaching media or to reduce the leachability of the hazardous constituents.

Immobilized Materials - Materials that are fixed in a matrix.

Incineration - (1) The controlled process by which combustible solid, liquid, or gaseous wastes are burned and changed into noncombustible gases and solid ash. (2) A treatment technology using combustion to destroy organic constituents and reduce the volume of wastes.

Inorganic Debris (as a waste matrix) - Wastes with matrices meeting the definition of debris per the 8/18/92 LDR debris rulemaking (57 FR 37194, 8/18/92). More specifically this category is defined for wastes that contain >90 percent inorganic debris. Example inorganic debris materials are: metal shapes (e.g. equipment, scrap), metal turnings, glass (e.g. light tubes, leaded glass, etc.), ceramic materials, concrete, rocks.

Lab Packs with Metals and Lab Packs without Metals (as waste matrices) - Wastes with one or more small containers of free liquids or solids surrounded by solid materials (virgin or waste materials) within a larger container. These categories include scintillation fluids that are packaged with vials. The difference between wastes within these categories is contaminants. Lab packed wastes contaminated with TC metals are categorized as "Lab packs with Metals". Lab packed wastes that are not contaminated with TC metals are categorized as "Lab packs without Metals".

Land Disposal Restrictions (LDRs) - (1) Provisions of the HSWA requiring phased-in treatment of hazardous wastes before disposal. (2) A RCRA program that restricts land disposal of RCRA hazardous wastes and requires treatment to promulgated treatment standards.

Legacy Waste - That backlog of stored waste remaining from the development and production of U.S. nuclear weapons, about which a permanent disposal determination remains to be made; i.e., waste that is currently in warehouse storage, retrievable storage on bermed pads, or disposed of in trenches, that has not been examined by EM-40, Environmental Restoration Group, and determined to be permanently disposed of. [Also called backlog waste.]

Listed Waste - Wastes listed as hazardous under RCRA that have not been subjected to the Toxic Characteristics Listing Process because the dangers they present are considered self-evident.

Liquid Mercury (as a waste matrix) - Any wastes containing bulk volumes of elemental liquid mercury. The category includes lab packs of strictly liquid mercury or other containers containing bulk mercury.

Low-Level Radioactive Waste (LLW) - (1) Waste that contains radioactivity and is not classified as high-level waste, TRU waste, or spent nuclear fuel, or the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of TRU is less than 100 Nci/g. (2) Radioactive waste not classified as high-level waste, TRU waste, spent nuclear fuel, or byproduct material.

Macroencapsulation (MACRO) - Application of surface coating materials such as polymeric organics (e.g., resins and plastics) or a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Macroencapsulation specifically does not include any material that would be classified as a tank or container according to 40 CFR 260.10.

Mixed Low Level Waste (MLLW) - Low level waste that also includes hazardous materials as identified in 40 CFR 261, Subparts C and D.

Mixed TRU (MTRU) Waste - TRU waste that also includes hazardous materials as identified in 40 CFR 261, Subparts C and D.

Mixed Waste - (1) Radioactive waste (as defined by the Atomic Energy Act) that contains material listed as hazardous waste in Subpart D of 40 CFR 261 or that exhibits any of the hazardous waste characteristics identified in Subpart C of 40 CFR 261. (2) Waste that contains both radioactive and hazardous components, as defined by the AEA and the RCRA. The term "radioactive component" refers only to the actual radionuclides dispersed or suspended in the waste substance.

Mixture Rule - Under the mixture rule, when any solid waste and a listed hazardous waste are mixed, the entire mixture is a listed hazardous waste. Mixtures of solid wastes and characteristic hazardous wastes are hazardous only if the mixture exhibits a characteristic. (40 CFR 261.3(a)(2))

Neutralization (NEUTR) - use of the following reagents (or waste reagents) or combinations of reagents: (1) Acids; (2) bases; or (3) water (including wastewaters) resulting in a Ph greater than 2 but less than 12.5 as measured in the aqueous residuals.

Onsite - (1) Within a single research or production site of the DOE weapons complex; e.g., LANL is a site, as is INEL, SNL, etc. (2) The contaminated area and all potential areas in very close proximity to the contamination that must be taken into account for effective implementation of the response action.

Onsite Facility - A hazardous waste treatment, storage, or disposal area that is located on the generating site.

Operable Unit (OU) - (1) A discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site; (2) A discrete portion of a site consisting of one to many release sites considered together for assessment and cleanup activities. The primary criteria for placement of release sites into an operable unit include geographic proximity, similarity of waste characteristics and site type, and the possibilities for economy of scale. (3) An overall response action that by itself eliminates or mitigates a release, a threat of a release, or an exposure pathway.

Organic Debris (as a waste matrix) - Wastes with matrices meeting the definition of debris per the 8/18/92 LDR debris rulemaking (57 FR 37194, 8/18/92). More specifically this category is defined for wastes that contain >90 percent organic debris. Example organic debris materials are: rags (including "solvent rags") plastic/rubber, paper, wood, and glovebox gloves (including lead-lined), animal carcasses.

Organic Liquids (as a waste matrix) - Liquids/slurries with a total organic carbon (TOC) content greater than or equal to 1 percent. Slurries must be pumpable (e.g. suspended/settled solids can be up to approximately 35-40 percent). Only liquids/slurries packaged/stored in bulk form (i.e., tank stored, drummed bulk free liquids) are included in this category. Liquids packaged in lab pack-type configuration are categorized as lab packs.

Package - A barrel, box, or other container into which waste is initially placed. A package is placed in packaging prior to transportation.

Packed Bed Reactor - A treatment technique, developed by Las Alamos National Laboratory, in which a chlorinated hydrocarbon liquid waste (i.e., PCB's) and excess air is injected into a refractory packed column which is at elevated temperature. Heat is provided by an external tube furnace. The waste and excess air mixture actually cools the reactor slightly. The waste reacts with the air to form hydrogen chloride, products of combustion and traces of products of incomplete combustion. A silent discharge plasma cell can be used to polish the output from the packed bed reactor.

pH - (1) Used to describe the hydrogen-ion activity of a system. The logarithm (the exponent indicating the power to which a given number must be raised to produce a given number) of the reciprocal of hydrogen ion concentration ($-\log_{10}[H^+]$, where $[H^+]$ is hydrogen-ion concentration in moles per liter). (2) A symbol for the degree of acidity or alkalinity.

Pollutant or Contaminant - Includes, but is not limited to, any element, substance, compound, or mixture, including disease-causing agents, that after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term "pollutant or contaminant" shall not include petroleum, including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

Pretreatment Processes - Processes (e.g., shredding, grinding, physical separation, etc.) that make the waste amenable to the treatment process that ultimately destroys, removes, or immobilizes the hazardous contaminants or characteristics.

Radiation - (1) Ionizing radiation that includes any or all of the following: gamma rays and x-rays, alpha and beta particles, high-speed electrons, neutrons, high-speed protons, and other atomic particles. This definition does not include nonionizing radiations, such as sound, microwave, radiowave or visible, infrared, or ultraviolet light. (2) Refers to the process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

Radioactive Mixed Waste - (See Mixed Waste)

Radioactive Waste - (1) Solid, liquid, or gaseous material that contains radionuclides regulated under the AEA of 1954, as amended, and of negligible economic value considering costs of recovery. (2) A solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities. Does not include material contaminated by radionuclides from nuclear weapons testing.

Radioactivity - (1) The spontaneous nuclear decay of a material with a corresponding release of energy in the form of particles and/or electromagnetic radiation. (2) The property or characteristic of radioactive material to spontaneously "disintegrate" with the emission of energy in the form of radiation. The unit of radioactivity is the curie (or becquerel).

Radionuclide - (1) A species of atom having an unstable nucleus, that is subject to spontaneous decay. (2) Any nuclide that emits radiation. A nuclide is a species of atom characterized by the constitution of its nucleus and hence by the number of protons, the number of neutrons, and the energy content.

Radionuclide Separation - The process by which the radioactive portion of a waste stream is physically separated from the hazardous portion creating two separate waste streams, one purely radioactive and one purely hazardous.

Reactive Metals (as a waste matrix) - Bulk reactive metals and equipment contaminated with reactive metals. Bulk reactive metals include sodium, alkali metal alloys, aluminum fines, uranium fines, zirconium fines, and other pyrophoric materials. Contaminated equipment includes piping, pumps, and other materials with a residue or reactive metals that cannot be separated from the equipment medium.

Reactivity - (1) A characteristic of a waste that is explosive, reacts violently with water, or generates toxic gases when exposed to water or liquids that are moderately acidic or alkaline. (2) An EPA characterization of hazardous waste that identifies waste that under routine management, presents a hazard because of instability or extreme reactivity.

Remedial Action (RA) - (1) Activities conducted at DOE facilities to reduce potential risks to people and/or harm to the environment from radioactive and/or hazardous substance contamination. (2) Those actions consistent with permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of a hazardous substance into the environment to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. (3) The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection, clay cover, neutralization, cleanup of released hazardous substances or contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging or excavations, repair or replacement of leaking containers, collection of leachate and runoff, onsite treatment or incineration, provision of alternative water supplies, and any monitoring reasonably required to ensure that such actions protect the public health and welfare and the environment. The term includes the costs of permanent relocation of residents and businesses and community facilities where the President determines that, alone or in combination with other measures, such relocation is more cost-effective than, and environmentally preferable to, the transportation, storage, treatment, destruction, or secured disposition offsite of such hazardous substances, or may otherwise be necessary to protect the public health or welfare. The term does not include offsite transport of hazardous substances or contaminated materials unless the President determines that such actions: are more cost-effective than other remedial actions; will create new capacity to manage in compliance with Subtitle C of the SWDA, hazardous substances in addition to those located at the affected facility; or are necessary to protect public health or welfare or the environment from a present or potential

risk that may be created by further exposure to the continued presence of such substances or materials [as defined by §101(24) of CERCLA].

Resource Conservation and Recovery Act (RCRA) Part A Permit - The first part of a Resource Conservation and Recovery Act permit application that identifies treatment, storage, and disposal units within a to-be-permitted facility.

Resource Conservation and Recovery Act (RCRA) Permit, Part B - The detailed second part of a RCRA permit application that describes waste to be managed, and waste quantities, and facilities.

Segregation - The separation of waste materials to facilitate handling, storage, treatment, transportation, and/or disposal.

Silent Discharge Plasma - A Los Alamos developed waste treatment technology which destroys trace quantities of halogenated hydrocarbon vapor contained in a gas stream. The technology involves the use a large electrical potential difference across a dielectric to produce oxygen free radicals which attack the halo-organics producing hydrogen chloride and combustion products.

Site - (1) A geographic entity comprising land, buildings, and other facilities required to perform program objectives. Generally a site has, organizationally, all of the required facilities for management functions. That is, it is not a satellite of some other site. (2) For the purposes of the ERWM Five-Year Plan, sites are lands, installations, and/or facilities for which DOE has or shares responsibility for ERWM activities. (3) An area or a location at which hazardous substances have been stored, treated, disposed of, placed, or otherwise come to be located. This includes all contiguous land, structures, other appurtenances, and improvements on the land used for treatment, storage, or disposal of hazardous substances. A site may consist of several treatment, storage, or disposal facilities (e.g., impoundments, containers, buildings, or equipment).

Site Characterization - The program of exploration and research, both in the laboratory and in the field, undertaken to establish the geologic conditions and the ranges of those parameters of a particular site relevant to the procedures under this part. Site characterization includes borings, surface excavations, excavation of exploratory shafts, limited subsurface lateral excavations and borings and geophysical testing.

Site Closure and Stabilization - Those actions that are taken upon completion of operations that prepare the disposal site for custodial care and that ensure that the disposal site will remain stable and will not need ongoing active maintenance.

Soil (as a waste matrix) - Soils contaminated with hazardous constituents and radioactivity that are stored in waste containers. Includes soils contaminated with organics, inorganics, or both.

Soil With <50 Percent Debris (as a waste matrix) - Soils contaminated with hazardous constituents and radioactivity that are stored in waste containers. Includes soils contaminated with organics, inorganics, or both. Wastes in this category may include debris, provided it is less than 50 percent of the waste.

Stabilization (STABL) - A broad class of treatment processes that immobilize hazardous constituents in a waste. For treatment of metals in low-level mixed wastes and for TRU wastes containing low-level radioactive components, stabilization technologies will reduce the leachability of the hazardous metal constituents (regardless of whether the metals are radioactive) in nonwastewater matrices.

Storage - (1) Temporary holding of waste pending treatment or disposal. Storage methods include containers, tanks, waste piles, and surface impoundments. (2) The containment of hazardous waste, either on a temporary basis or for a period of years, in such a manner as not to constitute disposal of such hazardous waste. (3) Retrievable retention of waste pending disposal.

Storage Facility - Land area, structures, and equipment used for the storage of waste.

Storage Unit - A discrete part of the storage facility in which waste is stored.

Technology Based Standard - A restricted waste for which a technology based standard is specified may be land disposed after it is treated using that specified technology or an equivalent treatment method approved by the Administrator of EPA.

Toxic Characteristic Leaching Procedure (TCLP) - A procedure developed by USEPA to simulate leaching processes thought to occur in a sanitary landfill. The procedure involves extraction of the solid waste and analysis of the extraction fluid for RCRA hazardous materials. If a total analysis of the waste demonstrates that all RCRA materials are at levels below the regulatory limits then the TCLP need not be run.

Thermal Treatment - The treatment of hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the hazardous waste. Examples of thermal treatment processes are incineration, pyrolysis, calcination, wet air oxidation, and microwave discharge.

Transuranic Waste (TRU) - This core definition appears in modified form in various relevant documents: Waste containing alpha-emitting radionuclides with an atomic number greater than 92 and half-lives greater than 20 years, at concentrations greater than 100 Nci/g of waste. Modifications include the following: (1) For purposes of management, DOE Order 5820.2A (a) considers TRU waste, as defined above, "without regard to source or form" [The proposed revision to the Order ("DOE Order 5820.2A Major Issues for Revision," May 6, 1992) contemplates removing this clause.]; (b) allows heads of field elements to determine that wastes containing other alpha-emitting radionuclides must be managed as TRU waste; and (c) adds "at time of assay", implying both that the classification of a waste as TRU is to be made based on an assay and that such classification can be superseded only by another assay. (2) For purposes of setting standards for management and disposal, 40 CFR 191.02(i) adds "except for: (a) high-level radioactive wastes; (b) wastes that the DOE has determined, with the concurrence of the Administrator [of EPA] do not need the degree of isolation required by this part; or (c) wastes that the Commission [NRC] has approved for disposal on a case-by-case basis in accordance with 10 CFR 61 [Licensing Requirements for Land Disposal of Radioactive Wastes]".

Treatability Group - Based on the radioactive characteristics, hazardous components, and physical/chemical matrices as discussed above, DOE has grouped its wastes to reflect salient treatment considerations for each waste stream. These "treatability groups" are used to relate waste streams and waste quantities to treatment facilities and technology development needs.

Treatment - (1) Any method, technique, or process designed to change the physical or chemical character of waste to render it less hazardous, safer to transport, store or dispose of, or reduced in volume. (2) Any activity that alters the chemical or physical nature of a hazardous waste to reduce its toxicity, volume, mobility, or render it amenable for transport, storage, or disposal.

Treatment Facility - The specific area of land, structures, and equipment dedicated to waste treatment and related activities.

Treatment, Storage, and Disposal (TSD) Facility - Any building, structure, or installation where a radioactive or hazardous substance has been treated, stored, or disposed.

Treatment System - The equipment and processes used for similar waste types at treatment facilities. A treatment system is the unit treatment operation or sequence of unit treatment operations carried out on all wastes that enter the system (e.g., a treatment system may consist of chemical reduction followed by precipitation, or an incinerator and a vitrification unit for the ash).

Vitrification - (1) A waste treatment process in which calcined or another decomposed form of waste is mixed with glass and fused into a solid mass. The resultant mass is expected to remain a stable and insoluble form for long time periods, and thus will be a leading candidate for the most benign wasteform for disposal. (Vitrification with borosilicate glass is the BDAT for HLW and certain mixed waste streams.) (2) The conversion of high-level waste materials into a glassy or noncrystalline solid for subsequent disposal. (3) The process of immobilizing waste that produces a glass-like solid that permanently captures the radioactive materials.

Volatile Organic Compound (VOC) - (1) Any reactive organic compound as defined in 40 CFR 60.2 definitions. (2) An organic (carbon-containing) compound that evaporates (volatilizes) readily at room temperature.

Waste Acceptance Criteria (WAC) - The criteria used to determine if waste and waste packages are acceptable for treatment, storage, transportation and disposal purposes.

Waste Characterization - Activities to determine the extent and nature of the waste. Note: Waste characterization may be based on process knowledge, nonintrusive (NDE/NDA) examination, or intrusive examination such as sampling and analysis.

Waste Form - The physical form of the waste such as sludges, combustibles, metals, etc.

Waste Isolation Pilot Plant (WIPP) - (1) The project authorized under §213 of the DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1980 (Public Law 96-164; 93 Stat. 1259, 1265) to demonstrate the safe disposal of radioactive waste materials generated by atomic energy defense activities. (2) A research and development facility, located near Carlsbad, New Mexico, to be used for demonstrating the safe disposal of TRU wastes from DOE activities.

Waste Management - The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste, as well as associated surveillance and maintenance activities.

Waste Minimization - (1) An action that effectively avoids or reduces the generation of waste by source reduction, improving energy usage, or by recycling. This action is consistent with the general goal of minimizing present and future threats to human health, safety, and the environment. (2) The reduction, to the extent feasible, of hazardous waste that is generated prior to treatment, storage, or disposal of the waste. Waste minimization includes any source reduction or recycling activity that results in either (a) reduction of total volume of hazardous waste, (b) reduction of toxicity of hazardous waste or (c) both.

Waste Segregation - The separation of waste materials before the package (or repackage process to facilitate handling, storage, treatment, transportation, and/or disposal.

Waste Stream - A flow of waste materials with specific definable characteristics that remain the same throughout the life of the process generating the waste stream. A waste stream is produced by a single process or sub-process; however, that process or sub-process may be one that combines two or more input waste streams together to produce a single output waste stream.

Wet Air Oxidation (WETOX) - A treatment technology applicable to wastewaters containing organics and oxidizable inorganics such as cyanide. The basic principle of operation for wet air oxidation is that the enhanced solubility of oxygen in water at high temperatures and pressures aid in the oxidation of organics.

COMPLIANCE PLAN VOLUME

of the

DRAFT SITE TREATMENT PLAN

for the

Mixed Wastes

at

Mound Facility

Miamisburg, Ohio

August 24, 1994

1.0 Purpose and Scope of the Compliance Plan Volume

For each facility at which the Department of Energy (DOE) generates or stores mixed waste, section 3021(b) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6721, as amended by section 105(a) of the Federal Facility Compliance Act ((P.L. 102-386) (the Act)), requires DOE to prepare a plan for developing treatment capacities and technologies to treat mixed wastes to the standards promulgated by the U.S. Environmental Protection Agency (EPA) pursuant to section 3004(m) of RCRA. Upon submission of a plan to the appropriate regulatory agency, the Act requires the recipient agency to solicit and consider public comments, and approve, approve with modification, or disapprove the plan within six months. The agency is to consult with EPA and any State in which a facility affected by the plan is located. Upon approval of a plan, the agency shall issue an Order requiring compliance with the approved plan.

DOE has prepared this Draft Site Treatment Plan (Draft Plan) for mixed waste at Mound Facility in accordance with the schedule published in the April 6, 1993, Federal Register notice for submitting the site treatment plans for facilities at which the Department generates or stores mixed waste (58 FR 17875). The purpose of this Draft Plan is to identify the currently preferred options for treating the mixed waste at Mound Facility or for developing treatment technologies where technologies do not exist or need modification. The Draft Plan reflects the site-specific preferred options, developed with the State's input and based on existing available information. The options reflect the "bottoms-up" approach and have not been completely evaluated for impacts on other DOE sites and impacts to the overall DOE program. Therefore, changes in the preferred option and associated schedules are possible between the Draft Plan, the Final Proposed Plan, and final approval and issuance of the Order as evaluation of DOE-wide impacts and State-to-State discussions progress.

To the extent possible, the Draft Plan identifies specific treatment facilities for treating the mixed waste and proposes schedules as set forth in the FFCAct. When not possible, schedules for alternative activities such as waste characterization and technology assessment are provided as appropriate. All schedule information presented is preliminary and is subject to change. For new facilities, the schedule is heavily dependent upon decisions made during the design phase and is contingent on funding availability. Assumptions and professional judgments related to the type of treatment technology, location of the treatment facility, contracting mechanism, project approval process, cost, etc. were used to develop the estimated schedule. Any variation from these assumptions will impact the estimated schedule. In addition, cost data used in developing options and schedules are planning estimates only and do not reflect a commitment of budgetary resources.

Emerging or new technologies not yet considered may be identified in the future that provide opportunities to manage waste more safely, effectively, and at lower cost than the current technologies identified in the Draft Plan. Working closely with regulators and other interested parties during the implementation of the Draft Plan, DOE will continue to evaluate and develop technologies that offer potential advantages in the areas of public acceptance, risk abatement, and performance and life cycle cost. Should more promising technologies be identified, DOE may request a modification of its treatment plan in accordance with provisions of the final Site Treatment Plan and/or the Order.

The Draft Site Treatment Plan is comprised of two volumes: this Compliance Plan Volume and the Background Volume. The Compliance Plan Volume proposes overall schedules with target dates for achieving compliance with the land disposal restrictions (LDR) and procedures for converting these target dates into milestones to be enforced under the Order. The more detailed discussion of the options contained in the Background Volume is provided for informational purposes only.

When finalized, the Site Treatment Plan will satisfy DOE's obligation under the Act to develop and submit a treatment plan for Mound. In addition, inasmuch as the Plan is intended to provide DOE's plans for achieving compliance with the LDR requirements of 3004(j) of RCRA at Mound, it is understood that no further civil enforcement action, administrative or judicial, will be initiated for violations of RCRA section 3004(j) arising from storage of mixed waste covered by the approved Plan for so long as DOE is in compliance with the requirements of the approved Plan and the Order issued which requires compliance with the Plan. This will include all mixed waste and suspect mixed waste in storage at Mound and identified in the approved Plan, as well as future mixed waste generated and incorporated into the Plan in accordance with the provisions of the Plan, and any mixed waste received from off-site which is being accumulated to facilitate the treatment of such waste at Mound and which is covered in another site's treatment plan approved by the appropriate regulatory agency after consultation with the State of Ohio.

2.0 Implementation of the Plan

Section 2.0 describes certain provisions DOE proposes to include in the Final Site Treatment Plan for Mound to facilitate implementation of the Plan. This Draft Plan provides a general description of what these provisions would be intended to achieve and the approach DOE proposes; it is expected that the specific language to be used in the Final Plan and Order, as well as specific milestones, will be developed in conjunction with the OhioEPA. As discussions on the Final Plan and Order progress, the Plan for some sites may eventually be expanded to address other administrative provisions or, alternatively, some or all of these provisions may be incorporated into the Order.

2.1 Approach to Setting Milestones

This Section of the Final Plan would establish a process for committing to milestones for specific activities based on the target dates in the schedules provided in Section 3.0 through 5.0 of the Compliance Plan Volume. Milestones would be defined as fixed, enforceable near-term dates on which a specified activity must be completed. Target dates would mark the anticipated completion of longer-term tasks and would not be enforceable until converted to milestones.

Activities to be proposed as milestones and target dates would generally be the activities identified in the Act for wastes with existing technology, for waste for which technology does not exist or needs adaptation, or for providing information when radionuclide separation is involved. However, other closely related activities, such as completion of design or characterization activities, may be proposed as milestones and target dates as well.

Target dates would be converted into milestones as the Plan is implemented according to procedures established in Section 2.0. DOE proposes establishing milestones for long-term projects such as those that will be covered by the Plan on a gradual basis because of such projects are subject to significant uncertainties. This would allow DOE and the OhioEPA to establish commitments as technical and funding information becomes known and would provide the OhioEPA, with input from the public as appropriate, to play a significant role in establishing work priorities at the site. Possible approaches to establishing milestones include:

- Establishing milestones on an annual basis for near-term activities. Milestones would be proposed for approval for activities that will take place in the ensuing one year period, with target dates covering longer-term activities.

- Establishing milestones in a phased approach that correspond to the activities identified in the Act. A milestone would be established for the current phase of each project (e.g., initiating construction of a treatment facility), and the target date for the next phase (e.g., commencing facility testing) would be converted to a milestone when the previous phase was achieved and when there is a good technical understanding of the work involved in carrying out the next phase.

For mixed waste to be shipped off-site, the final milestone and target date associated with the wastes would be the date of shipment. Other milestones and target dates for on-site activities related to preparing wastes for shipment could be proposed. When the intended treatment site is a DOE site, the Section would recognize that the development and availability of such off-site capacity is pursuant to the Site Treatment Plan and Order or other enforceable agreement at that site.

The Section would reference procedures for setting new milestones and for modifying milestones and target dates when necessary. Generally, where practical new milestones and changes to target dates would be achieved through Section 2.2, "Annual Site Treatment Plan Update." Modifications to current milestones would be governed by procedures in Section 2.5 "Modifications/Extensions or Revisions to the Plan."

2.2 Annual Site Treatment Plan Update

This Section of the Final Plan would provide for submission of an Annual Site Treatment Plan Update intended to communicate information on progress in implementing the Plan and to provide a mechanism for establishing new milestones, amending wastes covered by the Plan, and updating the Plan, as well as proposing revisions to the Plan when necessary. These latter actions may be accomplished through other mechanisms as described in other Sections of this Plan, but the Annual Update provides a coordinated mechanism to effect such changes on a routine basis. DOE proposes that all sites with a Site Treatment Plans provide Annual Updates in the same timeframe to facilitate necessary site and State interactions and to facilitate tracking progress across the DOE complex in developing treatment capacity and treating mixed waste.

The Annual Update would amend the Background Volume as necessary, identifying changes to mixed wastes covered by the Plan, including volumes; new waste streams and waste streams no longer covered by the Plan; and progress on activities undertaken to carry out the Plan.

The Annual Update would also update the Compliance Plan Volume. It would contain proposals for new milestones, identify any changes to target dates, and propose revisions to the Plan in accordance with Section 2.5, "Modifications/Extensions or Revisions to the Plan."

The Annual Update would be submitted to the OhioEPA for review and comment or approval, as appropriate, and made publicly available as defined in this Section and in accordance with the procedures in 2.8, "Submittal, Review and Approval of Deliverables." After the appropriate procedures are followed, the Compliance Plan Volume would be considered amended.

It is intended that the Annual Update be done in a way that minimizes unnecessary paperwork to the extent practical through page changes, etc. If there are no changes that require updates to the Compliance Plan and Background Volumes in a given year, a letter notifying the OhioEPA to that effect could be provided as an Annual Update.

2.3 Inclusion of New Waste Streams

This Section of the Final Plan would establish procedures for incorporating newly identified and

newly generated or stored waste streams into the Site Treatment Plan and for developing a plan and schedules for providing treatment capacity.

It would establish procedures for notifying the OhioEPA of a new waste stream as soon as possible. The notification would describe the waste code, volume, current and expected generation rate, and technology needs to the extent possible and would include the waste as a covered waste.

The next Annual Update would incorporate the new waste streams and propose a plan for treatment and associated schedules where possible, or schedules for developing a treatment plan as required by the Act if necessary.

2.4 Duration of the Plan and Deletion of Wastes

This Section of the Final Plan would establish that the approved Plan will terminate when the site's mixed waste, regardless of the time it was generated, is in compliance with the storage prohibition in RCRA 3004(j). This will occur: 1) when there is no longer any mixed waste stored or generated at the site that does not meet land disposal restriction requirements, or 2) when the mixed waste currently being stored or generated at the site, or that will be stored or generated, is being stored solely for the purposes of accumulating sufficient quantities as are necessary to facilitate proper treatment, recovery, or disposal.

Similarly, it would also establish that a specific waste would be deleted from the Plan when the waste is no longer being stored or generated at the site, or when the waste meets land disposal restriction standards or is being accumulated solely for the purposes of facilitating proper treatment, recovery, or disposal. This could occur, for example, when the last scheduled milestone under the Site Treatment Plan for treating the waste is completed; when the waste is shipped off-site, or when the characterization of the waste demonstrates it meets RCRA land disposal standards.

The Section would allow DOE and the OhioEPA to agree to terminate the Plan or to keep the Plan in effect, e.g., in anticipation of waste to be generated in the future, for reasons other than those provided above.

The Section would provide for notification of the OhioEPA and other procedures as appropriate for terminating the Plan and for deleting waste streams.

2.5 Modifications/Extensions or Revisions to the Plan

This Section of the Final Plan would establish procedures to enable DOE to seek adjustments to milestones when events cause or may cause delays, and would define the circumstances which justify a delay. It would require DOE to notify the OhioEPA, provide an explanation for the delay, and set procedures for reviewing and approving/disapproving alternative milestones.

It would also define and establish procedures for those revisions to the Plan that would require the OhioEPA to follow procedures in Section 3021(b)(2) and (3) of RCRA, as amended by the Act, including providing the proposed revision to the public and consulting with other affected States and EPA. The Annual Update described in Section 2.2 would generally be used to propose and approve a revision, unless the revision would become effective before it could be addressed in the regularly scheduled Annual Update.

DOE proposes that all Site Treatment Plans consistently define what constitutes a "revision" to the Plan that is subject to Sections 3021(b)(2) and (3) of the Act, since such a revision may often require the involvement of other affected States. Revisions would include addition of treatment capacity, technology development or use of radionuclide separation not previously included in the Compliance Plan Volume of the Site Treatment Plan or extensions to milestones for a period greater than one year. Inclusion of new waste streams would not constitute a revision but may result in a revision if inclusion of the new waste results in a change to the Site Treatment Plan that meets one of the above criteria. Other types of modifications to the Site Treatment Plan such as milestone changes of less than one year, although not a "revision," would require approval as described in Section 2.8.

2.6 Funding Considerations

This Section would describe DOE's obligations to seek the funding necessary to accomplish the activities in the Final Site Treatment Plan. It would also confirm DOE's authority over its budget and funding level submissions and its responsibilities under the Anti-Deficiency Act, 31 U.S.C. Section 1341, as amended.

2.7 Disputes

This Section would provide procedures to address disputes concerning scheduling under Section 2.1, Modifications/Extensions or Revisions to the Plan under Section 2.5, Review and Submittal of Deliverables in Section 2.8, and other circumstances agreed to by DOE and the OhioEPA. The Section would establish timeframes to resolve a dispute and a process that would elevate the dispute when agreement cannot be reached.

2.8 Submittal, Review and Approval of Deliverables

This Section would establish a process and timeframes for review, comment, response to comments, and approval as appropriate by the DOE and the OhioEPA of such deliverables as the Annual Update, notices signifying completion of milestones and identification of new wastes, and other deliverables.

3.0 Low-Level Mixed Waste Streams Treatment Plan and Schedules

3.1 Mixed Waste Streams for which Technology Exists

3.1.1 Preferred option and Estimated Schedule for Scintillation Cocktail in Vials withTritium and/or Pu-238

The Mound glass melter is determined to be the preferred treatment option as it exists on-site. The secondary wastes from the glass melter are radionuclide contaminated glass, scrubber salts, and filters which will be packaged and stabilized if necessary then placed in interim storage. This material will still carry the F003 mixed waste listing from the xylene in the waste. Disposal would be at the Nevada Test Site or a commercial site such as Envirocare in Utah.

3.1.2 Preferred option and Estimated Schedule for Waste Oil, Tritium, Pu-238,Contaminated

The preferred option is the Mound glass melter. Secondary wastes produced by treatment will be low-level radioactive waste if the input waste is mixed waste solely because of the ignitablity characteristic (D001A). Disposal would be at the Nevada Test Site or a commercial site such as Envirocare in Utah.

3.1.3 Preferred option and Estimated Schedule for Waste Lead Loaded Gloves

Encapsulation is BDAT. The DOE site at Pantex in Amarillo, Texas is building a mobile encapsulation unit which will be available to Mound and other DOE sites once constructed and proven. Construction of this unit is in Pantex's

budget. This will need to be coordinated with treatment of other Mound secondary wastes requiring stabilization. The treated waste will be placed in interim storage in preparation for shipment to Envirocare.

3.1.4 Preferred option and Estimated Schedule for Waste Lead-Acid Batteries Pu-238Contaminated

All lead that is not contaminated will be prepared for recycle or disposal. Contaminated lead parts which can not be decontaminated will be encapsulated in waste packages. The DOE site at Pantex in Amarillo, Texas is building a mobile encapsulation unit which will be available to Mound and other DOE sites once constructed and proven. Construction of this unit is in Pantex's budget. The treated waste will be placed in interim storage in preparation for shipment to Envirocare.

3.1.5 Preferred option and Estimated Schedule for Waste Lead Shapes

The treatment strategy involves surface abrasion, recycling the clean lead and secondary treatment of the removed material. If the material meets the requirements of the Los Alamos National Laboratory lead decontamination trailer for radionuclide containment the facility will be scheduled to be transported to Mound. The mixture of lead that is removed plus blast grit require further treatment as mixed waste. The cleaned bulk lead can be sent to recycle. If decontamination and recycling of the lead is not feasible, BDAT treatment for this waste is macroencapsulation. The treated waste will be placed in interim storage in preparation for shipment to Envirocare.

3.1.6 Preferred option and Estimated Schedule for Liquid Mercury, Tritium Contaminated

The DOE site at Pinellas, Florida is fabricating an amalgamation unit which would be available after proven for use at Mound. Los Alamos National Laboratory has a triple distillation unit which could be used for treatment but it is believed this method would not achieve significant separation from a volatile radionuclide like tritium. The Pinellas unit is included in their budget.

3.2 Mixed Waste Streams for Which Technology Exists But Needs Adaptation

3.2.1 Preferred Option and Estimated Schedule for Kerosene, PCB, Tritium Contaminated

The preferred option is the Packed Bed Reactor/ Silent Discharge Plasma (PBR/SDP) technology developed by Los Alamos National Laboratory. The device will be constructed as a mobile treatment unit. Secondary waste streams are scrubber salts, filters, charcoal and tritiated water. The tritiated water will be recycled or solidified, the scrubber salts, filters and charcoal will be stabilized, packaged and placed into interim storage. Each secondary waste stream will be analyzed to support an application the ship the material to disposal site at the Nevada Test Site. All secondary wastes will be low-level radioactive.

3.3 Waste Streams Requiring Further Characterization or for Which Technology Assessment Has Not Been Done

3.3.1 Absorbed Oil, PCB, Pu-238 Contaminated

Treatment would consist of a separation step, thermal desorption to remove the organic materials from the absorbant, followed by PCB destruction. Grand Junction Projects Office is building a mobile thermal desorption unit that will be available to Mound after built and proven. Construction of the unit is in the GJPO budget.

3.3.2 Plan for Activities and Estimated Schedule for Miscellaneous Lab Packs

After additional measurements on the radionuclide content are completed, similar wastes will be bulked together and then sampled for RCRA analysis. If the material is shown to be mixed waste appropriate treatment options will be explored. BDAT treatment requirements can not be determined until the waste is further characterized. This waste treatment is not included in the Five Year Plan budget.

3.3.3 Plan for Activities and Estimated Schedule for Newly Discovered Potentially Mixed Waste

The contents of each drum have been examined and segregated. Suspect mixed waste will be sampled. When sufficient data is gathered, various treatment options will be examined. BDAT treatment requirements can not be determined until the waste is further characterized. This waste treatment is not included in the Five Year Plan budget but is covered by Defense Programs funding.

4.0 TRU Mixed Waste Streams

4.1 TRU Wastes Expected to go to WIPP

4.1.1 Preferred Option and Estimated Schedule for TRU Corrosives.

This consists of liquid corrosive wastes from Plutonium 238 operations which have been absorbed. This waste is characterized by process knowledge and is contact handled. These wastes are stored in Type B containers.

The DOE wide strategy for managing defense related TRU wastes is disposal at WIPP. A no migration variance is being pursued for WIPP which, if successful, will not require TRU waste to meet LDR treatment standards. If it is not known at this time whether the final WIPP waste acceptance criteria could place additional treatment requirements on TRU waste. A schedule will be developed when WIPP becomes operational.

4.1.2 Preferred Option and Estimated Schedule for TRU Lead.

This waste stream is similar to low level waste stream MD-W012. Lead loaded gloves have been used on some glove boxes in plutonium areas. The gloves contains an inner layer of rubber that is compounded with approximately 8% by weight powdered lead oxide. This waste is characterized by process knowledge and is contact handled. These wastes are stored in Type B containers without overpack.

The DOE wide strategy for managing defense related TRU wastes is disposal at WIPP. A no migration variance is being pursued for WIPP which, if successful, will not require TRU waste to meet LDR treatment standards. If it is not known at this time whether the final WIPP waste acceptance criteria could place additional treatment requirements on TRU waste. A schedule will be developed when WIPP becomes operational.

4.2 TRU Waste Not Expected To Go To WIPP

Mound has no waste in this category.

5.0 High-Level Mixed Waste Streams

High-level mixed waste originates from the nuclear fuel cycle. No activities of this nature have been carried out at Mound. No high-level mixed waste has been or will be generated at Mound.

Plan Volume Appendix A

Mixed Waste Treatment Unit Schedules

DOE/AL MIXED WASTE TREATMENT PROGRAM

TREATMENT TECHNOLOGY	DATE AVAILABLE FOR DEPLOYMENT
Thermal Desorption	2/97
Lead Decontamination Unit	(See Note)
Amalgamation of Mercury	10/97
Macroencapsulation Unit	10/97
Mound Glass Melter	6/97
Packed Bed Reactor	10/96

NOTE: Dates shown are based on preliminary schedules for development, design, fabrication, and acceptance testing. Actual deployment at a given site will depend on approval of necessary permits and NEPA documentation, as well as inter-site scheduling for treatment of wastes using mobile treatment units.

Lead decontamination trailer is presently treating wastes at LANL