

**FEDERAL FACILITY COMPLIANCE ACT**

**PROPOSED SITE TREATMENT PLAN  
FOR DOE MIXED WASTES AT THE  
MISSOURI UNIVERSITY RESEARCH REACTOR**

Prepared for

The State of Missouri  
Department of Natural Resources  
Division of Environmental Quality  
P.O. Box 176  
Jefferson City, Missouri 65102-176

Prepared by

The U.S. Department of Energy  
Oakland Operations Office  
1301 Clay Street, N-700  
Oakland, California 94612-5208

March 1995



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## EXECUTIVE SUMMARY

### Purpose of the Site Treatment Plan

The Proposed Site Treatment Plan (PSTP) for U.S. Department of Energy (DOE) mixed wastes at the Missouri University Research Reactor (MURR) was written in response to the Federal Facility Compliance Act (FFCAct). The FFCAct requires that site treatment plans (STPs or plans) be developed for facilities at which the DOE generates or stores mixed waste. Mixed waste is defined by the FFCAct as any waste containing both a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA), and 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 *The Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site* in the *Federal Register* (58 FR 17875, DOE, 1993a) describing its proposed process for developing the site treatment plans. The plans would be developed in three phases: conceptual, draft, and proposed. The conceptual plan presented known treatment needs, capabilities, and preliminary options for treating the mixed waste. The purpose of the draft plan was to identify site-specific preferred options for treating the mixed waste, or for developing technologies where technologies do not exist or need modification. The proposed plan reflects DOE's preferred options, developed with state input and based on existing available information. The options reflect a "bottom-up" approach and have been evaluated for their potential affects on other DOE sites and the overall DOE program. Changes in the preferred options and associated schedules were also made between the draft and proposed site treatment plans as a result of evaluations from the DOE-wide perspective. These may change further as a result of discussions with affected states and public comments before the approval of the PSTP and issuance by the Missouri Department of Natural Resources (MDNR) of an Order (FFCAct Order) requiring DOE to implement the STP for each site.

The PSTP consists of the Compliance Plan Volume, and the Background Volume and its Appendices. The Compliance Plan Volume contains the enforceable milestones associated with the

preferred treatment options. A more detailed discussion of the preferred treatment options, which is provided for informational purposes only, is presented in the Background Volume and its Appendices.

DOE faces increasingly tight budgets throughout the DOE complex and anticipates that funding will continue to be constrained. The schedules in this and other Plans reflect those constraints. DOE has asked regulatory agencies to work with DOE and other interested parties at the site and National level to assist DOE in prioritizing its activities. Through this process, DOE expects that some schedules will be revised before the Site Treatment Plans are approved and FFCAct Orders issued.

### **Summary of PSTP Proposed Options**

Current inventories of DOE/OAK mixed wastes at MURR are relatively small, consisting of about 1 m<sup>3</sup> of mixed low-level waste (MLLW, 5 drums), comprised of debris and contaminated equipment, and 0.1 m<sup>3</sup> of mixed transuranic (MTRU) waste (0.5 drum), consisting of solid residues from analytical samples, spent reagents, and experimental apparatus components. Future generation of these two types of waste (until project completion in 1998) is expected to bring the total quantity of waste produced to 5 m<sup>3</sup> (24 drums) of MLLW and 1 m<sup>3</sup> of MTRU waste. If generation of these mixed wastes do not meet RCRA Land Disposal Restriction requirements, they will be characterized and addressed in updates to this plan as required.

The MLLW is expected to be shipped to the Hanford Waste Receiving and Processing (WRAP) IIA facility for treatment. The MTRU waste streams are expected to be shipped to the Waste Isolation Pilot Plant (WIPP); although the schedule dates for shipment are dependent upon development of final WIPP Waste Acceptance Criteria (WAC) and approval of the WIPP No-Migration Variance Petition by the EPA and the State of New Mexico.

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FOR DOE MIXED WASTES AT THE  
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COLUMBIA, MISSOURI**

**BACKGROUND VOLUME**

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Prepared for

The State of Missouri  
Department of Natural Resources  
Division of Environmental Quality  
P.O. Box 176  
Jefferson City, Missouri 65102-176

Prepared by

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1301 Clay Street, N-700  
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## LIST OF ACRONYMS

### All PSTP Volumes

|                |  |
|----------------|--|
| $\alpha$ -MLLW | Alpha-Contaminated MLLW                              |
| BDAT           | Best Demonstrated Available Technology               |
| CFR            | Code of Federal Regulations                          |
| CH             | Contact-Handled                                      |
| CSTP           | Conceptual Site Treatment Plan                       |
| D&D            | Decontamination and Decommissioning                  |
| DOE            | U.S. Department of Energy                            |
| DOE/OAK        | U.S. Department of Energy, Oakland Operations Office |
| DSTP           | Draft Site Treatment Plan                            |
| DSTP Framework | Draft Site Treatment Plan Development Framework      |
| EM             | Environmental Management                             |
| EMAB           | Environmental Management Advisory Board              |
| EPA            | U.S. Environmental Protection Agency                 |
| ER             | Environmental Restoration                            |
| FFCAct         | Federal Facility Compliance Act                      |
| HLW            | High-Level Waste                                     |
| INEL           | Idaho National Engineering Laboratory                |
| LDR            | Land Disposal Restriction                            |
| LLW            | Low-Level (Radioactive) Waste                        |
| MDNR           | Missouri Department of Natural Resources             |
| MLLW           | Mixed Low-Level Waste                                |
| MTRU           | Mixed Transuranic Waste                              |
| MWIR           | Mixed Waste Inventory Report                         |
| NEPA           | National Environmental Policy Act                    |
| NGA            | National Governors' Association                      |
| NRC            | Nuclear Regulatory Commission                        |
| OAT            | Options Analysis Team                                |
| ORNL           | Oak Ridge National Laboratory                        |
| PEIS           | Programmatic Environmental Impact Statement          |
| PSTP           | Proposed Site Treatment Plan                         |
| PUREX          | Plutonium-Uranium-Extraction                         |
| RCRA           | Resource Conservation and Recovery Act               |
| RIC            | Rockwell International Corporation                   |
| SRS            | Savannah River Site                                  |
| STP            | Site Treatment Plan                                  |
| TBD            | To Be Determined                                     |
| TRU            | Transuranic  |
| UMC            | University of Missouri at Columbia                   |
| WAC            | Waste Acceptance Criteria                            |
| WIPP           | Waste Isolation Pilot Plant                          |
| WM             | Waste Management                                     |
| WRAP           | Waste Receiving and Processing (Facility)            |

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## 1.0 INTRODUCTION

### 1.1 PURPOSE AND SCOPE

The Proposed Site Treatment Plan (PSTP) for U.S. Department of Energy (DOE) mixed wastes at the Missouri University Research Reactor (MURR) was written in response to the Federal Facility Compliance Act (FFCAct). The FFCAct requires that site treatment plans (STPs or plans) be developed for facilities at which the DOE generates or stores mixed waste. Mixed waste is defined by the FFCAct as any waste containing both a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA), and 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 *The Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site in the Federal Register* (58 FR 17875, DOE, 1993a) describing its proposed process for developing the site treatment plans. The plans would be developed in three phases: conceptual, draft, and proposed. The conceptual plan presented known treatment needs, capabilities, and preliminary options for treating the mixed waste. The purpose of the draft plan was to identify site-specific preferred options for treating the mixed waste, or for developing technologies where technologies do not exist or need modification. The proposed plan reflects DOE's preferred options, developed with state input and based on existing available information. The options reflect a "bottom-up" approach and have been evaluated for their potential affects on other DOE sites and the overall DOE program. Changes in the preferred options and associated schedules were also made between the draft and proposed site treatment plans as a result of evaluations from the DOE-wide perspective. These may change further as a result of discussions with affected states and public comments before the approval of the PSTP and issuance by the regulating agency of an Order (FFCAct Order) requiring DOE to implement the STP for each site. For the DOE Oakland Operations Office (DOE/OAK) mixed wastes at MURR, the plan must be submitted to the Missouri Department of Natural Resources (MDNR) Division of Environmental Quality for approval, approval with modification, or disapproval.

The PSTP identifies specific facilities for treating mixed waste and proposes schedules as required by the FFCAct. Schedules for activities associated with the preferred treatment options are

also provided as appropriate. A standardized evaluation procedure was used to identify the specific treatment facilities for treating the mixed wastes. If existing onsite treatment, onsite small-scale treatment (less-than-90-days generator treatment or a treatability study), or an existing commercial treatment agreement was available, then that option was considered the preferred treatment option. If these options were not available, then planned onsite, existing offsite, or planned offsite facilities that could potentially treat the waste were identified and evaluated. The evaluations were based on the following criteria: (1) treatment effectiveness, (2) environmental health and safety, (3) implementability, (4) regulatory concerns, (5) stakeholder concerns, and (6) life-cycle costs. The preferred treatment option selected for each characterized waste stream as a result of these evaluations, as modified by the Options Analysis Team (OAT) overall DOE preferred mixed waste treatment configuration, is presented in the PSTP.

The Proposed Plan also contains schedules for the implementation of the preferred treatment options. DOE faces increasingly tight budgets throughout the DOE complex and anticipates that funding will continue to be constrained. The schedules in this and other Plans reflect those constraints. DOE is providing schedules to support further discussions with the expectation that schedules in the approved Plans will differ for some sites from the schedules in the Proposed Plans.

The schedules contained in this and the Proposed Plans for other sites are based on funds currently budgeted for and projected to be available for waste management activities. As a result, schedules in the Proposed Plans for some facilities, particularly the largest and most costly facilities, may be protracted. Schedules for small sites that are relying on the treatment capacity at larger sites are also affected. DOE anticipates that, at some sites, funds will be shifted from other environmental management activities to support more sensible and integrated schedules for mixed waste treatment.

DOE discussed with States and EPA the difficulty DOE faces in providing timely schedules for some new treatment facilities given current budgetary constraints, and the need to consider whether funds from other activities should be shifted to support more timely schedules. The States and EPA recommended that the Proposed Plans be submitted with schedules consistent with current budget and priorities, even though they recognized schedules may be extended. As part of its efforts to develop its budget request for FY 1997, DOE has asked regulatory agencies to work with DOE and other interested parties at the site and National level to assist DOE in prioritizing its activities, including mixed waste treatment, and in assessing activities under way and that need to be accomplished at the site. Through this budget development process and through discussions on the Proposed Plans, DOE and the regulatory agencies expect that some schedules will be revised before the Site Treatment Plans are approved and the FFCAct Orders are issued.

Even after the Plans are approved, DOE anticipates that modifications and adjustments to the Plan will be necessary because of the technical and funding uncertainties that naturally exist with long-term activities like those covered by the Plans. For example, 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 Proposed 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 FFCAct Order.

The PSTP reflects the results of discussions among the State of Missouri and other states, the U.S. Environmental Protection Agency (EPA), and others based on the *Conceptual Site Treatment Plan* (CSTP, DOE/OAK, 1993a) submitted to the State of Missouri in October 1993, and the *Draft Plan* (DOE/OAK, 1994a) submitted in August of 1994. The plans for DOE/OAK mixed wastes located at MURR are available for review at the Department of Energy Oakland Operations Office Public Reading Room at 1301 Clay Street, Oakland, California, and at the Columbia Public Library located on West Broadway in Columbia, Missouri.

The PSTP consists of the Compliance Plan Volume, and the Background Volume and its Appendices. The Compliance Plan Volume contains the enforceable milestones associated with the preferred treatment options. A more detailed discussion of the preferred treatment options, which is provided for informational purposes only, is presented in the Background Volume and its Appendices.

## 1.2 SITE HISTORY AND MISSION

The University of Missouri at Columbia (UMC) is located in the central portion of the state of Missouri in Boone County. UMC maintains an active research laboratory, the MURR, which conducts a wide variety of nuclear energy experiments. MURR is located in the southern part of the city of Columbia, within the University's Research Park. The address for MURR is Research Center, Columbia, MO 65211. Figure 1-1, identifies the location of the MURR facility within the City of Columbia.

MURR is a 10 megawatt research reactor licensed by the Nuclear Regulatory Commission (NRC). It is one of only a few high-quality research reactors in the United States. For the last 27 years, MURR has supported effective research and development programs, focused on basic life sciences, natural sciences, material sciences, engineering, and technology. Examples of major accomplishments at MURR include studies on the effects of trace elements on human health; studies of basic wave-nature of particles using neutron interferometry; contributions to the development of the

new hard magnetic material, *MagneQuench*; development of radioisotopes for human therapy, including agents to treat bone cancer and liver cancer, as well as to tag monoclonal antibodies; and basic research which supports the development of the TRansUranic Management by Pyroprocessing - Separation (TRUMP-S) process to separate transuranic (TRU) materials from nuclear waste. Figure 1-2 illustrates MURR's organizational structure.

Rockwell International Corporation (RIC), under contracts with DOE and Kawasaki Heavy Industries to develop a pyrochemical process to separate TRU materials from Plutonium-Uranium Extraction (PUREX) waste, contracted with UMC in 1990 for the construction of an Alpha Laboratory and performance of actinide experiments at the MURR facility. Figure 1-3 shows the location of the MURR Alpha Laboratory and the storage area for TRUMP-S wastes. It is anticipated that the TRUMP-S test program will continue through March 1998. The tests are conducted in an inerted glove box using small (sub-gram) quantities of pure actinides. Since the tests also include use of some materials (cadmium and silver) defined as hazardous under RCRA, small quantities of mixed waste are generated.

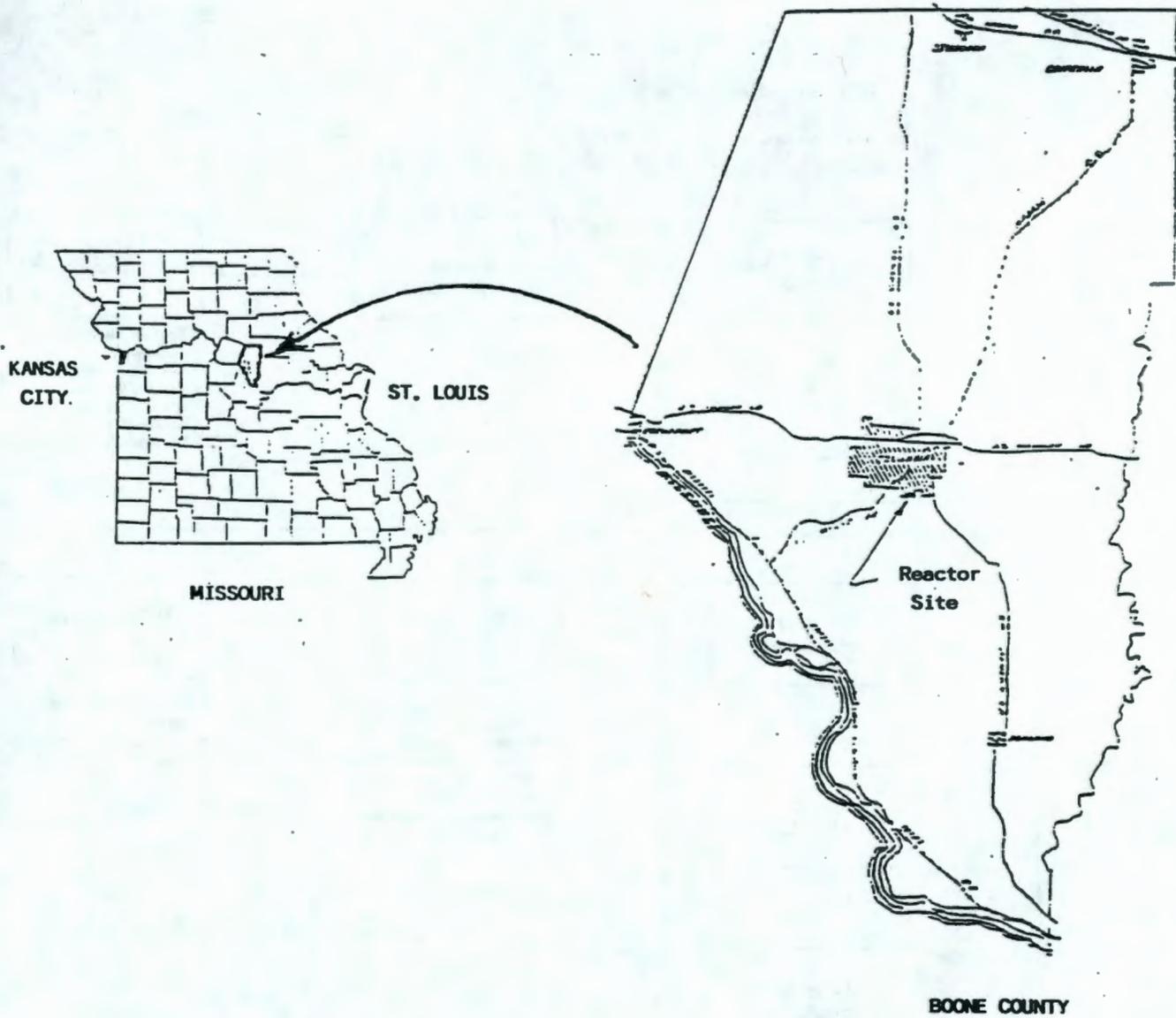


FIGURE 1-1 Regional Location Map of the University of Missouri, Boone County, Missouri

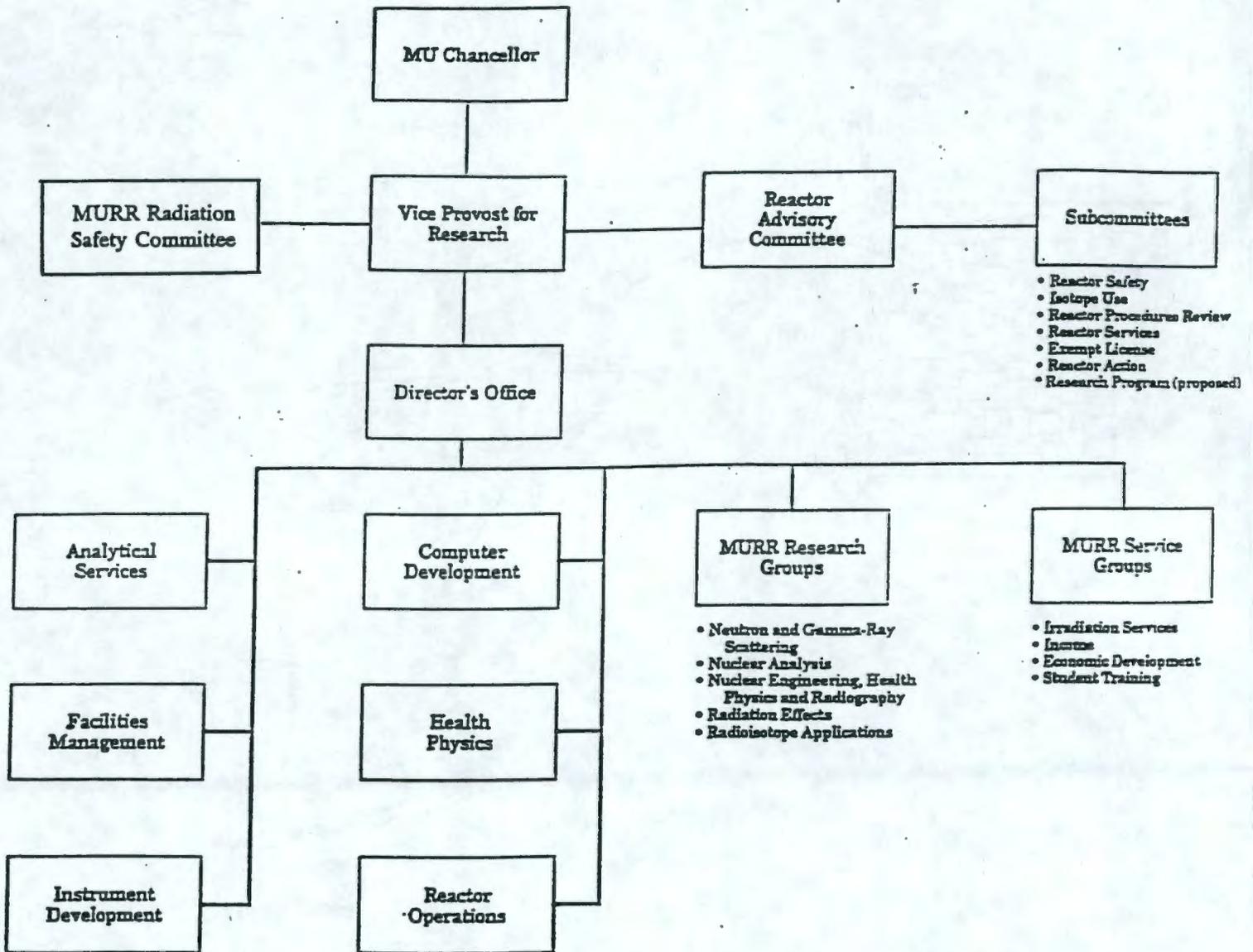


FIGURE 1-2 MURR Organizational Structure

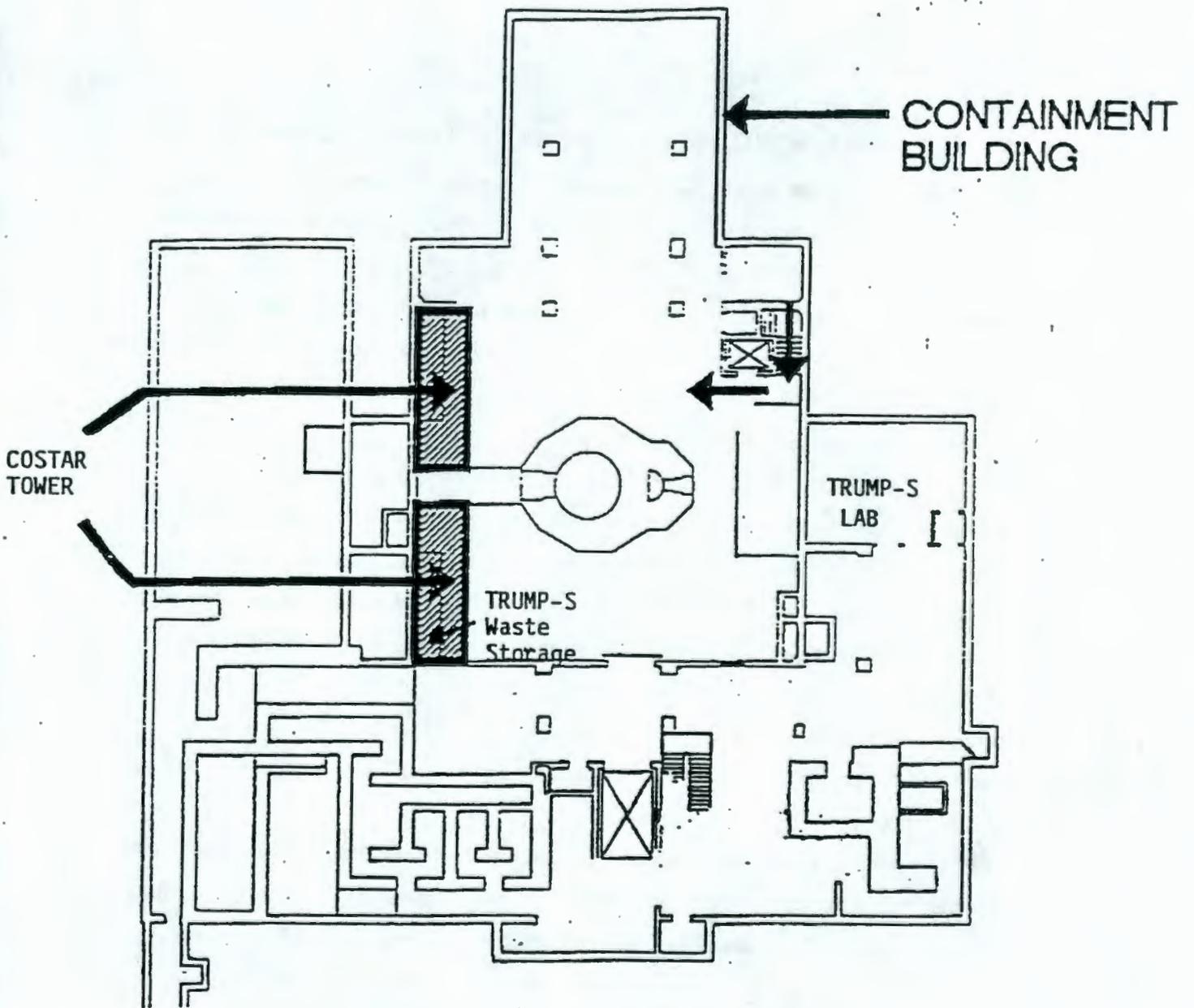


FIGURE 1-3 Missouri University Research Reactor Building Plan

DOE has provided several grams of TRU materials for experiments conducted at MURR in support of the TRUMP-S program. Management of the mixed low-level waste (MLLW) and mixed transuranic (MTRU) wastes generated from the TRUMP-S experiments conducted at the MURR facility is the responsibility of MURR and the DOE Office of Nuclear Energy which is partially funding the research project.

### 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(s) of mixed waste] to certain standards before the waste can be land-disposed, 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 FFCAct, signed on October 6, 1992, waives sovereign immunity for fines and penalties for RCRA violations at Federal facilities. However, the FFCAct postpones the waiver for three years for LDR storage prohibition violations for DOE mixed wastes and requires DOE to prepare plans for developing the required treatment capacity for its mixed waste at each site at which it stores or generates mixed waste. 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 regulatory agency requiring compliance with the plan. The FFCAct 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 FFCAct 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 FFCAct also requires the plan to provide certain information where radionuclide separation is proposed. The FFCAct states that the plans may provide for centralized, regional or onsite 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 as a notice April 6, 1993, in the *Federal Register* (58 FR 17875, DOE, 1993a). In the Notice, DOE committed to providing the site treatment plans in three phases: a conceptual plan to be submitted in October 1993, a draft plan to be submitted no later than August

1994, and a final proposed plan to be submitted no later than February 1995. The date for the final proposed plan submittal has been extended to April 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 Plan* (DOE/OAK, 1993a), submitted in October 1993, focused on identifying treatment needs, capabilities, and options for treating the site's mixed waste. The *Draft Plan* (DOE/OAK, 1994a), submitted in August 1994, focused on identifying site-specific preferred options for treating the site's mixed wastes, wherever possible, as well as proposed schedules for constructing capacity. The options presented in the DSTP represent the site's best judgment of the available information and the states' input, and provided a starting point for discussions leading to the development of the *Proposed Plan*. The options presented in this proposed plan represent DOE's best judgment. The proposed plan is being submitted to the regulatory agency for review and approval, approval with modification, or disapproval, as required by the FFCAct. Each version of the plan reflects discussions among states, 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 Site Treatment Plan and issuance of the compliance order required by the FFCAct. DOE's goal is to have all plans and FFCAct Orders in place by October 1995.

#### **1.4 PSTP ORGANIZATION**

The PSTP for DOE/OAK mixed wastes located at MURR follows the same format as the proposed plans of other DOE sites to facilitate cross-site comparisons. The proposed plan is organized in two separate, but integrated volumes. The *Compliance Plan Volume* is a short, focused document containing the preferred options and schedules for implementing the options and is intended to contain all the information required by the FFCAct. The Compliance Plan Volume also contains a mechanism to implement the plan and establish schedules that will be enforced by the Order. It references, but does not duplicate, details on the options in the *Background Volume*. This *Background Volume* provides a detailed discussion of the preferred treatment option or options, identifies the waste streams the option addresses, and gives explanatory information for the *Compliance Plan Volume*. The Background Volume *Appendices* include documentation on the proposed agreements with offsite receiving sites (Appendix A), and definitions applicable to all volumes of the PSTP (Appendix B).

*Sections 1.0 and 2.0* of the Compliance Plan Volume propose certain administrative provisions appropriate for implementing the plan when finalized. These include provisions such as

the approach to setting milestones, updates to the plan, additions or removals of 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 regulatory agency. New language to address other administrative provisions may eventually be added to these compliance plan volume sections or incorporated into a separate FFCAct Order.

Sections 1.0 and 2.0 in the Compliance Plan and Background Volumes contain introductory material relevant to the purpose of each Volume. The Background Volume contains general information on the proposed plan and the site in Section 1.0 and provides top-level assumptions and a description of the process used to determine the preferred options in Section 2.0.

*Sections 3.0 through 5.0* of the Compliance Plan and Background Volumes discuss the preferred option or options for MLLW, MTRU waste, and mixed high-level waste (HLW). Each volume discusses the same waste streams and options in parallel sections. The Background Volume discusses the waste streams, technology needs, and uncertainties and other details on the preferred options. In the Compliance Plan Volume, the sections include proposed schedules as required under the FFCAct.

The Background Volume includes three additional sections that are not included in the Compliance Plan Volume because they are not required by the FFCAct and are not 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 Compliance 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 DOE/OAK mixed wastes located at MURR pending treatment. *Section 7.0* also includes a discussion of storage for waste treatment residues prior to disposal.

*Section 8.0* describes a process being followed by DOE and the states for evaluating options for disposal of mixed waste treatment residues. Although the FFCAct does not require disposal to be covered in the plans, DOE is including disposal information to be responsive to the states' request that disposal be addressed and to support state discussions. *Section 8.0* identifies whether the MURR location is being further considered as a disposal site. Resources and guidance documents used to prepare this document are summarized in *Section 9.0*.

*Appendix A* to the Background Volume includes the proposed offsite shipping agreements between DOE/OAK and offsite treatment facilities. *Appendix B* includes a glossary of terms.

## **1.5 RELATED DOCUMENTS**

Other DOE efforts closely linked to STP development include treatment options analysis, cost estimating for treatment options, the Mixed Waste Inventory Report (MWIR), activities conducted pursuant to the National Environmental Policy Act (NEPA), and compliance and cleanup agreements containing commitments relevant to mixed waste.

### **1.5.1 Draft Site Treatment Plan Appendices**

The appendices to the draft STP (DSTP, DOE/OAK, 1994a) present summaries and evaluations of treatment options initially identified for DOE/OAK mixed wastes identified at that time. In some cases, the likely preferred option identified in the DSTP for a waste has been changed due to technical considerations (e.g., trace contaminants found to be incompatible with the treatment process), or policy decisions (e.g., proposed treatment facility eliminated, or inconsistent with the overall DOE preferred mixed waste treatment configuration).

### **1.5.2 The Mixed Waste Inventory Report**

The *Mixed Waste Inventory Report* (DOE, 1994a), which is required by the FFCAct contains inventories of (a) mixed waste currently stored or generated or expected to be generated during the next five years from DOE activities and (b) treatment capacities and technologies. The *Interim Mixed Waste Inventory Report* (DOE, 1993b), provided information on each waste stream for each site that generates or stores DOE mixed waste. Updated waste stream, treatment facility, and technology data was made available to the states and EPA in May 1994. The MWIR represents the best record of DOE's mixed waste inventory at the beginning of 1994. Because data are constantly being refined, waste stream information in DOE/OAK's proposed plan for MURR may differ somewhat from the most recent inventory report. Any changes in waste stream information are documented in the Background Volume. An updated MWIR is currently being prepared and is expected to be released by DOE in July 1995.

### **1.5.3 The Programmatic Environmental Impact Statement for Waste Management (NEPA)**

In compliance with NEPA (42 U.S.C. 4371 et seq) and its implementing regulations contained in 40 CFR 1500, DOE is preparing a Programmatic Environmental Impact Statement (PEIS). This PEIS will be used to formulate and implement a waste management program in a safe and environmentally sound manner and in compliance with applicable laws, regulations and standards. 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 DOE's environmental program. The PEIS is examining HLW, TRU waste, MLLW, low-level radioactive waste, and hazardous waste activities. The analysis for the Waste Management (WM) PEIS will evaluate decentralized, regional, and centralized approaches for storage of HLW; treatment and storage of TRU waste; treatment and disposal of MLLW and low-level radioactive waste; and treatment of hazardous waste.

Development of the WM PEIS is being coordinated with the preparation of the STPs under the FFCAct. Information being generated to support the WM PEIS (e.g., hypothetical configurations, preliminary risk analyses, and cost studies) is shared with states to support STP discussions. The Draft WM 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 WM 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 constructing new mixed waste facilities to treat mixed waste.

The Draft WM PEIS is scheduled to be published in May 1995. The Final PEIS will be issued after a public comment period, at or near the time of issuance of the FFCAct Orders by the appropriate regulatory agencies. To remain flexible and accommodate potential changes, the WM PEIS Record of Decision (ROD) for mixed waste will be issued after the appropriate regulatory agencies have fulfilled their legislative requirement of issuing the FFCAct Orders.

#### **1.5.4 RCRA Activities**

A revision to the MURR RCRA interim status (Part A) permit for hazardous waste storage has been submitted to address storage of mixed wastes in the MURR containment structure near the Alpha Laboratory where they are generated. MURR does not currently have a permit allowing treatment of mixed wastes.

### **1.6 SUMMARY AND STATUS OF DOE/OAK MIXED WASTES AT MURR**

Current inventories of DOE/OAK mixed wastes at MURR are relatively small, consisting of about 1 m<sup>3</sup> of MLLW (5 drums), comprised of debris and contaminated equipment, and 0.1 m<sup>3</sup> of MTRU waste (0.5 drum), consisting of solid residues from analytical samples, spent reagents, and experimental apparatus components. Future generation of these two types of waste (until project completion in 1998) is expected to bring the total quantity of waste produced to 5 m<sup>3</sup> (24 drums) of MLLW and 1 m<sup>3</sup> (5 drums) of MTRU waste.

The MLLW is expected to be shipped to the Hanford Waste Receiving and Processing (WRAP) IIA facility for treatment. The MTRU waste streams are expected to be shipped to the

Waste Isolation Pilot Plant (WIPP); although the schedule dates for shipment are dependent upon development of final WIPP Waste Acceptance Criteria (WAC), approval of the WIPP No-Migration Variance Petition by the EPA and the State of New Mexico, and DOE's declaration of operational readiness of WIPP.

Future generation of other DOE/OAK mixed wastes at MURR is not expected to occur. If, mixed wastes are generated that do not meet RCRA LDR requirements, they will be characterized and addressed in updates to this plan as required.

A summary of DOE/OAK mixed wastes located at MURR identified to date is shown in Table 1-1. This table is included as a tracking tool to indicate the status or disposition of mixed wastes that are subject to this PSTP. When a mixed waste no longer needs to be included in this PSTP (e.g., if further characterization indicates that it is not a RCRA waste, or when treatment is complete), discussions of the waste, schedule, and treatment information about the mixed waste stream will be deleted from this PSTP. The reference to the waste stream in Table 1-1 will be kept, however, to provide an final accounting of the waste stream disposition.

| <b>TABLE 1-1</b>                                      |  |                                  |                                |
|---|--|----------------------------------|--------------------------------|
| <b>SUMMARY OF DOE/OAK MIXED WASTE STREAMS AT MURR</b> |  |                                  |                                |
| <b>Waste Stream No.</b>                               | <b>Waste Stream Description</b>  | <b>Background Volume Section</b> | <b>Status</b>                  |
| MU-W001<br>(MURR-1)                                   | TRUMP-S Decontaminated and Failed Equipment Debris Contaminated with Cadmium and Silver (MLLW)   | 3.1                              | Hanford WRAP IIA Stabilization |
| MU-W002<br>(MURR-2)                                   | TRUMP-S Analytical Wastes and Equipment Debris Contaminated with Cadmium and Silver (MTRU waste) | 4.1                              | Disposal at WIPP               |

Key: WIPP = Waste Isolation Pilot Plant  
 WRAP = Waste Receiving and Processing (Facility)

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## 2.0 METHODOLOGY

### 2.1 ASSUMPTIONS

All sites used the following assumptions to ensure consistency among the STPs. The assumptions were developed as a part of the *Draft Site Treatment Plan Development Framework* (DOE, 1993c) and reflect review and comment from the states and EPA. Note that not all assumptions apply to every site.

1. HLW will continue to be managed according to current plans at each site [i.e., Hanford, West Valley, Savannah River Site (SRS), and the Idaho National Engineering Laboratory (INEL)]. Primarily due to potential safety concerns, HLW will not be transported offsite except as a treated, stable waste that is ready for disposal.
2. Regarding defense related MTRU, the PSTPs reflect DOE's current strategy that the WIPP will open and receive a No-Migration Variance. The PSTPs identify characterization, processing, and treatment of MTRU waste to meet the WIPP WAC. Consistent with this policy, treatment of MTRU waste to meet LDR standards is not included in the PSTPs at this time.

However, the PSTPs recognize that DOE's policy regarding WIPP is under review and may change in the future. As such, the PSTPs provide for the flexibility to modify activities and milestones regarding MTRU waste to reflect potential future changes in DOE policy.

Under current DOE policy, nondefense-related MTRU waste will not be disposed of at WIPP. As such, the PSTPs reflect LDR treatment of nondefense-related MTRU waste.

3. DOE recognizes some states' preference for treatment of all wastes onsite. Where appropriate, existing onsite capacity will be utilized before new facilities are constructed. When onsite treatment or use of commercial or mobile facilities is not practicable, the use of existing offsite capacity, as well as the construction of new facilities, will be considered.
4. Sites in the same state will investigate the practicality of consolidated treatment facilities.
5. 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 facilities identified in the PSTPs are being considered for managing ER and D&D waste.

6. On a volume basis, the large majority of DOE's mixed waste will be treated onsite. Because of transportation concerns and costs, this generally includes process wastewater and some explosives and remote-handled wastes. In addition, other large volume waste streams will generally be treated onsite. At a minimum, Hanford, Oak Ridge National Laboratory (ORNL), the INEL, and SRS will have onsite facilities to treat the majority of their wastes.
7. The PEIS is being prepared in parallel with the development of the STPs. The PSTP process will provide input to the PEIS. Each site will prepare any necessary specific NEPA documentation before proceeding with a specific project or facility approved by the state or EPA as part of the STP process.
8. In support of DOE's cradle-to-grave waste management philosophy, disposal site location and criteria will be factored into state equity discussions, waste treatment facility designs, and the characteristics of the final waste forms to the extent practicable under the time frame for submitting the STP.
9. To provide target dates for schedules for offsite shipment of wastes, various assumptions are identified in Sections 3.0 and 4.0. Some assumptions specify time periods for actions by the offsite facilities that will receive the wastes; if these time periods are exceeded, the target date(s) may be affected. Assumptions for offsite shipment schedules include estimated time frames for receiving the treatment facility WAC, approval of certification plans and waste profiles, and identification of an approved shipping date.

## **2.2 PREFERRED OPTION SELECTION PROCESS**

The preferred option selection process was conducted in two phases. Phase 1 consisted of each site developing preferred options for their DOE mixed waste streams. This preferred option development process and the sites' preferred treatment options were detailed in Appendix A to the DSTP. In Phase 2 a DOE complex-wide Options Analysis Team evaluated the sites' preferred options and optimized the overall DOE preferred mixed waste treatment configuration. The OAT process and the resulting preferred treatment configuration are described in the *Proposed National Mixed Waste Treatment Configuration* (DOE, 1995a).

### **2.2.1 Preferred Option Selection Process: Phase 1**

DOE prepared several guidance documents to assist the sites in identification of potential treatment options and the selection of preferred options. The overall process was described in the *Draft DSTP Framework*, which established common terminology, objectives and values, planning assumptions, and a recommended methodology for narrowing the alternatives presented in the

conceptual STP. The *Treatment Selection Guides* (DOE, 1994b), provided information for selecting among treatment options based on a comparison of key criteria such as regulatory compliance, environmental health and safety, treatment effectiveness, implementability, stakeholder concerns, and life-cycle costs. The *Draft Site Treatment Plan Cost Information Guidance* (DOE, 1994c), provided a level of consistency in the draft cost information by providing common cost assumptions. In some cases, site-specific cost information was also used to develop cost estimates for the preferred treatment options. Drafts of these and other technical assistance documents were provided to the states, and the states' comments were incorporated into the final revision of these documents. Copies of these documents are available in the DOE/OAK Public Reading Room at 1301 Clay Street, Oakland, California.

DOE/OAK developed an option selection process consistent with the DOE's *Draft DSTP Framework*. The DOE/OAK process favored the use of existing onsite treatment capabilities or capabilities that could be readily implemented. Therefore, onsite treatment of wastes at existing facilities was considered a preferred treatment option. Onsite "less than 90-day treatment" as allowed under Title 40 Part 262.34 of the Code of Federal Regulations (CFR), or treatability studies, as allowed under 40 CFR 261.4(e), were preferred treatment options when determined to be appropriate for a specific waste stream. If appropriate, existing commercial contracts for treatment of mixed waste were also identified as preferred treatment options.

If none of the preferred treatment options described above was identified for a given waste stream, then planned onsite and planned and existing offsite treatment facilities were evaluated. DOE's evaluation of planned and existing offsite facilities was conducted using some of the following major categories of criteria: treatment effectiveness; environmental health and safety; implementability; regulatory concerns; stakeholder concerns; and life-cycle costs.

The results of these evaluations were used as an analytical tool to determine a preferred treatment option. The process is considered to be a subjective evaluation process that relied on the weighted scoring system and best professional judgments of the evaluators. (Additional data regarding how preferred treatment options were identified are outlined in Section 2.0 of Appendix A to the DSTP.)

In summary, the options selection process examined preferred treatment options, including existing onsite treatment, existing commercial agreements, potential modifications to existing facilities, treatability studies, or treatment of wastes in tanks and containers within 90 days of generation (generator treatment). If none of these options was available, planned onsite or existing or planned offsite facilities were evaluated to determine a preferred treatment option. The preferred

treatment options identified as a result of these evaluations are summarized in Appendix A to the DSTP.

### 2.2.2 Options Selection Process: Phase 2

Because the DSTPs were prepared by the sites using a "bottom-up" approach, the resulting treatment configuration, when viewed from a national level, contained many redundancies and inefficiencies. In developing the PSTPs, an assessment was performed to determine what accommodations were necessary to blend the "bottom-up" DSTPs into a more sensible national configuration of treatment systems. To facilitate this assessment, DOE established an options analysis team comprised of site representatives and members of the Headquarters' FFCAct Task Force. The OAT coordinated their efforts with the states, through the National Governors' Association (NGA), to ensure the national mixed waste configuration reflects both the states' and DOE's concerns. As part of this evaluation, the impacts of implementing the emerging DSTP configuration, as well as alternative configurations, were evaluated.

The focus of the OAT's efforts has been on MLLW. While HLW and MTRU wastes are also covered by the FFCAct, the strategies for managing these wastes have already been established. However, DOE recognizes that modifications of these strategies may be needed as the programs evolve and new information becomes available.

In combination, the DSTPs form a mixed waste treatment configuration which was the baseline for the OAT analyses. Changes to the DSTP configuration proposed by the OAT were based on the following analyses:

1. Review of the DSTP baseline configuration to identify redundant and technically inefficient proposed treatment options.
2. Identification of alternative treatment configurations that emphasized key state and DOE concerns.
3. Evaluation of the DSTP baseline and alternate configurations against key evaluation areas to determine what combination of treatment options resulted in a configuration that best met DOE's, the states', EPA's and other stakeholders' concerns.

The results of the initial OAT analysis were shared with each of the sites and the state regulators, as well as DOE management. The OAT worked for several more months responding to state requests for additional analysis, incorporating ongoing site analysis, and responding to comments. The resulting configuration, described in the *Proposed National Mixed Waste Treatment*

*Configuration* (DOE, 1995a) and reflected in the PSTPs, is DOE's best attempt to balance competing DOE and stakeholder interests. The overall DOE preferred mixed waste treatment configuration did not affect the preferred treatment options previously identified in the MURR DSTP.

### **2.3 COORDINATION WITH REGULATORY AGENCIES AND OTHER STAKEHOLDERS**

The FFCAct offers an opportunity for DOE, the state, and EPA regulators who will be approving the Plans to work cooperatively toward defining mixed waste treatment plans. As requested by the states, DOE signed a cooperative agreement in August 1993 with the NGA to facilitate the DOE-to-State interactions. The NGA has sponsored national meetings on a routine basis with DOE, the states, EPA, and the Indian Nations throughout the development of the STPs.

The FFCAct requires the states and EPA to provide for public involvement after the PSTPs are submitted. DOE has provided additional opportunities for public input into the development of the Conceptual and Draft Plans through existing public involvement mechanisms at the site.

Representatives from DOE/OAK, MURR, and RIC met with the MDNR in early May of 1994. The purpose of the meeting was to discuss the DOE/OAK treatment option evaluation process for DOE/OAK mixed waste streams at MURR, and to familiarize MDNR with mixed waste issues relevant to DOE/OAK's mixed wastes at the MURR facility.

DOE/OAK has taken several steps to encourage public participation during the development of the STPs for Oakland Operations Office sites. Two FFCAct Fact Sheets have also been developed. Volumes 1 and 2 in a series of three fact sheets were published in January and September 1994. The two fact sheets were sent to approximately 1,000 public recipients. The fact sheets provide answers to common questions regarding the FFCAct and the STP development and approval process; address how the public can become more involved; and provide contact names and repository locations where STP documents can be reviewed. Throughout the STP process, mixed waste issues have been included on the agenda at several meetings conducted by DOE/OAK. These meetings were attended by the public and a wide variety of regulatory agencies.

At the national level, DOE has presented information on the development of the STPs to the Environmental Management Advisory Board, and held an Open House in Washington, D.C. when the Draft Plans were released. DOE also met informally with representatives of Indian Tribes and separately with representatives of other groups that may have interest in Site Treatment Plan development. The purpose of the meetings was to determine if there are national issues that may not be identified through site-specific activities. Additional opportunities to obtain input at the National level may be offered in coordination with the States and EPA. The Center for Environmental

Management provides information on FFCAct activities at the National level (1-800-736-3282; or 202-863-5084 in Washington, D.C.).

## 2.4 CHARACTERIZATION OF MIXED WASTES

### 2.4.1 DOE Treatability Groups

Treatability groups are used to characterize DOE waste stream information in a consistent and technically valid manner based on waste characteristics. Treatability groupings for waste streams in this PSTP are based on three parameters: (1) radiological, (2) waste stream matrix, and (3) regulated contaminants. Each of the three parameters are divided into subcategories based on the type of treatment required to meet RCRA LDR requirements for land disposal. DOE mixed waste streams are classified using the treatability group classification system outlined in *Waste Treatability Group Guidance* (DOE, 1994d). The three parameters that define a treatability group are defined as follows:

The *Radiological* parameter identifies up to four key elements including (1) radiological waste classification as low-level, TRU, high level, or mill tailings; (2) handling restrictions, noted as contact-handled (CH) or remote-handled (RH); (3) TRU alpha levels, indicating the presence and activity level (if known) of alpha-emitting TRU radionuclides; and (4) non-TRU alpha levels, indicating the presence and activity level (if known) of other alpha-emitting radionuclides.

The waste *Matrix* identifies the overall bulk physical and chemical form of the waste. The matrix code is selected from a list containing approximately 100 codes, and consists of a title and a single character to describe the waste stream physical form (e.g., "S" for solids, "L" for liquids), plus a four-digit code describing the chemical form of the waste stream (if known).

The *Regulated Contaminant* parameter identifies up to three key elements to indicate the regulatory classification and types of regulated contaminants in the waste, including (1) the regulatory program that covers the waste (e.g., "RC" for RCRA-regulated); (2) the presence of any RCRA-regulated hazardous organics (code "O") and/or metals (code "M") for which LDR treatment standards have not been met or established; and (3) whether the waste exhibits a RCRA hazardous characteristic (code "C") for ignitable, corrosive, or reactive wastes.

Under this waste classification system, waste streams that fit the criteria for a specific treatability grouping will have the same or similar matrices, and the same or similar radiological and chemical contaminants. This allows site-wide comparisons and groupings of DOE waste streams in order to assess treatment technology, capacity, and technology development needs. Treatability groups have been identified, if known, for DOE/OAK mixed waste located at MURR in Table 3-2

(for MLLW), and Table 4-2 (for MTRU wastes). Codes for treatability groups used in those tables are defined in Table 2-1.

| <b>TABLE 2-1</b>   |  |
|--|--|
| <b>DOE TREATABILITY GROUP CODES FOR DOE/OAK MIXED WASTES AT MURR</b> |  |
| Code   | Definition   |
| <b>Radiological Parameters</b>                                       |  |
| LL<br>TR   | Low-Level<br>Transuranic   |
| CH   | Contact-Handled  |
| N12<br>T11   | 0 < NonTRU Alpha ( $\alpha$ ) < 10 nCi/g<br>10 $\leq$ TRU $\alpha$ < 100 nCi/g |
| <b>Matrix</b>  |  |
| S5440  | Predominantly Organic Debris   |
| <b>Regulated Contaminant</b>   |  |
| RC   | RCRA-Regulated   |
| C90  | Not Ignitable, Corrosive, or Reactive  |
| O90  | No (RCRA-Regulated) Organics Present   |
| M11  | Metals without Mercury   |

#### 2.4.2 Mixed Waste Characterization Practices at MURR

The procedures and methodologies for characterizing wastes are designed to ensure safe handling and storage of wastes at MURR. All mixed waste storage and treatment activities are performed by Rockwell & MURR's TRUMP-S staff. The TRUMP-S staff are responsible for performing waste analyses. The objectives of the waste analyses are the following:

1. To ensure that sufficient information exists to ensure proper handling, storage, and disposition of all waste materials.
2. To establish uniform and comparable waste characterization requirements in accordance with applicable WACs.
3. To verify that incoming waste materials are properly described in accompanying documentation.

4. To ensure that all information requirements specified in the applicable WACs are met.
5. To ensure that sufficient waste characterization data is collected to support proper treatment and disposal of the wastes.

Before a waste is accepted into the TRUMP-S waste storage room, the chemical and physical properties of the wastes have been and will continue to be evaluated and documented to ensure safe storage for subsequent treatment and disposal. The TRUMP-S Program generators may obtain the necessary characterization information either from "process knowledge," (used in conjunction with existing published or documented data on the waste, or on waste generated from similar processes), or from sampling and laboratory analysis of the waste. Confidence in the characterization of this waste is high. It is anticipated that the MURR-1 waste will be similar to wastes stored at the Hanford site (the Preferred Option location). Since each bag of waste results from a particular test or test series, the amount of radioactivity is accurately known along with specific components in the waste bag. The amount of D&D waste generated from each test or test series varies between bags. Each 55-gallon drum contains 20 to 40 bags of waste. Each bag is marked so that the test numbers which generated the waste can be identified.

## **2.5 WASTE MINIMIZATION**

Where possible, components are reused in test series to minimize waste generation. The mixed waste goes through a volume reduction step if possible. Waste minimization strategies are specific to each mixed waste stream; however, segregation and volume reduction elements are common to each strategy.

### 3.0 MIXED LOW-LEVEL WASTE STREAMS

The waste streams identified in this section are DOE/OAK MLLW located at MURR, which contain both RCRA-hazardous waste and radioactive constituents. MLLW is defined as mixed waste that does not satisfy the definition of HLW (see Section 5.0), nor is it a transuranic waste (see Section 4.0). Alpha-contaminated MLLW ( $\alpha$ -MLLW), which is waste with TRU contamination  $> 10$  nanoCuries per gram (nCi/g) but  $\leq 100$  nCi/g, has historically been managed by DOE along with TRU waste, but is addressed in this document as MLLW. To date, waste characterization results for DOE/OAK mixed wastes at MURR have not identified any HLW or wastes classified as  $\alpha$ -MLLW.

Table 3-1 provides a summary of current DOE/OAK MLLW streams identified at MURR (See Table 1-1 for a complete summary and status of all FFCAct-covered DOE/OAK mixed wastes identified at this site). Table 3-2 is reserved to provide a brief description of DOE/OAK MLLW streams at MURR that have been characterized sufficiently to identify a preferred treatment option. Preferred treatment options selected will meet RCRA LDR requirements for land disposal. Table 3-3 is reserved to provide a list of wastes that still require characterization, or that have been characterized but require a technology assessment.

Tables 3-4(a) through (e) contain the proposed treatment or characterization schedules for DOE/OAK MLLW at MURR. Activities noted in boldface print in these tables are repeated in the Compliance Plan Volume as enforceable milestones and non-enforceable target dates. Other intermediate activities and dates shown in these Background Volume tables are for information only, and may be used to facilitate internal tracking of progress for each waste stream. For consistency in comparing activities for treating MLLW at any of the several DOE/OAK sites required to prepare PSTPs, the tables have been assigned the following standard identification: (a) is reserved for onsite treatment schedules; (b) is reserved for offsite treatment schedules; (c) is reserved for technology development schedules; (d) is reserved for treatability studies; and (e) is reserved for schedules for waste streams requiring characterization or technology assessment. The tables are included in the PSTP only if applicable to this site.

### 3.1 MLLW STREAMS FOR WHICH TECHNOLOGY EXISTS

Treatment schedules for those waste streams identified in Table 3-2 as having a preferred option using existing technology are included in Tables 3-4(a) or (b), as appropriate (the tables are included only if applicable to this site).

| <b>TABLE 3-1</b>                               |   |                                |
|--|---|--------------------------------|
| <b>SUMMARY OF DOE/OAK MLLW STREAMS AT MURR</b> |   |                                |
| <b>Waste Stream No.</b>                        | <b>Waste Stream Description</b>   | <b>Status</b>                  |
| MU-W001<br>(MURR-1)                            | TRUMP-S Decontaminated and Failed Equipment Debris Contaminated with Cadmium and Silver | Hanford WRAP IIA Stabilization |

#### 3.1.1 Characterized MLLW Stream Description and Proposed Treatment Option

Based on process knowledge the TRUMP-S waste streams are well characterized with high confidence and require no further characterization to determine appropriate treatment technologies. The MLLW is composed of Low Specific Activity (LSA) components (radioactive material) which may be mixed with cadmium and silver hazardous constituents. The MLLW includes: Kimwipes, paper, wipe-down filter papers, gloves, surgical gloves, glass, tantalum tubes, plastic sample bottles, and lithium/potassium chloride solution evaporate. The total radionuclides available for the eight-year TRUMP-S project that form LSA are shown in Table 3-1.1. These quantities represent the maximum total radionuclide contamination for all TRUMP-S wastes produced during the life of the project. Radiological parameters for the MLLW at MURR generated by the TRUMP-S program as of December 1994 are shown in Table 3-1.2.

Detailed test records, including both analytical measurements and process knowledge, are kept at MURR. It is anticipated that these records are adequate to fully characterize the waste.

**TABLE 3-1.1**

**Radionuclides Available for TRUMP-S Project (1990-1998)**

| <b>Element</b>   | <b>Total Mass (grams)</b> | <b>Calculated Volume (cc)</b> | <b>Isotope</b>   | <b>Calculated Mass (grams)</b>                        | <b>Calculated Activity (Ci)</b>                                      |
|------------------|---------------------------|-------------------------------|--|---|--|
| Uranium          | 74.983                    | 3.936                         | U-238<br>U-235   | 74.84<br>.15  | $2.51 \times 10^{-5}$<br>$3.25 \times 10^{-7}$                       |
| Uranium-Chloride | 5.0                       | 1.027                         |  |   | $1.06 \times 10^{-6}$  |
| Plutonium        | 4.999                     | 0.252                         | Pu-238<br>Pu-239<br>Pu-240<br>Pu-241<br>Pu-242<br>Am-241 | 0.241<br>4.720<br>0.279<br>0.0015<br>0.0009<br>0.0107 | 0.0070<br>0.2934<br>0.0021<br>0.052<br>$3.54 \times 10^{-6}$<br>0.04 |
| Neptunium        | 4.00                      | 0.196                         | Np-237<br>Pa-233   | 4.00<br>0.00*   | $2.82 \times 10^{-3}$<br>$2.82 \times 10^{-3}$                       |
| Americium        | 2.441                     | 0.179                         | Am-241<br>Np-237   | 2.441<br><0.001                                       | 8.3<br>< $7.05 \times 10^{-7}$                                       |

Notes:

\* Np-237 decays to Pa-233 which (with a 27.0-day half-life) decays very quickly. Thus, each Np-237 decay (measured in Curies, where 1 Curie =  $3.7 \times 10^{10}$  decays per second) is quickly followed by the decay of the resulting Pa-233 nuclide. This results in the same activity in Curies for Np-237 and Pa-233, but an essentially unmeasurably small mass for the Pa-233.

**TABLE 3-1.2**

**Radiological Activity of MLLW at MURR (December 1994)**

| <b>Waste Stream No.</b> | <b>Stored Waste Volume (m<sup>3</sup>)</b> | <b>Mass of Waste (kg)</b> | <b>Total Activity (Ci)</b> |
|-------------------------|--|---------------------------|----------------------------|
| MU-W001                 | 1  | 156.5                     | 0.001                      |

**TABLE 3-2**

**TREATMENT OPTIONS FOR CHARACTERIZED DOE/OAK MLLW STREAMS AT MURR**

| MWIR Waste Stream No. | Waste Stream Description and DOE Treatability Group   | RCRA Waste Code(s) | Best Demonstrated Available Technologies (BDAT) | Universal Treatment Standard(s)                           | Preferred Treatment Option     | Current Volume   | Projected Additional Volume (thru '98) |
|-----------------------|---|--------------------|---|---|--------------------------------|------------------|--|
| MU-W001 (MURR-1)      | TRUMP-S Decontaminated and Failed Equipment Debris Contaminated with Cadmium and Silver<br><br>LL-CH-T11-N12/S5440/RC-O90-M11-C90 | D006<br>D011       | Stabilization                                   | Concentration-based treatment standards for D006 and D011 | Hanford WRAP IIA Stabilization | 1 m <sup>3</sup> | approx.<br>4 m <sup>3</sup>            |

Notes: -RESERVED-

Treatability Group Key: See Table 2-1 of this Background Volume for Treatability Group Codes

### **3.1.2 Description of Technology and Capacity Needs**

The DOE program at UMC-MURR is expected to generate a total of 24 55-gallon drums of MLLW throughout the program which will be completed in March 1998. The bulk of this is D & D wastes, which will be generated after the project ends in March 1998. Currently, there is approximately 1 m<sup>3</sup> (5 drums) of MLLW on site.

The treatment technology needed for MURR-1 would be that required to immobilize the RCRA hazardous components. Immobilization (stabilization or macroencapsulation) is considered to be the best demonstrated available technology (BDAT) for debris which is contaminated with metals constituents. An evaluation was conducted of facilities which have a volume reduction step prior to stabilization, such as incineration, compaction and shredding. The evaluations are found in Tables 1, 2, and 3 of Appendix A to the DSTP (DOE/OAK, 1994a).

### **3.1.3 Treatment Facility Descriptions and Schedules**

The preferred treatment option selected for MU-W001 is the Waste Receiving and Processing Facility (WRAP-IIA) at the Hanford Site. Hanford has confirmed that their treatment processes are capable of handling this MURR waste. Storage of the waste at the Hanford site while treatment capacity is being developed will be in compliance with RCRA LDR storage prohibitions in accordance with Hanford's Tri-Party Agreement signed by DOE, the EPA, and the State of Washington. Therefore, any DOE/OAK mixed wastes shipped to Hanford for future treatment will be in compliance with the LDR storage prohibition when they are accepted for storage at Hanford. The facility proposed for treatment of this waste stream is as follows:

- WRAP IIA. The Hanford Site is proposing to seek treatment services from the private sector for waste streams, including wastes from other DOE sites, that were to be treated in the proposed WRAP IIA facility. Accordingly, the DOE Richland Operations Office has requested that the Milestone M-19-00, "Complete WRAP IIA Module Construction and Initiate Operations," in the Hanford Tri-Party Agreement be amended. The proposed amendment would not change the milestone date for initiating operations on September 30, 1999. If the amendment is approved, the specific nature and location of the facility will be determined through the contracting process. The status of the privatization effort, progress in securing treatment services by DOE-Richland, and any change to the facility title will be reported in subsequent Annual Updates to this plan.

### **3.2 MIXED WASTE STREAMS FOR WHICH TECHNOLOGY EXISTS BUT NEEDS ADAPTION, OR FOR WHICH NO TECHNOLOGY EXISTS**

No DOE/OAK MLLW streams at MURR fall into this category. Future DOE/OAK MLLW located at MURR identified for technology development or treatability studies will be shown in Table

3-2, with schedule information shown in Tables 3-4(c) or (d), as appropriate (the tables are included only if applicable to this site).

### 3.3 MIXED WASTE STREAMS REQUIRING FURTHER CHARACTERIZATION

No DOE/OAK MLLW streams at MURR fall into this category. Future waste streams that require characterization will be identified in Table 3-3, with schedule information reflected in Table 3-4 (e) (the table will be included only if applicable to this site).

| <b>TABLE 3-3<br/>-RESERVED-<br/>UNCHARACTERIZED DOE/OAK MLLW STREAMS AT MURR</b> |                                 |
|--|---------------------------------|
| <b>Waste Stream No.</b>  | <b>Waste Stream Description</b> |
| —  | None identified at this time.   |
|  |                                 |

TABLE 3-4 (b)

**SCHEDULE: MLLW STREAMS TO BE TREATED OFFSITE WITH EXISTING TECHNOLOGIES**

| Activity  | Waste Stream No.                 |   |
|---|----------------------------------|---|
|   | MU-W001<br>Debris w/Cd<br>and Ag | — |
| <b>Offsite Treatment Location</b>   | <b>Hanford<br/>WRAP IIA</b>      | — |
| Request WAC from selected offsite treatment facility.   | Completed                        |   |
| Submit a written certification plan to the offsite facility.  | 9/30/95                          |   |
| Conduct sampling and analysis of waste generated if required, and submit resulting wastes profiles to the offsite facility. | 6/30/96                          |   |
| <b>Request an acceptable shipping schedule from offsite facility for offsite transport of waste(s).</b>                     | <b>12/30/96</b>                  |   |
| <b>Complete shipment of waste(s) offsite.</b>   | <b>Assumption<br/>#7</b>         |   |

Assumptions:

Items noted in boldface are reflected as milestones/target dates in the Compliance Plan Volume.

1. **Waste Acceptance Criteria (WAC) Timing:** Hanford requires 3 months following request.
2. A certification plan is required by DOE Order 5820.2A and includes packaging requirements, waste form acceptance criteria, and constituent acceptance criteria. The plan is developed from the information established in the offsite facility's WAC.
3. The offsite facility may or may not require additional sampling and analysis prior to waste acceptance; sampling and analysis would be conducted in accordance with the procedures established in the approved certification plan.
4. The offsite facility will approve the certification plan within 6 months of submittal.
5. The offsite facility will approve the waste profile within 6 months of submittal.
6. The shipment date will be provided by the offsite facility.
7. Wastes will be shipped within 6 months after the approved shipping date provided by the offsite treatment facility (in response to MURR's request shown as the first milestone). Shipment dates estimated for budgeting purposes were 9/30/97 (MURR-1); and 9/30/99 (Future).
8. Schedule dates assume that MURR will be an approved generator for Hanford by 9/30/95.

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## **4.0 MIXED TRANSURANIC WASTE STREAMS**

The waste streams identified in this section are DOE/OAK MTRU wastes located at MURR, which contain both RCRA hazardous wastes and transuranic constituents. MTRU waste, by definition, is waste, regardless of source or form, that is contaminated with (1) alpha-emitting transuranium nuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at time of assay and (2) RCRA-regulated waste.

### **4.1 MTRU WASTES EXPECTED TO GO TO WIPP**

#### **4.1.1 National Strategy for Managing Mixed Transuranic Waste**

The current DOE strategy for managing defense-related MTRU wastes is to segregate MTRU wastes from MLLW; to maintain the MTRU wastes in safe interim storage; to characterize, certify, process if necessary, and package the wastes to meet the WAC for WIPP located near Carlsbad, New Mexico; and to permanently dispose of applicable MTRU waste in WIPP. Compliance with the requirements of the FFCAct for MTRU waste will be achieved using the RCRA No-Migration Variance petition approach as provided in 40 CFR 268.6.

Under this strategy, no treatment other than that necessary to meet the WIPP WAC is anticipated. However, a performance assessment being conducted by DOE, and the EPA No-Migration Variance petition determination will define what treatment, if any, will be required to ensure disposal compliance.

DOE is actively gathering inventory and characterization data for input into the performance assessment and preparing several regulatory submittals to EPA to demonstrate compliance with the No-Migration Variance petition requirements. The current plan is as follows:

- Submit a draft compliance certification package to EPA in March 1995;
- Submit a No-Migration Variance petition to EPA by May 1995;

- Submit a revised RCRA Part B Permit Application to the New Mexico Environment Department by June 1995;
- Submit a final compliance certification package (including final performance assessment results) to EPA by December 1996;
- Submit the final WIPP WAC by June 1997;
- Declare operational readiness for WIPP by December 1997;
- Begin disposal of CH MTRU waste in June 1998; and
- Begin disposal of RH MTRU waste in June 1999.

These dates are contingent upon permit approval, certification of disposal compliance, and approval of the No-Migration Variance petition from the appropriate regulators, and are subject to availability of funds.

In the interim, site-specific information is included in this section and in Section 7.0, "Storage Report," to outline activities being performed at MURR to maintain safe, compliant storage, waste characterization activities, and other activities planned to support the ultimate goal of shipment and disposal at WIPP under a no-migration variance petition.

#### **4.1.2 DOE/OAK Potential MTRU Wastes at MURR Expected to Go to WIPP**

Table 4-1 summarizes DOE/OAK defense-related potential MTRU waste streams located at MURR which are ultimately expected to go to WIPP. Estimated schedules for characterizing, packaging, and shipping of the waste are shown in Table 4-4(a) (the table is included only if applicable to this site).

Defense-related MTRU waste has been generated at MURR as a result of TRUMP-S research on DOE supplied actinide Special Nuclear Material (SNM). This research has been on-going for the past four years, and there have been no changes in the process since it started. Based on this process knowledge the TRUMP-S waste streams are well characterized with high confidence. The waste generated is placed in small bags and the bags are stored in a 55 gallon drum located inside the MURR facility.

Thus far in the program, after almost four years of test activities, about 0.1 m<sup>3</sup> (0.5 55-gallon drums) of waste material has been classified as MTRU waste. The maximum amount of mixed TRU waste expected to be generated by the test activities, including the final clean-up and D&D of the facility is projected to be 1 m<sup>3</sup> (5 drums) of MTRU. Radiological information in Table 4-1.1 for the MTRU waste was obtained from records maintained at MURR. The waste was produced from operations in the MURR Alpha Laboratory associated with the TRUMP-S program.

The MTRU waste contains neptunium (Np), plutonium (Pu), and americium (Am) TRU components, as well as cadmium (Cd) and silver (Ag) hazardous constituents. The MTRU waste includes Kimwipes, paper, wipe-down filter papers, gloves, surgical gloves, glass, tantalum tubes, plastic sample bottles, and lithium/potassium chloride solution evaporate. Table 4-2 provides a description of the MTRU waste stream at MURR and identifies the management option planned. Detailed schedule information is provided in Table 4-4(a) (the table is included only if applicable to this site).

#### 4.2 MTRU WASTES NOT DESTINED FOR WIPP

There are no DOE/OAK MTRU waste streams at MURR which fall in this category.

| TABLE 4-1<br>SUMMARY OF DOE/OAK MTRU WASTE STREAMS AT MURR |  |   |
|--|--|---|
| Waste Stream No.   | Waste Stream Description   | Status                                      |
| MU-W002 (MURR-2)   | TRUMP-S Analytical Wastes and Equipment Debris contaminated with Cd and Ag | No LDR treatment required; Disposal at WIPP |

| TABLE 4-1.1<br>Radiological Activity of MTRU Waste at MURR (December 1994)* |                                       |                    |                     |
|---|---------------------------------------|--------------------|---------------------|
| Waste Stream No.  | Stored Waste Volume (m <sup>3</sup> ) | Mass of Waste (kg) | Total Activity (Ci) |
| MU-W002   | 0.1                                   | 8                  | 0.148               |

\*See Table 3-1.1 for listing of total radionuclides available for the TRUMP-S Program.

**TABLE 4-2**  
**MANAGEMENT PLAN FOR DOE/OAK MTRU WASTE STREAMS LOCATED AT MURR**

| Waste Stream No. | Waste Stream Description and DOE Treatability Group   | RCRA Waste Code(s) | Preferred Management Option                 | Current Volume     | Projected Additional Volume (thru '98) |
|------------------|---|--------------------|---|--------------------|--|
| MU-W002          | TRUMP-S Analytical Wastes and Equipment Debris Contaminated with Cadmium and Silver<br><br>TR-CH\S5440\RC-O90-M11-C90 | D006<br>D011       | No LDR treatment required; Disposal at WIPP | 0.1 m <sup>3</sup> | approx.<br>0.9 m <sup>3</sup>          |

Notes: -RESERVED-

Treatability Group Key: See Table 2-1 of this Background Volume for Treatability Group Codes

| <b>TABLE 4-4 (a)</b>   |                         |
|--|-------------------------|
| <b>SCHEDULE: MTRU WASTE STREAMS SCHEDULED FOR DISPOSAL AT WIPP</b>   |                         |
| <b>Activity</b>  | <b>Waste Stream No.</b> |
|  |                         |
| <b>Offsite Disposal Location</b>   | <b>WIPP</b>             |
| <b>Characterize waste to confirm identification as MTRU.</b>   | <b>Completed</b>        |
| <b>Provide schedule for offsite shipment of waste to WIPP. This may include schedule dates for requesting the WIPP WAC, submitting a written certification plan, conducting additional sampling and analysis of waste if needed to meet WAC, requesting an acceptable shipping schedule from WIPP, and a date to complete shipment of waste offsite.</b> | <b>12/30/98</b>         |

Note: Items noted in boldface are reflected as milestones/target dates in the Compliance Plan Volume.

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## 5.0 MIXED HIGH LEVEL WASTE STREAMS

DOE/OAK has not generated or stored mixed high-level waste (HLW) at MURR, nor are mixed HLW anticipated to be generated as a result of DOE/OAK activities in the future. HLW is defined as 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 transuranic waste and fission products in concentrations requiring permanent isolation.

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## 6.0 FUTURE GENERATION OF MIXED WASTE STREAMS

DOE generates mixed waste or may generate mixed waste at about 50 sites. The three Missouri sites where mixed waste is or may be generated are Weldon Springs, Kansas City, and MURR. The TRUMP-S program is being conducted at the University of Missouri at the MURR facility. Wastes generated by these experiments are mixed low-level and mixed TRU wastes. The maximum total amount of MLLW and MTRU waste expected to be generated by the test activities, including the final cleanup and D & D of the facility is projected to be 1 m<sup>3</sup> (5 drums) of MTRU, and 5 m<sup>3</sup> (24 drums) of MLLW. Of this total amount, approximately 0.9 m<sup>3</sup> of MTRU, and about 4 m<sup>3</sup> of MLLW will be generated between now and 1998. Table 6-1 summarizes the future potential DOE/OAK mixed wastes at MURR.

Any other future mixed waste will be incorporated into the STP following generation only if it does not meet LDR requirements, regardless of the time of generation. Waste streams will be added in accordance with the process outlined in Section 2 of the Compliance Plan Volume.

### 6.1 FUTURE MIXED WASTE STREAMS FROM ENVIRONMENTAL RESTORATION

Future generation of DOE-related mixed waste from ER activities that is also subject to LDRs is not anticipated at MURR. Any future ER mixed waste streams subject to the FFCAct will be identified in Table 6-1.

### 6.2 FUTURE MIXED WASTE STREAMS FROM DECONTAMINATION AND DECOMMISSIONING

Decontamination and decommissioning (D & D) for TRUMP-S project activities at MURR is anticipated to produce waste amounts projected to be 0.8 m<sup>3</sup> (4 drums) of MTRU, and about 3 m<sup>3</sup> (15 drums) of MLLW. These waste streams are identified in Table 6-1. This estimate is based on the following assumptions:

- The laboratory and the equipment in it will be assigned to alternative service when this project ends in March 1998.

- Equipment contaminated with actinide metals will be decontaminated to the extent that is practical. It is assumed that the actinide contamination of the glove boxes can be reduced to non-TRU classification levels.
- Mixed TRU wastes will consist of solid residues from analytical samples, spent reagents, experimental apparatus, and some components of the Inductively Coupled Plasma-Atomic Emission Spectrometer (ICP-AES) and ICP-Mass Spectrometer (ICP-MS) at the end of the project.
- D & D activities are expected to produce an additional barrel from the glove box containment on the ICP-AES, 12 barrels from the three experimental glove boxes and three antechambers, and 2 barrels contingency.

**TABLE 6-1**  
**SUMMARY OF FUTURE POTENTIAL DOE/OAK MIXED WASTES AT MURR**

| Waste Stream No.  | Waste Stream Description   | Current Volume   | Projected Additional Volume (thru '98)                                  |
|---|--|--|---|
| <b>ER Activities</b>  |  |  |   |
| —   | None identified at this time.  |  |   |
| <b>D&amp;D Activities</b>   |  |  |   |
| —   | MLLW - D&D of the glove box containment on ICP-AES (1 drum), the three experimental glove boxes and three antechambers (12 drums), plus 2 drums contingency. | - 0  | 3 m <sup>3</sup><br>(15 drums)  |
| —   | MTRU - Solid residues from analytical samples, spent reagents, experimental apparatus, and some components of the ICP-AES and ICP-MS.                        | - 0 -  | 0.8 m <sup>3</sup><br>(4 drums)   |
| <b>Other Activities</b>   |  |  |   |
| —   | MLLW - TRUMP-S test and experiment activities wastes.  | 1 m <sup>3</sup><br>(5 drums)  | 1 m <sup>3</sup><br>(4 drums)   |
| —   | MTRU - TRUMP-S test and experiment activities wastes.  | 0.1 m <sup>3</sup><br>(0.5 drum)                                       | 0.1 m <sup>3</sup><br>(0.5 drum)  |
| TOTALS: MLLW 5 m <sup>3</sup> 24 drums<br>MTRU 1 m <sup>3</sup> 5 drums |  | MLLW 1 m <sup>3</sup> (5 drums)<br>MTRU 0.5 m <sup>3</sup> (0.5 drums) | MLLW 4 m <sup>3</sup> (19 drums)<br>MTRU 0.9 m <sup>3</sup> (4.5 drums) |

### **6.2.1 Description of Technology Needs**

Although the inorganic to organic components ratio in the waste may increase when the facility's D&D activities begin in approximately 1998, it is expected that the waste treatability matrix will continue to be categorized as Predominantly Combustible Debris. Waste treatment technology required for MURR's future waste streams is expected to be limited to sizing, compaction, and stabilization/macroencapsulation for combustible MTRU and MLLW debris. This treatment technology is discussed in Sections 3 and 4 of this PSTP Background Volume.

### **6.3 OTHER POTENTIAL MIXED WASTE STREAMS**

Wastes generated by the TRUMP-S experiments, are mixed low level and mixed TRU waste. Thus far in the program, after almost four years of test activities, about 0.1 m<sup>3</sup> (0.5 55-gallon drums) of MTRU waste, has been classified as mixed TRU waste. The maximum amount of additional mixed waste expected to be generated by the test activities is 0.1 m<sup>3</sup> (0.5 barrel) of MTRU wastes, and about 1 m<sup>3</sup> (4 barrels) of MLLW. This estimate is based on the following assumptions:

- Mixed TRU wastes will consist of solid residues from analytical samples, spent reagents, experimental apparatus, and some components of the Inductively Coupled Plasma-Atomic Emission Spectrometer (ICP-AES) and ICP-Mass Spectrometer (ICP-MS) at the end of the project.
- Future non-D&D wastes will consist of an additional 4 barrels from the Stage 3 project extension (to March 1998).

### **6.3.1 Description of Technology Needs**

Waste treatment technology required for MURR's future waste streams is expected to be limited to sizing, compaction, and stabilization for combustible MTRU and MLLW debris. This treatment technology is discussed in Sections 3 and 4 of this PSTP Background Volume.

### **6.4 RECYCLABLE MATERIALS**

To date, no future DOE/OAK potential mixed wastes that might be recyclable materials have been identified at MURR.

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## **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 STPs.

### **7.1 STORAGE FOR CURRENT INVENTORY AND FUTURE WASTES**

Mixed wastes generated at MURR are stored in the MURR containment structure, close to the Alpha Laboratory where they are generated. The current waste storage area is operated according to NRC requirements contained in 10 CFR and RCRA requirements contained in 40 CFR 265. The storage area has a capacity of approximately 10 m<sup>3</sup> (equivalent to roughly 48 55-gallon drums). This storage capacity exceeds the current and projected waste inventory at MURR, so no additional storage will need to be provided for these wastes.

### **7.2 STORAGE FOR WASTES PRIOR TO TREATMENT**

MLLW to be treated at offsite facilities may be shipped and stored at the receiving facility prior to treatment (in this case, at Hanford). DOE/OAK believes that the small volume of wastes to be stored will have a negligible impact on the offsite receiving facility's compliant storage capacity. Detailed information regarding the offsite temporary storage location is included in the proposed agreements with the offsite treatment facilities (contained in Appendix A to this PSTP Background Volume).

MTRU wastes destined for the WIPP facility in New Mexico will be stored onsite at MURR, pending approval from the EPA and the State of New Mexico for WIPP to commence operations.

### **7.3 STORAGE FOR WASTE TREATMENT RESIDUALS PRIOR TO DISPOSAL**

DOE/OAK's approach for treatment residuals from wastes shipped offsite for treatment consists of the following two options, in order of preference:

- (1) Treatment residuals will be stored in an approved storage location at the treatment site, pending final decisions regarding disposal. The status of storage for residuals at offsite treatment sites is noted in the tables contained in Appendix A to this volume.
- (2) If the above option is not feasible, treatment residuals will be shipped back to MURR or an approved site located in Missouri pending final decisions regarding disposal.

## 8.0 MIXED WASTE DISPOSAL ISSUES

This section discusses the overall DOE process for evaluating issues related to the disposal of residuals from the treatment of MLLW subject to the FFCAct. MURR is not among the sites being analyzed further for potential development as a disposal site for residuals from the treatment of MLLW subject to the FFCAct. This section outlines the disposal planning process developed by DOE, in consultation with the states, for evaluating potential options for the disposal of residuals from the treatment of MLLW. Importantly, because DOE is not currently developing MLLW disposal sites (with the exception of the Hanford Site) preferred alternatives or final destinations for disposal of treatment residuals are not known at this time. The results of this process are intended to be considered during subsequent planning activities and discussions between DOE and regulatory agencies.

### 8.1 BACKGROUND

The FFCAct requires DOE to develop a plan for the treatment of mixed wastes. The FFCAct does not impose any similar requirement for the disposal of mixed wastes after they have been treated; however, DOE recognizes the need to address this final phase of mixed waste management. The following process reflects DOE's current strategy for evaluating the options for disposal; the evaluation will increase understanding of the strengths and weaknesses of a site's potential for disposal but is not a site selection process. Ultimately the identification of sites that may receive mixed waste for disposal will follow state and federal regulations for siting and permitting, and will include appropriate public involvement.

HLW and MTRU wastes are among the mixed waste subject to the FFCAct. Options for disposal of these mixed wastes are not identified by this process because there are established processes for studying, designing, constructing, and operating disposal facilities for these wastes. The DOE has historically planned to develop MLLW disposal facilities at the six DOE sites currently disposing of low-level waste. These sites are Hanford, Savannah River, Oak Ridge Reservation, Idaho National Engineering Laboratory, Nevada Test Site, and Los Alamos National Laboratory.

Currently, the Hanford Site has the only active permitted facility operated by DOE for the disposal of residuals from the treatment of MLLW. This plan has been re-directed in conjunction with the planning efforts of the FFCAct to include the results of the disposal planning process (see Figure 8-1), and the WM PEIS. The sites subject to evaluation under this process are the 49 sites reported to Congress by DOE in the April 1993 MWIR that are currently storing or expected to generate mixed waste.

## **8.2 DISPOSAL PLANNING PROCESS**

Although the FFCAct 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 to the potential disposal of the residuals from the treatment of DOE MLLW at the sites subject to the FFCAct, shown in Figure 8-1. The focus of this process has been to identify, from among the 49 sites that currently store or are expected to generate mixed waste, sites that are suitable for further evaluation of their potential as disposal sites. Sites determined to have marginal or no potential for disposal will be removed or deferred from further evaluation under this process. The remaining sites will be evaluated more extensively. Ultimately, a number of sites are expected to be identified that are technically acceptable for disposal of treated residuals.

### **8.2.1 Activities to Date**

*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 MWIR, 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:

- Idaho National Engineering Laboratory and Argonne National Laboratory West are located on a single federally-owned reservation near Idaho Falls, Idaho;
- The Sandia National Laboratories, California, and Lawrence Livermore National Laboratory are located on adjoining, federally-owned properties near Livermore, California;
- The Inhalation Toxicology Research Institute and Sandia National Laboratories, New Mexico, are located on the same federally-owned reservation, 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, near Oak Ridge, Tennessee.

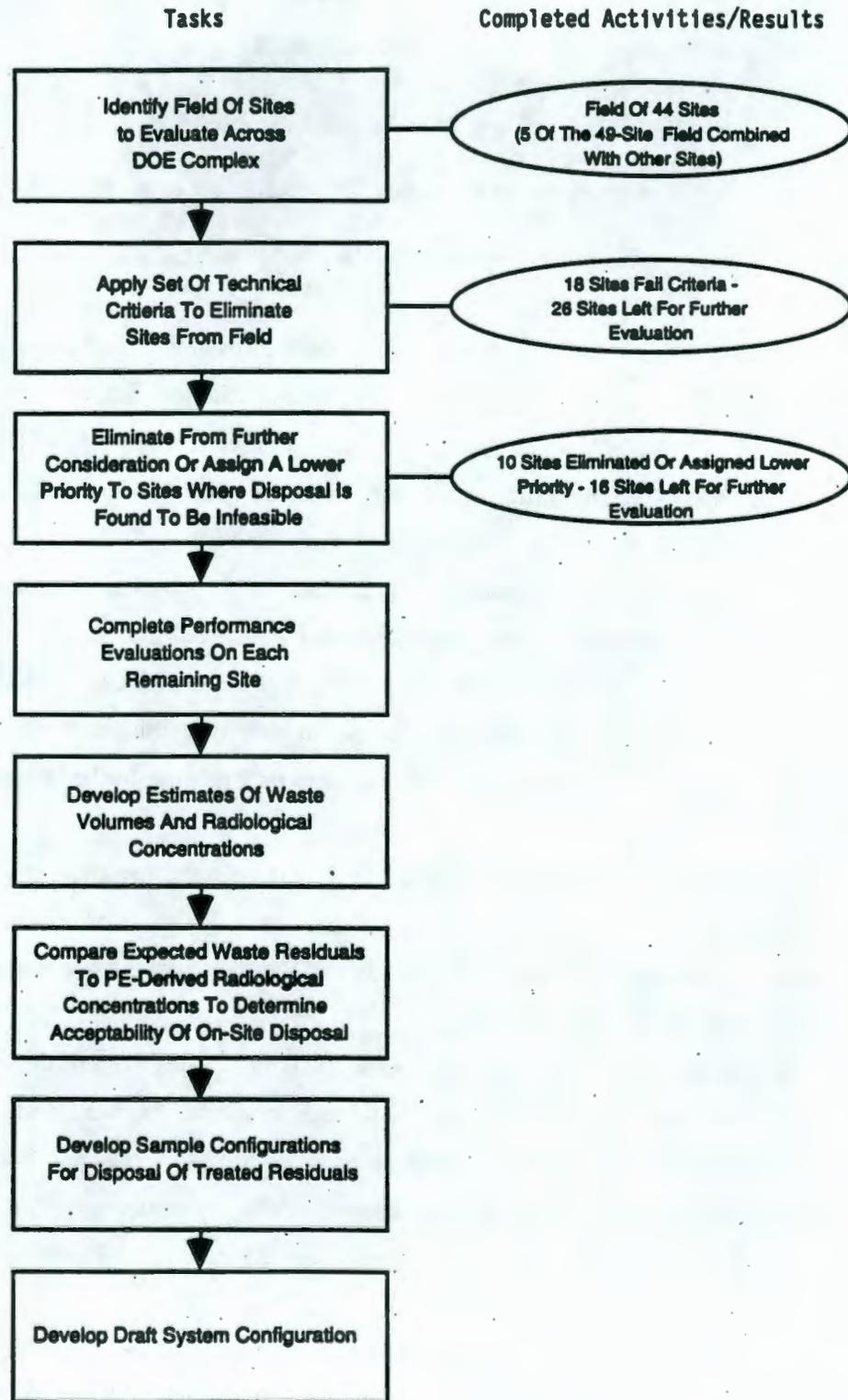


FIGURE 8-1 Disposal Planning Process

*Initial Site Screening.* At a joint meeting on March 3-4, 1994, DOE and the states agreed on three exclusionary criteria for further screening the 44 remaining sites. These criteria were developed by reviewing federal and state requirements regarding the siting of waste treatment, storage, and disposal facilities. In order to be evaluated further, a site must:

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

The first criterion (100-year flood plain) is derived from both National Regulatory Commission (NRC) and RCRA requirements. The second criterion (active fault) was selected from requirements found in RCRA which restrict the location of waste treatment, storage, and disposal facilities. The third criterion (sufficient area for 100-meter buffer) is derived from guidance from the EPA, NRC, and DOE for the proper operation of waste facilities.

Evaluation of the 44 sites resulted in identification of 26 sites meeting the above criteria. At a joint meeting on March 30-31, 1994, DOE and the states agreed to remove from further evaluation those sites not meeting the screening criteria. Also at that meeting, DOE agreed to collect additional, more detailed information on the remaining 26 sites to identify additional strengths and weaknesses of the sites. It was agreed that DOE or any affected state may propose further elimination of sites from consideration following the site-specific evaluation.

*Evaluation of the Remaining 26 Sites.* DOE and the states met on July 26-27, 1994, to discuss the site-specific data on the remaining 26 sites, and to consider proposals for eliminating additional sites from further evaluation. The focus of these discussions was to identify sites suitable for further evaluation under this process.

The criteria that DOE and the states used to eliminate sites from further evaluation at this stage were derived from three main groupings of considerations: technical considerations, potential receptor considerations, and practical considerations. Each of the remaining 26 sites were evaluated against criteria in these groupings that included soil stability and topography, precipitation and evapotranspiration, population, proximity to sensitive environment, land acquisition, government presence at the site, and regulatory constraints.

Sites with marginal or no potential for disposal, based on these criteria, were recommended for removal or postponement from further evaluation. As a result of the meeting, DOE and the states

agreed to eliminate five sites from further evaluation due to their limited potential for disposal (See Table 8-1).

| <b>SITES REMOVED FROM CONSIDERATION AS DISPOSAL LOCATIONS</b> |            |
|---|------------|
| 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 to merge the evaluation of Knolls Atomic Power Laboratory at Niskayuna, New York, and Knolls Atomic Power Laboratory at Kesselring, New York, due to their close, geographic proximity.

While not eliminated from further evaluation, it was agreed to lower the evaluation priority of an additional four sites. Issues such as the technical capabilities of the site, the volume of mixed waste that may be generated by the sites, and the acceptability of offsite waste contributed to a conclusion that further evaluation of some sites should not be a high priority. DOE and the states agreed to evaluate these sites in terms of their capability to dispose of their own mixed waste if no other offsite disposal options could be identified. These sites, identified in Table 8-2, will not be considered for disposal of wastes from other sites, and may be eliminated from further analysis if sufficient evidence suggests the potential for disposal is too limited.

*Performance Evaluation.* The performance evaluation being conducted for the 16 sites identified for further evaluation entails the collection of more detailed site-specific data related to the site characteristics. The performance evaluation methodology is based on the principles of radiological performance assessments and was developed by DOE performance assessment experts. Additionally, the evaluation will be based on RCRA-compliant engineered facilities. This information will be used to evaluate the sites and estimate the radionuclide concentration limits of waste that may be disposed at a given site. The performance evaluations were initiated in August 1994. The 16 sites for which performance evaluations are being prepared are identified in Table 8-3.

| <b>TABLE 8-2</b>   |              |
|--|--------------|
| <b>SITES WITH LOW PRIORITY FOR CONSIDERATION AS DISPOSAL LOCATIONS</b> |              |
| <b>Site</b>  | <b>State</b> |
| Weldon Spring Remedial Action Project                                  | Missouri     |
| Brookhaven National Laboratory   | New York     |
| Mound Plant  | Ohio         |
| Bettis Atomic Power Laboratory   | Pennsylvania |

| <b>TABLE 8-3</b>  |                |
|---|----------------|
| <b>REMAINING POTENTIAL DISPOSAL SITES UNDER CONSIDERATION</b> |                |
| <b>Site</b>   | <b>State</b>   |
| Lawrence Livermore National Laboratory, Site 300              | California     |
| Rocky Flats Environmental Technology Site                     | 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 Laboratories, NM                              | 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 National Laboratory                                 | Tennessee      |
| Pantex Plant  | Texas          |
| Hanford   | Washington     |

\* Because the West Valley Demonstration Project Act does not authorize the site to accept offsite wastes, the site will only be evaluated for disposal of onsite wastes.

### 8.2.2 Next Steps in the Evaluation Process

As illustrated in Figure 8-1, progress has been made in the planning of the disposal process. The following steps outline future activities that are either ongoing or are to be completed to facilitate an informed decision about the disposal of DOE MLLW. Coordination with the states will continue to ensure stakeholder input and to resolve concerns at the earliest possible stage.

*Complete Remaining Performance Evaluations.* To date, 10 performance evaluations have been completed for the following sites: Savannah River, Oak Ridge Reservation, Idaho National Laboratory, Hanford, Sandia National Laboratories, Rocky Flats Environmental Technology Site, Los Alamos National Laboratory, Pantex Plant, Nevada Test Site, and Lawrence Livermore National Laboratory. Performance evaluations for the remaining 6 sites are scheduled to be completed by June 1995. A progress report for the performance evaluation activities has been issued at approximately the same time frame as the final PSTPs in order to keep the states and other interested parties informed of the progress.

*Develop Estimates of Waste Volumes and Radionuclide Concentrations in Treated Residuals.* Once treatment methods for the MLLW waste streams are finalized through the FFCAct process, estimates of the volumes and radionuclide concentrations of the treated residuals will be developed for all waste streams. This analysis will take place after the PSTPs have been approved by the appropriate regulatory agencies. These estimates are needed to compare to the performance evaluation-derived radionuclide concentration guides.

*Compare Estimates of Radionuclide Concentration in Treated Residuals to Performance Evaluation-Derived Radionuclide Concentration Guides.* Radionuclide concentrations for each treated residual will be compared to those disposal values derived in the performance evaluation in this step. Comparing radionuclide concentrations in treated residuals with performance evaluation concentration guides will compare MLLW stream characteristics to potential disposal sites' capabilities. This evaluation will also include offsite DOE and commercial disposal site candidates for those treated waste streams that do not have onsite capabilities. Confirmation of the candidates streams and sites will be attained through detailed performance assessment efforts.

*Develop Sample Configurations for Disposal of Treated Residuals.* An options analysis team approach will be employed to develop sample complex-wide configurations for the disposal of treated MLLW residuals. These configurations will take into account such technical issues as compatibility of radionuclides (both for those handled at the site and those considered acceptable by the performance evaluations), capacity to handle projected residual volumes, etc. Under the OAT approach, other types of issues will be weighed during the configuration discussions such as transportation costs and distances.

*Develop a Draft Disposal System Configuration.* Using the sample configurations as a starting point, DOE will develop a draft disposal system configuration with state and stakeholder input. This configuration will be the basis for determining future funding and schedules for proposed disposal facilities. The Final WM PEIS will provide bounding analysis of potential environmental impacts for the range of sample configurations considered. It will identify preferred sites for further development as disposal facilities. Following the issuance of the ROD for the WM PEIS, DOE may initiate site-specific NEPA evaluations for the proposed disposal facilities; initiate performance assessment analyses for compliance with DOE Order 5820.2A; and initiate processes for permitting disposal facilities.

### **8.3 INTEGRATION WITH THE STP PROCESS**

The FFCAct does not require disposal to be included in the STPs. Given the complex issues involved however, DOE recognizes the importance of state input to facilitate resolution of issues related to disposal. Section 8 information is provided in the PSTP to continue to involve the states and inform them of DOE's continued work on the disposal issue. For more detailed information on the ongoing performance evaluation process, refer to DOE's *Progress Report on Performance Evaluation of DOE Sites' Capabilities for Mixed Low-Level Waste Disposal*. As the disposal planning process moves forward, further information will be provided and coordination with the states will continue.

## 9.0 REFERENCES

U.S. Department of Energy, 1992a, *Technical Area Status Report for Low-Level Mixed Waste Final Waste Forms*, DOE/MWIP-3, June 1992, Washington, D.C.

\_\_\_\_\_, 1993a, *Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site*, *Federal Register* (58 FR 17875), April 6, 1993, Washington, D.C.

\_\_\_\_\_, 1993b, *Interim Mixed Waste Inventory Report*, April 1993, Washington, D.C.

\_\_\_\_\_, 1993c, *Draft Site Treatment Plan Development Framework, Revision 7*, April 1994, Washington, D.C.

\_\_\_\_\_, 1993d, *Technical Area Status Report for Chemical/Physical Treatment*, DOE/MWIP 8, May 1993.

\_\_\_\_\_, 1994a, *Mixed Waste Inventory Report*, May 1994, Washington, D.C.

\_\_\_\_\_, 1994b, *Treatment Selection Guides, Revision 0*, March 1994, Washington, D.C.

\_\_\_\_\_, 1994c, *Draft Site Treatment Plan Cost Information Guidance*, April 1994, Washington, D.C.

\_\_\_\_\_, 1994d, *DOE Waste Treatability Groups Guidance, Final Draft*, November 1994, Washington, D.C.

\_\_\_\_\_, 1995a, *Proposed National Mixed Waste Treatment Configuration*, January 13, 1995, Washington, D.C.

U.S. Department of Energy, Office of Environmental Restoration and Waste Management (DOE/ERWM), 1993a, *Hanford Site Waste Acceptance Criteria*, Document No. WHC-EP-0063-4, November 1993.

U.S. Department of Energy, Oakland Operations Office, 1993a, *Conceptual Site Treatment Plan for the University of Missouri Research Reactor*, October 1993, Oakland, California.

\_\_\_\_\_, 1994a, *Draft Site Treatment Plan for the University of Missouri Research Reactor*, DOE/OAK Doc. No. 94-W 284/5400.2.a.3.8, August 1994, Oakland, California.

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**Appendix A**

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**PROPOSED OFFSITE TREATMENT FACILITY AGREEMENTS  
FOR DOE/OAK MIXED WASTES**

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## PROPOSED OFFSITE TREATMENT FACILITY AGREEMENTS

Mixed waste streams have been identified for treatment at offsite facilities in some of the DOE/OAK Proposed Site Treatment Plans. For these options, it was necessary for DOE/OAK to initiate discussions with the offsite treatment facility(s) to develop an offsite shipping agreement for implementation of the option.

DOE/OAK initiated the process for developing an offsite shipping agreement by developing a proposed agreement. The proposed agreement was transmitted to the DOE Operations Office responsible for the respective offsite treatment facility. The proposed offsite shipping agreement(s) related to this PSTP are included in this Appendix. The proposed agreements include all DOE/OAK managed waste streams planned for treatment at the respective offsite treatment facility, not just those identified in this PSTP.

DOE/OAK is presently coordinating activities with the offsite treatment facilities to obtain formal approval or concurrence on the proposed offsite shipping agreements. Major issues that still require resolution are the pre-treatment storage of wastes and the storage of post-treatment residuals at the treatment site. Treatment options that involve pre- and/or post-treatment storage at the treatment site may require additional discussions between DOE, States, regulators, and interested members of the public. These discussions could impact the schedule dates for shipping the affected waste streams to the receiving site. For example, one resolution of the pre- and/or post-treatment storage issue could be that mixed waste will not be shipped to an offsite treatment facility until the treatment facility becomes operational and/or treats the existing onsite mixed waste backlog first. This resolution could result in a delay in the actual shipping date.

DOE/OAK recognizes that although these proposed offsite shipping agreements may require further discussions prior to approval or concurrence, such proposals should be presented in the PSTPs.

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# memorandum

DATE: February 9, 1995

REPLY TO  
ATTN OF: DOE Oakland Operations Office

SUBJECT: Federal Facility Compliance Act Proposed Site Treatment Plans: Proposed Offsite Shipping Agreement with Hanford for Pre-treatment Storage, Treatment, and Post-treatment Residual Management of DOE/OAK Mixed Wastes

TO: Ed MacAlister, DOE/Richland (DOE/RL)

As required under the Federal Facility Compliance Act of 1992, DOE is required to prepare Site Treatment Plans (STPs) for sites which generate and store DOE mixed waste subject to the RCRA LDR storage prohibition. Consistent with DOE Headquarters protocol for finalizing offsite waste treatment options, the DOE Oakland Operations Office (DOE/OAK) and its proposed receiving sites have agreed to develop "Offsite Shipping Agreements" which will be incorporated (along with supporting documentation), as an Appendix into applicable DOE/OAK Proposed Site Treatment Plans (PSTPs).

This memorandum requests concurrence from DOE/RL on the attached Offsite Shipping Agreement, addressing the shipment, pre-treatment storage, treatment, and post-treatment management of residuals of DOE/OAK mixed wastes. Table 1 of the Shipping Agreement has been developed to include: Shipping and Receiving Site Contacts; Waste Stream ID Numbers and Volumes; Pre-treatment and Post-treatment Storage Locations; Treatment Facilities; and Milestone Dates for "Requesting Shipping Schedules" (from Hanford), as well as "Approved Shipping Dates." An Approved Shipping Date will be added to Column 5 of Table 1 based upon DOE/RLs response to this memorandum.

The following information request and proposed terms of the Offsite Shipping Agreement include:

**WRAP IIA Scheduling Information:** Consistent with DOE Headquarters guidance regarding the development of treatment options in the PSTPs, DOE/OAK is requesting treatment schedule information for the WRAP IIA Facility. Treatment schedule data will be incorporated into the PSTP Background Volumes for the DOE/OAK sites proposing to ship to WRAP IIA.

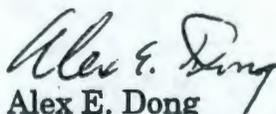
**Pre-treatment Storage:** Please note that DOE/OAK is proposing pre-treatment storage of it's mixed wastes at Hanford. Based on the small volume of waste to be shipped, it is DOE/OAKs position that compliant storage capacity at Hanford should not be significantly impacted.

**Approved Shipping Dates:** In order to develop PSTP Milestones and/or Target Dates for shipment of mixed wastes to Hanford, DOE/OAK is requesting acceptable shipping dates for each waste stream. The information provided by DOE/RL will be added to Table 1, and will be incorporated into both the PSTP Background and Compliance Plan Volumes of the applicable DOE/OAK sites' as an acceptable Milestone and/or Target Date.

**Post-treatment Residual Storage:** DOE/OAK is also proposing that post-treatment residuals be managed at the Hanford site pending the outcome of the DOE disposal-site evaluations (described in Section 8.0 of the PSTPs). DOE/OAK believes that until the outcome of the disposal issue is resolved, post-treatment storage of residuals at the treatment site is a technically and economically sound management approach, especially when considering the very small volumes likely to be generated.

In order for DOE/OAK to submit its PSTPs to DOE Headquarters according to schedule (March 3, 1995), DOE/OAK is requesting a response to this memorandum no later than February 17, 1995. Should you have any questions, please contact me at (510) 637-1625, or Dave Osugi at (510) 637-1628.

Sincerely,



Alex E. Dong  
Deputy Director,  
Waste Management Division

Enclosures (2):           -DOE/OAK - DOE/RL Offsite Shipping Agreement  
                                  -Table 1: DOE/OAK Mixed Waste Identified for Treatment at  
                                  the Hanford Site

cc w/ encl:               Patty Bubar, EM-352  
                                  Dan Ruge, GC-51

## DOE/OAK / DOE-RL Off-Site Shipping Agreement

**Transportation Safety Standards:** DOE/OAK will assure that the shipping sites identified in the following table, adhere to all appropriate shipping requirements including those identified by the Hanford Site.

**Off-site Pretreatment Storage:** The attached Table identifies waste streams to be treated at the WRAP IIA Facility. These waste streams will be shipped to the Hanford Site prior to the operation of the WRAP IIA facility. The waste streams identified for treatment at the WRAP IIA Facility are currently located at 4 sites in California and 1 site in Missouri.

**Shipping Date:** DOE/OAK has identified in the accompanying table the date that the site will request a shipping date from the Hanford Site. This request is to take place after all technical issues regarding the shipment of the waste stream to the Hanford Site have been addressed. The date identified for "the request of a shipment date" coincides with the date for this milestone included in the DOE/OAK Proposed Site Treatment Plan. Additionally, it is indicated in the DOE/OAK PSTPs that the shipment of mixed waste to the Hanford Site for treatment will take place no later than 6 months after the approved shipping date provided by the Hanford Site.

**Treatment Residuals Management Plan:** The treatment residuals will be stored at the Hanford Site pending the outcome of the disposal investigations (as described in Section 8 of the Proposed Site Treatment Plan Background Volume). Following the completion of the disposal investigation, DOE/OAK will work with DOE-RL to identify the appropriate disposal site for the DOE/OAK treatment residuals. If a California disposal site is selected, it is likely that the disposal of the DOE/OAK treatment residuals would be disposed at this site.

**Funding Requirements:** DOE/OAK agrees to provide funding to DOE-RL for the purpose of pretreatment storage, treatment and management of the treatment residuals for the mixed wastes described in the attached table. The amount of funding provided by DOE/OAK will be consistent with the Hanford Site treatment costs for off-site waste.

**Table 1 - DOE/OAK Mixed Waste Identified  
For Treatment at the Hanford Site**

| Shipping Site / Contact   | Waste ID / Volume (M <sup>3</sup> ) | Projected Annual Future Generation (M <sup>3</sup> ) <sup>1</sup> | Receiving Site / Contact | Pretreatment Storage Facility / Treatment Facility | Request Shipping Schedule (MM/YY) / Approved Shipping Date (MM/YY) | Treatment Residuals Storage Facility |
|---------------------------|-------------------------------------|---|--------------------------|--|--|--------------------------------------|
| LBL/Maxwell Yao           | LB-W005/0.42                        | 0.0   | Hanford/                 | Hanford/Hanford                                    | 6/98 / TBD   | Hanford                              |
| LLNL/Glenn May            | LL-W015/3.0                         | 3.0   | Hanford/                 | Hanford/Hanford                                    | 10/98 / TBD  | Hanford                              |
| LLNL/Glenn May            | LL-W007/3.9                         | 1.0   | Hanford/                 | Hanford/Hanford                                    | 10/98 / TBD  | Hanford                              |
| GA/Brian Laney            | GA-W007/0.208                       | 0.0   | Hanford/                 | Hanford/Hanford                                    | 8/96 / TBD   | Hanford                              |
| GA/Brian Laney            | GA-W013/1.04                        | 0.0   | Hanford/                 | Hanford/Hanford                                    | 8/96 / TBD   | Hanford                              |
| GA/Brian Laney            | GA-W003/1.47                        | 0.0   | Hanford/                 | Hanford/Hanford                                    | 8/96 / TBD   | Hanford                              |
| Univ. of Mo. / Mike Azizi | MU-W001/1.0                         | 1.33  | Hanford/                 | Hanford/Hanford                                    | 12/96 / TBD  | Hanford                              |
| ETEC/Ravnesch Amar        | ET-W009/0.64                        | 0.0   | Hanford/                 | Hanford/Hanford                                    | 3/96 / TBD   | Hanford                              |
| ETEC/Ravnesch Amar        | ET-W019/2.45                        | 0.0   | Hanford/                 | Hanford/Hanford                                    | 3/96 / TBD   | Hanford                              |
| ETEC/Ravnesch Amar        | ET-W026/0.1                         | 0.0   | Hanford/                 | Hanford/Hanford                                    | 3/96 / TBD   | Hanford                              |

Footnote:

- 1 - The annual mixed waste projection identifies waste to be generated after October 1995. These wastes will be shipped to the Hanford site pursuant to updated agreements as necessary. Updated mixed waste volumes will be provided in the Annual Updates to the STP.

**Appendix B**

**GLOSSARY**

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ENCLOSURE

The terms defined below (a) have been collected or derived from documentation for regulatory agencies and U.S. Department of Energy (DOE) sites and environmental and other sources of regulations and documents or (b) were written as part of the Site Treatment Plan development. The words and phrases are listed alphabetically. Common abbreviations, if any, follow the term. In cases where the regulatory definition differs from the definition provided in this section, the regulatory definition has been used.

**Amalgamation** - Amalgamation is achieved by mixing, at room temperature, the liquid mercury with powdered reagents such as copper, zinc, tin, nickel, gold, and/or sulfur to yield a metal alloy with no free mercury.

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

**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., TOC can often be used as an indicator parameter for the biodegradation of many organic constituents that cannot be directly analyzed in wastewater residues).

**Capacity** (of a facility) - The annual process throughput, in cubic meters per year ( $m^3/yr$ ) 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, five days per week; two shifts/day, five days per week; 24 hours/day, seven days per week).

**Carbon Adsorption (CARBN)** - A treatment technology used to treat wastewaters containing dissolved organics at concentrations less than about 5% and, to a lesser extent, dissolved metal and other inorganic contaminants. The most effective metals removal is achieved with metal complexes. The two most common carbon adsorption processes are Granular Activated Carbon (GAC), which is used in packed beds, and Powdered Activated Carbon (PAC), which is added loosely to wastewater.

**Cemented Solids** (as a waste matrix) - Sludges or solids (e.g., particulates) that have been solidified/stabilized with cement or other solidifying agents but do not meet Land Disposal Restriction

(LDR) treatment standards. These wastes may require pretreatment (e.g., crushing/grinding) before subsequent LDR treatment.

**Characterization** - The determination of waste contents and properties, whether by review of process knowledge, Nondestructive Examination/Nondestructive Assay (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: (a) hypochlorite (e.g., bleach), (b) chlorine, (c) chlorine dioxide, (d) ozone or UV- (ultraviolet light-) assisted ozone, (e) peroxides, (f) persulfates, (g) perchlorates, (h) permanganates, and/or (i) 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. For example, TOC 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.

**Chemical Reduction (CHRED)** - Chemical reduction utilizing the following reducing reagents (or waste reagents) or combination of reagents: (a) sulfur dioxide or (b) sodium, potassium, or alkali salts of sulfites, bisulfites, metabisulfates, and polyethylene glycols (e.g., Total Organic Halogens can often be used as an indicator parameter for the reduction of many halogenated organic constituents that cannot be directly analyzed in wastewater residues). Chemical reduction is commonly used for the reduction of hexavalent chromium to the trivalent state.

**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. Includes 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. Concentration-based standards are based on BDAT and the waste, 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 millirems (mrem) per hour at the surface of the 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 (b) it is a liquid and corrodes steel at a rate greater than 6.35 millimeters (mm) (0.25 inch) per year at a test temperature of 55°C (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.

**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). (Debris 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 contaminated DOE 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.

**Delist** - Use of the petition process to have a waste stream's toxic designation rescinded.

**Delisting** - According to 40 Code of Federal Regulations (CFR) 260.20 and 260.22, to be exempted from the Resource Conservation and Recovery Act (RCRA) hazardous waste "system," a listed hazardous waste, a mixture of a listed and solid waste, or a derived-from waste must be delisted. Characteristic hazardous wastes never need to be delisted but can be treated to no longer exhibit the characteristic. A contained-in waste also does not have to be delisted; it only has to "no longer contain" the hazardous waste.

**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** - The derived-from 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.

**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 Section 102(2)(C) of the National Environmental Policy Act (NEPA). (2) A tool for decision making; it describes the positive and negative effects of the undertaking and lists alternative actions. A draft environmental impact statement (DEIS) is prepared by the U.S. Environmental Protection Agency (EPA), or under EPA guidance, and attempts to identify and analyze the environmental impacts of a proposed action and feasible alternatives. DEIS is circulated for public comment before preparation of the final environmental impact statement (FEIS).

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

**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, 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 or FFA)** - 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.

**Filtration** - Removal/separation of particles from a mixture of fluid and particles by a medium that permits the flow of the fluid but retains the particles. Usually, the larger the particles, the easier they are to remove from the fluid.

**Generation** - Includes the wastes resulting from new production, rework operations, wastes generated from decontamination and decommissioning (D&D) operations and the 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 that have produced or are producing RCRA-regulated waste.

**Glovebox** - (1) A sealed volume penetrated by leaded-rubber gloves that allow safe manipulation of some alpha-emitting materials. (2) A windowed, low-leakage enclosure equipped with one or more pairs of flexible gloves to allow personnel on the outside to handle radioactive material within the enclosure.

**Hazardous Waste (HW)** - Solid waste that possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or that is listed as described by 40 CFR 261.

**Heterogeneous Debris (as a waste matrix)** - Wastes with matrices meeting the definition of debris pursuant to the August 18, 1992, LDR debris rulemaking (57 Federal Register [FR] 37194, August 18, 1992). This category includes debris that does not meet the criteria for categorization as either *Organic Debris* or *Inorganic Debris*. This category also includes mixtures of debris and solid process residues and soil, provided debris constitutes no more than 50% of the waste.

**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 pursuant to the August 18, 1992, LDR debris rulemaking (57 FR 37194, August 18, 1992). More specifically, inorganic debris is defined as wastes that contain greater than 90% inorganic debris. Inorganic debris

includes metal shapes (e.g., equipment, scrap), metal turnings, glass (e.g., light tubes, leaded glass), ceramic materials, concrete, and rocks.

**Inorganic Sludges/Particulates** (as a waste matrix) - Solid process residues with a predominately inorganic matrix. Solid process residues are solids that do not fit the definition of debris. Typically, these solids are sludge or particulate materials. Wastes in this category may also contain some debris materials, provided the amount of debris is less than 50% (based on the LDR debris rule). The solids in this category may be contaminated with or contain organics such that thermal treatment is required. However, the matrices are predominantly inorganic such that thermal treatment would result in a high residue. Waste materials in this category include sludges, ashes, sand-blasting media, absorbed aqueous or organic liquids (or inorganic particulate absorbents), ion exchange resins, and paint chips/residues.

**Ion Exchange** - A process used to separate a mixed waste into its radioactive and hazardous constituents if the radioactive components are ionic. It will also concentrate the radioactive ionic species into a small volume, leaving a nonradioactive aqueous phase. The principal mixed waste application of this process is to recover metallic radionuclides from wastewaters or acid leach liquors.

**Key Decision (KD)** - DOE projects proceed through several discrete phases: research, design, and operation. These phases are separated by KD points, which are numbered consecutively from KD-0 to KD-4.

**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 in vials. These categories are differentiated by contaminants in the wastes. Wastes contaminated with toxicity characteristic (TC) metals are categorized as "Lab packs with Metals." Wastes that are not contaminated with TC metals are categorized as "Lab packs without Metals."

**Land Disposal Restrictions (LDRs)** - (1) Provisions of the Hazardous and Solid Waste Amendments (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. (See **Thirds Rule**.)

**Leachate** - (1) Any liquid, including any suspended components in the liquid, that has percolated through or drained from hazardous waste. (2) A contaminated liquid resulting when water percolates or trickles through waste materials and collects components of those wastes. Leaching may occur at landfills and may result in hazardous substances entering soil, surface water, or groundwater.

**Legacy Waste** - The 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 and that has not been examined by DOE's Environmental Management, Environmental Restoration Group (EM-40) 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-Liquid Extraction (LLEXT)** - Extraction (often referred to as solvent extraction) of organics from liquid wastes into an immiscible solvent for which the hazardous constituents have a greater

solvent affinity, resulting in (a) an extract high in organics that must undergo either incineration, reuse as a fuel, or other recovery/reuse and (b) a raffinate (extracted liquid waste) proportionately low in organics that must undergo further treatment as specified in the standard.

**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, transuranic (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 LLW provided the concentration of TRU elements is less than 100 nanocuries/gram (nCi/g). (2) Radioactive waste not classified as high-level waste, TRU waste, spent nuclear fuel, or by-product 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.

**Metals Recovery (RMETL)** - Recovery of metals or inorganics utilizing one or more of the following direct physical/removal technologies: ion exchange, resin or solid (i.e., zeolites) adsorption, reverse osmosis, chelation/solvent extraction, freeze crystallization, ultrafiltration, and/or simple precipitation (i.e., crystallization). Note: This does not preclude the use of other physical phase separation or concentration techniques such as decantation, filtration (including ultrafiltration), and centrifugation when used in conjunction with the direct physical/removal technologies.

**Microencapsulation** - Stabilization of the debris with the following reagents (or waste reagents) such that the leachability of the hazardous contaminants is reduced: portland cement or lime/pozzolans (e.g., fly ash and cement kiln dust). Reagents (e.g., iron salts, silicates, clay) may be added to enhance the set/cure time and/or compressive strength or to reduce the leachability of the hazardous constituents.

**Mixed Low-Level Waste (MLLW)** - Low-level 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 (AEA)] 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 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: acids, bases, or 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 complex; for example, Lawrence Livermore National Laboratory (LLNL) is a site, as is the Lawrence Berkeley Laboratory (LBL), the Sandia National Laboratory-California (SNLC). (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 consists of 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 OUs, depending on the complexity of the problems associated with the site. OUs 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 a period of 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 or more release sites considered together for assessment and cleanup activities. The primary criteria for placement of release sites into an OU 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 pursuant to the August 18, 1992, LDR debris rulemaking (57 FR 37194, August 18, 1992). More specifically, organic debris is defined as wastes that contain greater than 90% organic debris. Organic debris includes rags (including "solvent rags") plastic/rubber, paper, wood, glovebox gloves (including lead-lined), and animal carcasses.

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

**Organic Sludges/Particulates** (as a waste matrix) - Solid process residues with an organic matrix. Solid process residues are solids that do not fit the definition of debris. Typically, these solids are sludges or particulate materials. Waste in this category may also contain some debris materials provided the amount of debris is less than 50% (based on the LDR debris rule). As opposed to inorganic sludges/particulates, wastes in this category would not leave a large residue when thermally treated. Waste materials in this category include organic sludges (e.g., sewage sludges), activated carbon, organic resins, and absorbed liquids (organic particulate absorbents).

**Package** - A barrel, box, or other container into which waste is initially placed. A waste is placed in packaging before transportation.

**pH** - (1) Used to describe the hydrogen-ion activity of a system. The logarithm (the exponent that indicates the power to which a 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.

**Precipitation (PRECP)** - Treatment of metals and other inorganics to form insoluble precipitates of oxides, hydrides, carbonates, sulfides, sulfates, chlorides, fluorides, or phosphates. The following reagents (or waste reagents) are typically used alone or in combination: lime (i.e., containing oxides and/or hydroxides of calcium and/or magnesium), caustic (i.e., sodium and/or potassium hydroxides), soda ash (i.e., sodium carbonate), sodium sulfide, ferric sulfate or ferric chloride, alum, or sodium sulfate. Additional flocculating, coagulating, or similar reagents/processes that enhance sludge dewatering characteristics are not precluded from use.

**Pretreatment Processes** - Processes (e.g., shredding, grinding, physical separation) that make the waste amenable to the treatment process, which 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 soundwaves, microwaves, radiowaves or visible, infrared, or ultraviolet light. (2) 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 Waste** - (1) Solid, liquid, or gaseous material that contains radionuclides regulated under the AEA of 1954, as amended, and that is 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, hence by the number of protons, the number of neutrons, and the energy content.

**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.

**Remote-Handled Waste (RH Waste)** - Packaged waste with an external surface dose rate that exceeds 200 mrem per hour.

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

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

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

**Site** - (1) A geographic entity comprising land, buildings, and other facilities required to perform program objectives. Generally a site has, organizationally, all the required facilities for management functions; that is, it is not a satellite of some other site. (2) For the purposes of the Environmental Restoration and Waste Management (ER&WM) Five-Year Plan, sites are lands, installations, and/or facilities for which DOE has or shares responsibility for ER&WM 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, equipment).

**Stabilization (STABL)** - A broad class of treatment processes that immobilize hazardous constituents in a waste. For treatment of metals in mixed low-level 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 non-wastewater matrices.

**Storage** - (1) Temporary holding of waste pending treatment or disposal. Storage may 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.

**Supercompaction** - A volume-reduction method relying on mechanical compaction.

**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 EPA Administrator.

**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 (TRU) Waste** - The following core definition appears in modified form in various relevant documents: Waste containing alpha-emitting radionuclides with an atomic number greater than 92, half-lives greater than 20 years, and at concentrations greater than 100 nCi/g of waste. Modifications include

the following. (1) DOE Order 5820.2A, for purposes of management, (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 whether 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 EPA Administrator do not need the degree of isolation required by this part; or (c) wastes that the [Nuclear Regulatory] 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 (see relevant discussions elsewhere in this Glossary), 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, or 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 of.

**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).

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

**Waste Acceptance Criteria (WAC)** - The criteria used to determine whether 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 or nondestructive (NDE, NDA) examination, or intrusive examination, such as sampling and analysis.

**Waste Form** - The physical form of the waste (e.g., sludges, combustibles, metals).

**Waste Isolation Pilot Plant (WIPP)** - (1) The project authorized under Section 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 and safety and the environment. (2) The reduction, to the extent feasible, of hazardous waste that is generated before treatment, storage, or disposal of the waste. Waste minimization includes any source reduction or recycling activity that results in either reduction of total volume of hazardous waste or reduction of toxicity of hazardous waste, or both.

**Waste Segregation** - The separation of waste materials before the packaging or repackaging process to facilitate handling, storage, treatment, transportation, or disposal.

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

**Wastewaters** - Wastes that contain less than 1% by weight TOC and less than 1% by weight Total Suspended Solids (TSS) with the following exception: F001, F002, F003, F004, or F005 wastewaters are solvent-water mixtures that contain less than 1% by weight TOC or less than 1% by weight total F001, F002, F003, F004, or F005 solvent constituents listed in 40 CFR 286.41, Table CCWE (Constituent Concentrations in Waste Extract).

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

**FEDERAL FACILITY COMPLIANCE ACT  
PROPOSED SITE TREATMENT PLAN  
FOR DOE MIXED WASTES AT THE  
MISSOURI UNIVERSITY RESEARCH REACTOR  
COLUMBIA, MISSOURI**

**COMPLIANCE PLAN VOLUME**

Prepared for

The State of Missouri  
Department of Natural Resources  
Division of Environmental Quality  
P.O. Box 176  
Jefferson City, Missouri 65102-0176

Prepared by

The U.S. Department of Energy  
Oakland Operations Office  
1301 Clay Street, N-700  
Oakland, California 94612-5208

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## **1.0 PURPOSE AND SCOPE OF THE COMPLIANCE PLAN VOLUME**

- 1.1** The U.S. Department of Energy (DOE) is required to prepare a plan for developing treatment capacities and technologies for each facility at which DOE generates or stores mixed waste, pursuant to Section 3021(b) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6939c(b), as amended by Section 105(a) of the Federal Facility Compliance Act (P.L. 102-386, FFCAct). Upon submission of the plan to the appropriate regulatory agency, the FFCAct requires the recipient agency to solicit and consider public comments and approve, approve with modification, or disapprove the plan within 6 months. The agency is to consult with the U.S Environmental Protection Agency (EPA) and any state in which a facility affected by the plan is located. Upon approval of a plan, the regulatory agency must issue an order (FFCAct Order) requiring compliance with the approved plan.
- 1.2** The DOE Oakland Operations Office (DOE/OAK) has prepared this Site Treatment Plan (STP) for mixed waste at the Missouri University Research Reactor (MURR) to identify how DOE/OAK proposes to obtain treatment for this mixed waste or develop technologies where technologies do not exist or need modification. For some waste streams, a plan and schedules for characterizing wastes, undertaking technology assessments, and for providing the required plans and schedules for developing capacities and technologies, as appropriate, are provided.
- 1.3** The purposes of this STP include:
- 1.3.1** Fulfilling the requirements of the FFCAct;
- 1.3.2** Establishing an enforceable framework in conjunction with the FFCAct Order in which DOE/OAK will develop and treat or otherwise meet RCRA land disposal restrictions (LDRs) for all covered LDR mixed wastes currently in storage or that will be generated or received in the future; and

- 1.3.3** Allowing for storage of current and projected covered LDR mixed wastes at MURR during implementation of this STP and the FFCAct Order.
- 1.4** The Compliance Plan Volume, in conjunction with the Background Volume and its Appendices, comprises the STP. The Compliance Plan Volume provides overall schedules with milestones and target dates for achieving compliance with LDRs, a general framework for the establishment and review of milestones and target dates and the conversion of target dates into milestones, and other provisions for implementing the approved STP that will be enforced under the FFCAct Order. Discussion in the Background Volume and its Appendices is provided for informational purposes only.
- 1.5** When this STP is approved and an FFCAct Order issued, the requirements contained in the Federal Facility Compliance Act of 1992, RCRA Section 3021 will be fulfilled. Therefore, pursuant to Section 105(a) of the FFCAct (RCRA Section 3021(b)(5)), this STP and FFCAct Order shall stand in lieu of any other interpretations of DOE/OAK's requirement to develop and submit a plan for the development of treatment capacities and technologies pursuant to RCRA Section 3021.

## **2.0 IMPLEMENTATION OF THE SITE TREATMENT PLAN**

This section establishes the mechanisms and procedures for administering and implementing the treatment plans and schedules in Sections 3.0 through 5.0 of the Compliance Plan Volume of the STP.

### **2.1 COVERED MATTERS**

The Compliance Plan Volume and implementing FFCAct Order of the STP address LDR requirements pertaining to storage and treatment of covered wastes, whether such wastes were generated or accumulated in the past, present or future. Covered wastes are all mixed waste at MURR identified in the STP or added to the STP in accordance with Section 2.4, except those mixed wastes that (1) meet LDR requirements, regardless of the time of generation or that (2) are being stored or will be stored when generated solely for the purpose of accumulating sufficient quantities of mixed waste necessary to facilitate proper recovery, treatment, or disposal.

### **2.2 COMPLIANCE SCHEDULES**

**2.2.1** The Compliance Plan Volume of the STP provides overall schedules for achieving compliance with LDR requirements for mixed wastes at MURR. The schedules include those activities required to bring existing waste treatment facilities or technologies into operation and those required to develop new facilities and capacity for treatment. The Compliance Plan Volume shows target dates and milestones for treatment technologies and facilities for wastes covered under the STP. The schedules symbolically depict and differentiate between milestones and target dates that will be converted to milestones. Other schedule information may be depicted in the Background Volume of the STP, but such information is provided solely for informational purposes.

- 2.2.1.1** For the purposes of this STP, milestones and target dates shall identify dates or time frames by which a certain activity (including an event such as submittal of a deliverable) is scheduled to occur, as set forth in the Compliance Plan Volume, or any other dates or deliverables that are properly incorporated into the approved STP.
- 2.2.1.2** The assumptions upon which individual schedules are dependent are contained in Sections 3.0 through 5.0 of the Background Volume and this Compliance Plan Volume. The schedules may be affected if the underlying assumptions are incorrect or change.
- 2.2.1.3** *Milestones* are fixed, firm, and enforceable dates as set forth in the Compliance Plan Volume. Milestones correspond to the categories of milestones set forth in Section 2.2.3. Changes or revisions to milestones are subject to approval, approval with modifications, or disapproval by the Missouri Department of Natural Resources (MDNR) Division of Environmental Quality according to the process and framework set forth in this STP. Milestones are set based on target dates, defined in Section 2.2.1.4 below, in accordance with the process in Section 2.2.2.
- 2.2.1.4** *Target dates* mark the anticipated completion of tasks that have not been designated as milestones. Target dates correspond to the categories of milestones set forth in Section 2.2.3. Target dates are not requirements and are not enforceable. Target dates are converted into enforceable milestones in accordance with the procedure set forth in Section 2.2.2.
- 2.2.2** Approach to Setting Milestones and Target Dates. DOE proposes using the rolling milestone approach outlined in the Addendum to this Compliance Plan Volume, "Milestone Approach and Environmental Management Budget Formulation Process."
- 2.2.3** Categories of Milestones and Target Dates. Examples of categories of activities for which milestones and target dates will be provided for different types of treatment approaches in the Compliance Plan Volume are listed in the Tables 2-1 through 2-4 and in other provisions below. The categories of activities are based on Section 3021(b)(1)(B)(i), (ii) and (iii) of RCRA, to the extent appropriate. Depending upon the status of the facility (e.g., operating under interim status or at differing stages of development), certain types of target dates or

milestones may not be necessary, activities may appear in a different order, or an alternative activity more appropriate to the facility or treatment approach may be provided.

**2.2.3.1 Plans Where Treatment Technology Exists Onsite.** For some of the mixed wastes, treatment technologies have been identified and developed. For wastes that will be treated onsite, the categories of milestones and target dates identified in Table 2-1, "Schedule For Wastes With Existing Treatment Technologies" shall apply.

**TABLE 2-1**

**SCHEDULE FOR WASTES WITH EXISTING TREATMENT TECHNOLOGIES**

**Categories of Milestones/Target Dates:**

- a. Submit RCRA permit applications to MDNR.
- b. Procure contracts.
- c. Initiate construction.
- d. Commence systems testing.
- e. Commence operations.
- f. Submit a schedule for processing backlogged and currently generated mixed wastes.

**2.2.3.2 Plans Where Technology Must Be Developed.** For some mixed wastes, no treatment technologies have been identified and developed, or treatment technology must be modified or adapted to be made applicable for mixed waste. For wastes which will be treated onsite, the categories of milestones and target dates identified in Table 2-2, "Schedule for Waste Without Existing Treatment Technologies" shall apply.

**TABLE 2-2**

**SCHEDULE FOR MIXED WASTES WITHOUT EXISTING TREATMENT TECHNOLOGIES**

**Categories of Milestones/Target Dates:**

- a. Identify funding requirements for identification and development of technology.
- b. Identify and develop technology.
- c. Submit treatability study exemption application.
- d. Submit Research, Development, and Demonstration (RD&D) permit applications.
- e. Submit schedule in accordance with Table 2-1 or new schedule for development of alternative treatment technologies in accordance with this section.

**2.2.3.3 Requirements Pertaining to Radionuclide Separation.** The FFCAct sets additional requirements in cases where DOE intends to conduct radionuclide separation of mixed waste. Should DOE/OAK determine to conduct radionuclide separation of such mixed wastes onsite, DOE/OAK will provide those milestones and target date categories identified in Table 2-3, "Schedule for Radionuclide Separation of Mixed Waste."

**TABLE 2-3**

**SCHEDULE FOR RADIONUCLIDE SEPARATION OF MIXED WASTES**

**Categories of Milestones/Target Dates:**

- a. Complete an estimate of the volume of waste generated by each case of radionuclide separation.
- b. Complete an estimate of the volume of waste that would exist or be generated without radionuclide separation.
- c. Complete an estimate of the costs of waste treatment and disposal if radionuclide separation is used compared to the estimated costs if it is not used.
- d. Provide the assumptions underlying such waste volume and cost estimates.
- e. Submit a plan for treatment or management of residues, as appropriate, in accordance with this section.

**2.2.3.4. Plans for Other Types of Activities.** The Compliance Plan Volume may contain additional milestones and target dates for other types of situations related to treatment of DOE/OAK's mixed wastes, including:

- a. For mixed waste that shall be shipped offsite for treatment, two activities are identified. First, MURR must request approval from the offsite treatment facility to ship the waste. This request will result in the offsite treatment facility providing a shipping date to MURR. The shipping date will identify when MURR will be allowed to ship the waste to the offsite treatment facility. In some cases, the shipping date is currently unknown because the approval to ship the waste(s) has not been requested. MURR will obtain this date as a result of completing the first milestone. The completion of the waste shipment will be accomplished no later than 6 months following the designated date for shipment provided by the offsite treatment facility. Information supporting development or use of offsite treatment capacity or technology for treatment of such wastes is provided in the background volume of the STP. In the event that changes in the schedule of the offsite treatment facility impact the schedule in DOE/OAK's Compliance Plan Volume, DOE/OAK shall notify MDNR, and DOE/OAK and MDNR shall negotiate necessary changes in accordance with Sections 2.5, "Revisions," or 2.6, "Extensions," as appropriate, and subject to Section 2.10, "Disputes." Table 2-4 contains some examples of milestones/target dates that may be provided for mixed wastes shipped offsite for treatment.

**TABLE 2-4**

**SCHEDULE FOR MIXED WASTE TO BE SHIPPED OFFSITE FOR TREATMENT**

**Examples of Milestones/Target Dates:**

- a. Request approval to ship the waste offsite.
- b. Complete shipment of waste(s) offsite.

- b. In the event that DOE decides to treat waste at an offsite facility in lieu of plans to treat such waste onsite, DOE shall so notify MDNR, and the schedules, target dates and pre-existing milestones pertaining to management of that particular waste will no longer be applicable or enforceable. DOE shall propose a new schedule with milestone and target dates, as appropriate, as part of the notice, which shall be subject to approval by MDNR under Section 2.8, "Procedures for Review and Approval," and, if applicable, shall also be subject to Section 2.5, "Revisions." Where waste will be shipped to another DOE facility, it is the expectation that DOE/OAK shall ensure notification (or MDNR shall notify

if so agreed) of the proposed shipment to the regulatory agency of the state in which the receiving facility is located.

- c. For mixed wastes that are not sufficiently characterized to allow identification of appropriate treatment or for which technology assessment has not been completed, the Compliance Plan Volume will contain schedules for characterizing such wastes and/or completing the technology assessment. The final milestone/target date for such a schedule will be the requirement for DOE/OAK to either identify the facility that will receive the waste and any necessary changes to the pertinent schedule for that facility or submit a proposed schedule as described in this section.
- d. Notwithstanding any other provision of this Compliance Plan Volume, the provisions of Sections 4 shall apply regarding schedule for mixed transuranic (MTRU) wastes destined for the Waste Isolation Pilot Plant (WIPP) in lieu of other schedule requirements of this section.
- e. Storage of mixed wastes for purposes of allowing for radioactive decay of the radioactive portion of the mixed waste shall be considered to be storage for the purpose of accumulation of such quantities of waste as are necessary to facilitate proper recovery, treatment, or disposal in compliance with RCRA Section 3004(j). Such storage may be included in the schedules of the Compliance Plan Volume, as appropriate, including treatment schedules or schedules related to radionuclide separation.

## **2.3 ANNUAL SITE TREATMENT PLAN UPDATES**

- 2.3.1** This section provides a mechanism to (1) communicate and exchange information about schedule, technology development, funding and other concerns that affect the implementation of the STP; (2) update the Background Volume to the STP in a timely fashion, including information on new waste streams; (3) propose and establish the next ensuing milestones; and (4) update and propose revisions to the Compliance Plan Volume.
- 2.3.2** Each fiscal year after the fiscal year in which this STP is approved and accompanying FFCAct Order executed, DOE/OAK shall provide an Annual Update to the STP to MDNR for review and comment. The Annual Update shall (1) provide MDNR with information to track progress on milestones and target dates; (2) allow input from the public, affected states, and EPA to be obtained when revisions to the STP are proposed; (3) bring the STP current to the end of the previous fiscal year (September 30); and will minimize the paperwork necessary to document changes, which will be handled by page changes to the extent practicable. These changes will be marked for comparison to the previous STP. If there are no changes to the

information, milestones, or target dates in the STP, a letter to that effect will be sent to MDNR in lieu of an Annual Update.

[A date for submittal of the Annual Update will be added that allows all sites to submit Updates in a consistent time frame to facilitate coordination of necessary site-to-site and state-to-state interactions. The date will be consistent with the framework outlined in the addendum to this STP, "Milestone Approach and Budget Formulation Process."]

### **2.3.3 The Annual Update of the STP shall update the Background Volume and the Compliance Plan Volume.**

#### **2.3.3.1 The update to the Background Volume will provide the following information:**

- a. The amount of each covered waste stored at MURR as follows: (1) the estimated amount in storage at the end of the previous fiscal year, and (2) the estimated amount anticipated to be placed in storage in the next five fiscal years.
- b. A description of progress made up to the end of the last fiscal year on treatment or technology development of each treatment facility or activity scheduled in the STP. If applicable, DOE will also describe current or anticipated alternative treatment technology which is being evaluated for use in lieu of treatment technologies or capacities identified in the STP. This description will include potential alternate commercial treatment and offsite DOE treatment capacity or technology development.
- c. An evaluation of characterization, packaging, and/or treatment capabilities and/or plans for MTRU waste to ensure that the activities and commitments included in the STP remain consistent with the WIPP waste acceptance criteria (WAC), No Migration Variance petition, RCRA Part B permit, and/or compliance certification development.
- d. A description of DOE's funding for STP-related activities and any funding issues that may impact the schedule.
- e. The status of any pending or planned extension, treatability variance, or no migration petition.
- f. Information that has changed or has not been previously included regarding waste form, waste code, technology, and capacity needs, including new waste streams in accordance with Section 2.4.2.
- g. Notification of the deletion of waste streams in accordance with Section 2.7.1.

**2.3.3.2** The Annual Update will update the Compliance Plan Volume and may also contain notification of changes or requests for approval of changes to the Compliance Plan Volume. These notifications or requests for approval may include, as appropriate:

- a. Any changes to the Compliance Plan Volume incorporated since the previous Annual Update;
- b. Any proposed revisions or conditionally approved revisions;
- c. Any proposed new milestones, in accordance with Section 2.2; and
- d. Any other changes to the overall schedules.

The Annual Update would clearly identify proposed changes requiring approval under Sections 2.8, "Procedures for Review and Approval," and 2.5, "Revisions."

**2.3.4** DOE shall make the Annual Update publicly available. When the update includes proposed revisions to the Compliance Plan Volume, the provisions of Section 2.5, "Revisions," also apply to such proposed revisions.

## **2.4 INCLUSION OF NEW WASTE STREAMS**

**2.4.1** This section establishes a method for including new mixed waste streams at MURR in the STP, including mixed wastes that are newly discovered, identified, generated, or received from offsite and mixed wastes that are generated through environmental restoration (ER) and decontamination and decommissioning (D&D) activities to the extent such wastes are expected to become a covered waste.

**2.4.2** DOE/OAK shall notify MDNR of additional or new mixed wastes or waste streams that have been generated or stored and may notify MDNR of mixed wastes that are anticipated to be generated or stored at MURR, and that are expected to be covered wastes. Unless otherwise specified in the notification, the mixed waste will be a covered waste and subject to the requirements of this Compliance Plan Volume upon receipt of such notification or when generated or stored at MURR, whichever is later. To the extent practicable, DOE/OAK shall provide a description of the waste code, waste form, volumes, technology, and capacity needs, and similar pertinent information in the notification. In general, additional detail on

the waste and the proposed plan and schedules consistent with Section 2.2, "Compliance Schedules," will be provided in the next regularly scheduled Annual Update, or a date for submittal of such a proposed plan and schedules will be provided if additional time is required for its preparation. The information provided pursuant to this subsection is subject to MDNR approval to the extent provided for in Section 2.4.4.

**2.4.3** If DOE/OAK cannot provide such information or schedules as required by Section 2.4.2 because of inadequate characterization or because it is otherwise impracticable, DOE/OAK shall include appropriate justification, supporting information, and proposed plans for approval as a deliverable under Section 2.8, "Procedures for Review and Approval," for developing such information and schedules consistent with Section 2.2, "Compliance Schedules."

**2.4.4** DOE/OAK may propose changes to the Compliance Plan Volume of the STP to accommodate new waste streams. If any such changes are required, DOE/OAK shall submit the changes for approval as a deliverable under Section 2.8, "Procedures for Review and Approval." Also, DOE/OAK may propose revisions to the Compliance Plan Volume of the STP as necessary to accommodate new waste streams subject to Section 2.5, "Revisions."

## **2.5 REVISIONS**

**2.5.1** A revision is a change to the Compliance Plan Volume of the STP that requires, for those affected portions of the STP, publication of a notice of availability to the public and consultation with affected states and EPA pursuant to this STP and Section 3021(b)(2) and (3) of RCRA. A revision is (1) the addition of a treatment facility at MURR or technology development not previously included in the Compliance Plan Volume to the STP; or (2) an extension to a milestone (including an extension by mutual agreement under Section 2.6 or a proposed milestone converting a target date under Section 2.2) for a period greater than one year. Changes in waste volume; the addition or deletion of wastes or waste types; extensions; changes to milestones for a period less than a year; or changes to target dates shall not, by themselves, constitute a revision.

**2.5.2** Revisions to the STP shall be made as follows:

**2.5.2.1** DOE/OAK shall identify to MDNR the need to revise the Compliance Plan Volume of the STP and provide supporting information on the basis for the revision as a deliverable pursuant to Section 2.8, "Procedures for Review and Approval." Under these procedures, within 30 days of receipt, MDNR may conditionally approve the revision, return it to DOE/OAK with comments so that changes can be made for resubmittal, or disapprove it. In reviewing the revision, MDNR shall consider the need for regional treatment facilities. Conditional approval of a revision is a determination by MDNR that the revision is acceptable subject to the results of public comment and consultation with affected states and EPA.

**2.5.2.2** Within 30 days subsequent to conditional approval, MDNR shall publish a notice of availability and make the revision to the STP available to the public for review and comment and to affected states and EPA for consideration and consultation. Revisions shall be approved or approved with modification by MDNR within 6 months after MDNR's receipt of the proposed revision. MDNR shall either (1) notify DOE/OAK that the revision has final approval or (2) notify DOE/OAK that MDNR received comments from the public, affected states, or EPA indicating that such revision should be modified before approval. Any proposed modifications to the revision shall include supporting explanation and information. DOE/OAK shall have 30 days to discuss the proposed modifications with MDNR. If agreement is not reached on the proposed modifications in this 30-day period, the procedures of Section 2.10, "Disputes," will apply.

**2.5.3** To the extent practicable, comments from the public, affected states, and EPA on conditionally approved revisions will be obtained in conjunction with the Annual Update to the STP, governed by Section 2.3, "Annual Site Treatment Plan Updates." However, in the event a conditionally approved revision is proposed to become effective before it could be addressed in the regularly scheduled Annual Update, MDNR shall publish a Notice of Availability and consult with affected states and EPA, as appropriate, within 30 days of such conditional approval.

[Additional or revised procedures may need to be added to Section 2.5, "Revisions," that involve schedules to ensure consistency with the framework outlined in the addendum to this STP, "Milestone Approach and Budget Formulation Process."]

## 2.6 EXTENSIONS

2.6.1 DOE/OAK shall implement this STP in accordance with the milestones set forth in the STP, as well as milestones subsequently developed pursuant to this STP. DOE/OAK further agrees to adopt all reasonable measures to avoid or minimize any delays in the implementation of this STP.

2.6.2 A milestone that is established according to the provisions of the FFCAct Order shall be extended upon receipt by the MDNR of a timely request for extension, provided good cause, as defined in this section, exists for the requested extension. Any request for extension by DOE/OAK shall be made to the MDNR prior to the milestone date in the manner described below and shall specify:

- a. The milestone that is sought to be extended;
- b. The length of the extensions sought;
- c. The good cause(s) for the extension; and
- d. Any related milestone or target date that would be affected if the extension were granted.

2.6.3 Good cause for an extension includes, but is not limited to:

- a. An event of *force majeure* (as defined in Section 2.6.6 below);
- b. A delay caused by the MDNR's failure to meet any requirement of this STP;
- c. A delay caused by the good faith invocation of dispute resolution or the initiation of administrative or judicial action; and
- d. A delay caused, or which is likely to be caused, by the grant of an extension in regard to another milestone;
- e. A delay caused by additional work agreed to by DOE/OAK and the MDNR;
- f. Circumstances that are unforeseen at the time this STP was prepared and that significantly affect the work required under the STP;

- g. Delay in the MDNR's review of a permit application or issuance of a permit required to conduct the work specified in the STP or to meet a milestone;
- h. Inconsistency with the requirements of any other existing permit, order, or agreement to which DOE is a party;
- i. A delay caused by a change to a planning assumption, as specified in the STP, that results from either a request by the MDNR or is identified by DOE but does not represent a failure of DOE or its contractor to properly manage the work specified in the STP;
- j. A stop-work order by the MDNR; or
- k. Any other event or series of events mutually agreed upon by DOE/OAK and the MDNR as constituting good cause.

**2.6.4** In the absence of agreement between the DOE/OAK and the MDNR with respect to the existence of good cause, the parties may seek and obtain a determination through the dispute resolution process, Section 2.10, whether good cause exists.

**2.6.5** For extension requests by DOE/OAK, except for extensions sought on the basis of *force majeure* (defined in Section 2.6.6), the following procedures shall apply:

- a. DOE/OAK requests for an extension for one or more milestones shall be made to the MDNR no less than thirty (30) days prior to the date of the first milestone for which the extension is sought, either in writing or orally with a written follow-up request within ten (10) business days of the request.
- b. Within fifteen (15) business days of receipt of a written request for an extension of a milestone, the MDNR shall advise DOE/OAK in writing whether it shall approve, approve in part, or deny the request. Any failure by the MDNR to respond within the fifteen (15) day period shall be deemed to constitute the MDNR's approval of the requested extension. If the MDNR approves in part or denies the requested extension, it shall explain in its written response to DOE/OAK its reasons for the partial approval or denial of the requested extension.
- c. If the MDNR approves the requested extension, then the affected milestone(s) shall be extended accordingly. If the MDNR approves in part or denies the requested extension, then the affected milestone(s) shall not be extended except as set forth in Paragraph b of this section, or in accordance with a determination resulting from the dispute resolution process.
- d. Within fifteen (15) business days of receipt of the MDNR's written determination to approve in part or deny DOE/OAK's extension request, the DOE/OAK may invoke dispute resolution. If DOE/OAK does not invoke dispute resolution within this time period, then DOE/OAK shall be deemed to have accepted the MDNR's determination and the existing milestone schedule set forth in the STP.

## 2.6.6 Force Majeure

2.6.6.1 The DOE/OAK shall perform the requirements of this FFCAct Order within the time limits set forth in the STP, unless performance is prevented or delayed by events which constitute a *force majeure*. A *force majeure* is defined as any event arising from a cause not foreseeable and beyond the control of the DOE/OAK, which could not be avoided or overcome by due diligence and which delays or prevents performance by a date required by the FFCAct Order. Such a cause shall be considered an event of *force majeure* and shall include, but not be limited to:

- a. Acts of God, fire, war, insurrection, civil disturbance, or explosion;
- b. Adverse weather conditions that could not be reasonably anticipated;
- c. Unusual delays in transportation beyond the control of DOE/OAK;
- d. Unanticipated malfunction or breakdown of, or accident to, machinery, equipment, or lines of pipe not due to negligence, inadequate maintenance, or improper operation;
- e. Restraint by court order or order of public authority;
- f. Inability to obtain, at reasonable cost and after exercise of reasonable diligence, any necessary authorizations, approval, permits, or licenses due to untimely action or failure to act of any governmental agency or authority other than the DOE/OAK;
- g. Delays caused by compliance with applicable statutes or regulations such as those governing contracting, procurement, or acquisition procedures, despite the exercise of reasonable diligence;
- h. A strike, lockout, or other labor difficulty whether or not within the control of the DOE/OAK;
- i. Unavailability of equipment despite reasonable diligence used to obtain the equipment in a timely manner;
- j. Lack of or inability to obtain raw materials, labor, fuel, or supplies; or
- k. Unanticipated condition or hazard posed to persons or property.

2.6.6.2 To claim *force majeure* the DOE/OAK shall give prompt oral notification to the MDNR within forty-eight (48) hours after the event which the DOE/OAK knows or

should know constitutes a *force majeure*, and shall serve written notice on the MDNR not less than seven (7) days after such oral notification. The written notice shall contain an estimate of the anticipated length of delay, a description of the cause of delay, a plan for implementing measures to correct the problem and avoid such delays in the future, and an estimated schedule for implementation of these measures. The DOE/OAK shall adopt all reasonable measures to avoid and minimize the delay. If the suspension of obligation(s) under this section would, in the MDNR's opinion, render compliance with this FFCAct Order impossible or impracticable, the MDNR reserves the right to terminate this FFCAct Order or to seek judicial enforcement, or both.

**2.6.6.3** Except as otherwise provided in this FFCAct Order, the MDNR shall notify the DOE/OAK in writing of the MDNR's determination regarding the asserted claims of *force majeure*. If the MDNR agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this FFCAct Order that are affected by the *force majeure* event shall be extended by the MDNR for such time as corresponds to the delay shown to have resulted from the *force majeure* event or for such longer period of time that is reasonable under the circumstances. An extension of the time for performance of the obligations affected by the *force majeure* event shall also extend the time for performance of any subsequent obligation that is affected by such delay. If the MDNR does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, the MDNR shall notify the DOE/OAK in writing of its decision.

**2.6.6.4** If the DOE/OAK elects to invoke the dispute resolution procedures set forth in this FFCAct Order in response to the MDNR's determination that a delay or anticipated delay has not been or will not be caused by a *force majeure* event, the DOE/OAK shall do so no later than thirty (30) days after receipt of this written determination from the MDNR. In any such proceeding, the DOE/OAK shall have the burden of demonstrating, by a preponderance of the evidence, that the delay or anticipated delay has been or will be caused by a *force majeure* event, that reasonable efforts were exercised to avoid and mitigate the effects of the delay, and that the DOE/OAK reasonably complied with all requirements imposed by this section. If

the DOE/OAK carries this burden, the delay at issue shall not be deemed to be a violation by the DOE/OAK of the affected obligation of this FFCA Act Order.

**2.6.7** A timely and good faith request for extension shall toll any assessment of penalties or the initiation of any action to enforce the affected milestone(s) until a decision by MDNR is reached on whether to approve, approve in part, or deny the requested extension. If dispute resolution is invoked and the contested portion of the extension request is denied, penalties may be assessed based on an accrual date of the original milestone(s) for which the extension request was sought. Following the approval of an extension request, the MDNR may assess penalties or initiate any action to enforce the affected milestone(s) based on the most recently approved new milestone(s).

**2.6.8** Extension requests made in writing by the MDNR to DOE/OAK shall be deemed approved if the DOE/OAK does not invoke dispute resolution within fifteen (15) business days after receiving written notice of the request.

## **2.7 DELETION OF WASTES AND TERMINATION OF THE STP**

**2.7.1** Deletion of Wastes. The requirements of this Compliance Plan Volume shall terminate with regard to any covered waste upon DOE/OAK's notice to MDNR of the following:

- a. Completion of activities required pursuant to a milestone under the Compliance Plan Volume for treatment of such waste;
- b. Shipment of wastes offsite for treatment, disposal, or storage pending treatment or disposal;
- c. Changes to statute or regulation or determinations of the regulatory authority that causes a waste or waste categories to be no longer subject to the requirements of RCRA or the LDR requirements of RCRA;
- d. Storage for the sole purpose of accumulating such quantities of covered wastes as are necessary to facilitate proper recovery, treatment, or disposal;
- e. Information demonstrating the waste meets the treatment standards of RCRA, Section 3004 (m);
- f. Treatment in accordance with the conditions of an approved LDR treatability variance; or
- g. Mutual agreement between DOE/OAK and MDNR.

**2.7.2** Inasmuch as the intent of the FFCAct requirement to develop an STP is to address compliance with RCRA Section 3004(j), this STP shall terminate either at such time as (1) there is no longer any mixed waste, regardless of when generated, being stored or generated at MURR which does not meet LDR requirements or (2) the mixed waste being stored or generated at MURR is being stored, or will be stored when generated, solely for the purpose of accumulating sufficient quantities of mixed wastes as are necessary to facilitate proper recovery, treatment, or disposal.

**2.7.3** DOE/OAK will notify MDNR of such termination independently and/or in the Annual Updates to the STP. MDNR will provide DOE/OAK with a written response to the notification within 30 days. MDNR's response to this notice shall be subject to the provisions of Section 2.10, "Disputes."

## **2.8 PROCEDURES FOR REVIEW AND APPROVAL**

[Additional or revised procedures may need to be added to Section 2.8, "Procedures for Review and Approval," that involve schedules to ensure consistency with the framework outlined in the addendum to this STP, "Milestone Approach and Budget Formulation Process."]

**2.8.1** Deliverables developed by DOE/OAK pursuant to this Compliance Plan Volume shall be submitted by DOE/OAK to MDNR for review and comment as provided in this section. Deliverables include documents or notices signifying completion of milestones, identifying new wastes, and supporting proposed revisions as required or permitted under this Compliance Plan Volume. Where MDNR approval of a deliverable is expressly required in this Compliance Plan Volume, the approval provisions in this section apply. Permit applications and National Environmental Policy Act (NEPA) documents shall not be subject to the procedures of this section. Permit applications shall be submitted and reviewed under applicable regulations, and NEPA documents shall be submitted and reviewed under the DOE regulations implementing NEPA. Each submittal of a deliverable shall specify the milestone or other provision of this Compliance Plan Volume requiring submittal of that deliverable.

**2.8.2** Unless otherwise noted, each deliverable shall be transmitted directly to the project manager of MDNR responsible for implementation of this STP.

**2.8.3** MDNR will promptly review each deliverable submitted by DOE/OAK required to be approved pursuant to this Compliance Plan Volume, within the time frames established in this section unless other time frames are agreed to in writing. In the course of their review, MDNR will consult with DOE/OAK regarding the adequacy of each deliverable. Oral comments made during these discussions shall not require a written response.

**2.8.4** Deliverables that do not require MDNR approval shall be provided to MDNR for review and comment. In the event that DOE/OAK disagrees with MDNR's comments, DOE/OAK shall respond to MDNR's comments in writing explaining the DOE/OAK's position. If DOE/OAK has not received comments from MDNR within 30 days of submittal of the deliverable, it will be deemed that MDNR has no comments.

**2.8.5** For any deliverable that requires MDNR approval under the provisions of this Compliance Plan Volume, the following procedures shall apply:

**2.8.5.1** MDNR shall, within 30 days of receipt, take action as follows: (1) approve, conditionally approve (if the deliverable is a revision), or disapprove the deliverable as submitted; or (2) return the deliverable to DOE/OAK with comments so that changes can be made for resubmittal. Conditionally approved revisions will be approved or approved with modification after public review and comment and consultation with affected states and EPA pursuant to Section 2.5, "Revisions." MDNR may extend this review period by an additional 30 days by notifying DOE/OAK. This period may be further extended for an additional period of time, as may be agreed to by MDNR and DOE/OAK. Comments on the deliverable shall be provided with adequate specificity so that DOE/OAK can make the appropriate changes to the document. To the extent applicable, comments should refer to specific paragraphs of any sources of authority or references on which the comments are based; and upon request of DOE/OAK, MDNR shall provide a copy of the cited authority or reference.

**2.8.5.2** If MDNR fails to take one of the actions specified above within the time frames required by this STP, the deliverable shall be considered approved or conditionally approved as submitted. If MDNR extends the review period for a deliverable, any milestones or target dates dependent upon the results of deliverable review will

automatically be extended an equivalent amount of time as the time taken beyond the specified time frame for review. DOE/OAK will notify MDNR in writing of any enforceable milestones that will need to be extended or revised.

**2.8.5.3** In the event that MDNR returns the deliverable to DOE/OAK with comments, within thirty (30) days of receipt, DOE/OAK shall incorporate the comments and shall retransmit the deliverable. DOE/OAK may extend this period by an additional 30 days by notifying MDNR. This period may be further extended for an additional period of time, as may be agreed to by MDNR and DOE/OAK. In the event DOE/OAK disagrees with MDNR's comments and the parties are unable to resolve their disagreement, DOE/OAK may invoke the dispute resolution provisions of Section 2.10, "Disputes."

## **2.9 FUNDING**

**2.9.1** DOE proposes MDNR an opportunity to input into formulating the DOE/OAK budget and setting the DOE/OAK budget priorities as outlined in the addendum to this STP, "Milestone Approach and Budget Formulation Process." Nothing in the STP affects DOE's authority over its budget and funding level submissions. Further, it is DOE's position that any requirement for the payment or obligation of funds by DOE established by the terms of the STP and FFCAct Order requiring compliance with the STP would be subject to the availability of appropriated funds, and that no provision of the STP or FFCAct Order should be interpreted to require the obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. Section 1341, as amended. In cases where the payment or obligation of funds would constitute a violation of the Anti-Deficiency Act, the dates established requiring the payment or obligation of such funds should be appropriately adjusted.

## **2.10 DISPUTES**

[Additional or revised procedures may need to be added to Section 2.5, "Revisions," that involve schedules to ensure consistency with the framework outlined in the addendum to this STP, "Milestone Approach and Budget Formulation Process."]

**2.10.1** Except as specifically set forth elsewhere in this STP, any action which leads to or generates a dispute regarding compliance with this STP, is subject to resolution under this section.

DOE/OAK and MDNR must exhaust the dispute resolution process prior to seeking any administrative or judicial relief.

**2.10.2** DOE/OAK and MDNR shall make reasonable efforts to informally resolve disputes as expeditiously as possible at the project manager/division director levels. If resolution cannot be achieved informally, the disputing party may elevate the dispute for formal resolution in accordance with this section.

**2.10.3** To initiate formal dispute resolution, the disputing party shall submit to the other party a written Notice of Dispute specifying:

- a. The nature of the dispute;
- b. The work affected by the dispute;
- c. The disputing party's position; and
- d. The information the disputing party is relying upon to support its position.

**2.10.4** Upon receipt of the Notice of Dispute, the MDNR Assistant Director for Hazardous Waste Management shall notify the DOE/OAK Assistant Manager for Environmental Management and Support to begin attempts at formal dispute resolution. The parties (or their respective delegates) shall have thirty (30) days from the date of the receipt by MDNR of the Notice of Dispute to resolve the dispute. If the parties cannot agree on a resolution of the dispute, the dispute shall be escalated by the disputing party to the Director, MDNR. Within thirty (30) days of escalation, the MDNR Director shall consult with the Manager, DOE/OAK, and issue a final written determination of MDNR. This 30-day period may be extended by mutual agreement of the parties. The decision of MDNR shall be binding upon the parties unless timely appeal is taken.

**2.10.5** DOE shall have the right to seek administrative or judicial relief from MDNR's final determination under this section, as provided for by law. During the pendency of any dispute, DOE/OAK agrees that it shall continue to implement those portions of this STP affected by the dispute that can be reasonably implemented pending final resolution of the issue(s) in dispute. All elements of work required by this Compliance Plan Volume that are not affected by the dispute shall continue and be completed in accordance with the applicable schedule.

**2.10.6** Unless timely appeal is made, DOE/OAK shall incorporate the resolution and final determination into the appropriate plan, schedule, or procedure and proceed with implementation in accordance with the amended plan, schedule, or procedure within forty-five (45) days after resolution of the dispute pursuant to the procedures specified in this section, in order for Section 2.11, "Covenants and Reservations," to remain effective for the affected waste stream.

**2.10.7** States affected by the dispute and/or EPA may be consulted by the parties as part of the dispute resolution process, as appropriate.

## **2.11 COVENANTS AND RESERVATIONS**

**2.11.1** This STP and implementing FFCAct Order shall stand in lieu of any administrative, legal, and equitable remedies which are available to the MDNR against DOE, its contractors and subcontractors at any tier and all persons bound by this STP and implementing FFCAct Order with respect to the matters covered by this STP and implementing Order, so long as DOE and all parties bound by this STP and implementing FFCAct Order are in compliance with the STP and implementing FFCAct Order as determined by MDNR or a court of competent jurisdiction.

**2.11.2** Except as specifically set forth herein, DOE reserves and does not waive any rights, authority, claims or defenses, including sovereign immunity, that it may have or wish to pursue in any administrative, judicial or other proceeding with respect to any person; nor does DOE waive any claim of jurisdiction over matters which may be reserved to DOE by law, including the Atomic Energy Act. Nothing in this STP and implementing FFCAct Order shall constitute an admission on the part of DOE, in whole or in part, in any proceeding except in a proceeding to enforce the FFCAct Order implementing this STP. DOE specifically reserves all rights it may have by law to seek and obtain administrative or judicial review or appeal according to law of any determination made by MDNR during DOE/OAK's performance of its obligations under this STP and implementing FFCAct Order. DOE also specifically reserves all rights it may have by law to seek and obtain administrative or judicial review or appeal of permit requirements.

### **3.0 MIXED LOW-LEVEL WASTE TREATMENT PLAN AND SCHEDULES**

This section describes the proposed treatment plans and schedules for DOE/OAKs mixed low-level waste (MLLW) streams at MURR. These schedules represent enforceable milestones for the purposes of the FFCAct. More detailed information regarding the preferred treatment options, including additional breakdowns of schedules and target dates, is provided in the Background Volume. It is DOE/OAK's intention to develop enforceable milestones only as specifically required by the FFCAct.

Table 3-1 provides information regarding the preferred treatment option for the characterized DOE/OAK MLLW stream at MURR. Table 3-2 is reserved to provide the treatment options for MLLW requiring technology development, and Table 3-3 is reserved to provide a list of MLLW that require characterization, or that have been characterized but require a technology assessment.

Tables 3-4(a) through (e) contain the proposed treatment or characterization schedules for MLLW. For consistency in comparing activities for treating MLLW at any of the several DOE/OAK sites required to prepare Proposed STPs (PSTPs), the tables have been assigned the following standard identification: (a) is reserved for onsite treatment schedules; (b) is reserved for offsite treatment schedules; (c) is reserved for technology development schedules; (d) is reserved for treatability studies; and (e) is reserved for schedules for waste streams requiring characterization or technology assessment. The tables are included in the PSTP only if applicable to this site.

#### **3.1 MLLW STREAMS FOR WHICH TECHNOLOGY EXISTS**

The preferred treatment option for DOE/OAK MLLW streams at MURR for which technology exists are identified in Table 3-1, with detailed schedule information provided in Tables 3-4(a) or (b), as appropriate (the tables are included only if applicable to this site). Additional schedule information and a description of the interim steps needed to bring these wastes into compliance with RCRA LDR requirements are included in Section 3.1 of the Background Volume. Preferred treatment options selected will meet RCRA LDR requirements for land disposal.

| TABLE 3-1  |   |                                   |
|--|---|-----------------------------------|
| TREATMENT OPTIONS FOR CHARACTERIZED DOE/OAK MLLW STREAMS AT MURR |   |                                   |
| Waste Stream No.   | Waste Stream Description  | Preferred Treatment Option        |
| MLLW, Primarily Organic Debris, CH                               |   |                                   |
| MU-W001  | TRUMP-S Decontaminated and Failed Equipment Debris Contaminated with Cadmium and Silver | Stabilization at Hanford WRAP IIA |

Key: CH = Contact-Handled  
 TRUMP-S = TRansUranic Management by Pyroprocessing - Separation  
 WRAP IIA = Waste Receiving and Processing (Facility)

**3.2 MLLW STREAMS FOR WHICH TECHNOLOGY EXISTS BUT NEEDS ADAPTION OR FOR WHICH NO TECHNOLOGY EXISTS**

There are currently no DOE/OAK MLLW streams at MURR that fall into this category. Any such waste identified in the future will be noted in Table 3-2, with detailed schedule information provided in Tables 3-4(c) or (d), as appropriate (the tables are included only if applicable to this site). Additional schedule information and a description of the interim steps needed to bring these wastes into compliance with RCRA LDR requirements will be included in Section 3.2 of the Background Volume.

| TABLE 3-2   |                               |                            |
|---|-------------------------------|----------------------------|
| <del>RESERVED</del>   |                               |                            |
| TREATMENT OPTIONS FOR DOE/OAK MLLW STREAMS AT MURR REQUIRING TECHNOLOGY DEVELOPMENT OR TREATABILITY STUDIES |                               |                            |
| Waste Stream No.  | Waste Stream Description      | Preferred Treatment Option |
| (Treatability Group)  |                               |                            |
| —   | None identified at this time. |                            |

**3.3 MLLW STREAMS REQUIRING FURTHER CHARACTERIZATION, OR FOR WHICH TECHNOLOGY ASSESSMENTS HAVE NOT BEEN DONE**

There are currently no DOE/OAK MLLW streams at MURR that fall into this category. Any such waste identified in the future will be noted in Table 3-3, with detailed schedule information in Table 3-4(e) (the table is included only if applicable to this site). Following the completion of the characterization process, DOE/OAK will select a preferred treatment options and submit a proposed schedule as described in Section 2.0 of the Compliance Plan Volume. Additional schedule information and a description of the interim steps needed to bring these wastes into compliance with RCRA LDR requirements will be included in Section 3.3 of the Background Volume.

| <b>TABLE 3-3<br/>-RESERVED-<br/>DOE/OAK MLLW STREAMS AT MURR:<br/>UNCHARACTERIZED OR REQUIRING TECHNOLOGY<br/>ASSESSMENT</b> |                              |
|--|------------------------------|
| <b>Waste Stream No.</b>  | <b>Description</b>           |
| <b>(Treatability Group)</b>  |                              |
| —  | None identified at this time |

| <b>TABLE 3-4 (b)</b>   |   |
|--|---|
| <b>SCHEDULE: MLLW STREAMS TO BE TREATED OFFSITE WITH EXISTING TECHNOLOGIES</b>                   |   |
| <b>Activity</b>  | <b>Waste Stream No.</b>                   |
|  | <b>MU-W001<br/>Debris w/Cd and<br/>Ag</b> |
| <b>Offsite Treatment</b>   | <b>Hanford WRAP IIA</b>                   |
| <b>Target Dates</b>  |   |
| Request an acceptable shipping schedule from offsite facility for offsite transport of waste(s). | 12/30/96                                  |
| Complete shipment of waste(s) offsite.   | Assumption #1                             |

**Note:** Compliance Plan schedule tables generally show only activities that have not yet been completed. Where a milestone is shown as completed for a waste stream in the table, the next target date becomes the milestone for that waste stream.

**Assumptions:**

1. Wastes will be shipped within 6 months after the approved shipping date is provided by the treatment facility (in response to MURR's request shown as the first milestone).

## **4.0 MIXED TRANSURANIC WASTE MANAGEMENT PLAN AND SCHEDULES**

This section describes the proposed management plans and schedules for DOE/OAK mixed transuranic (MTRU) wastes located at MURR. MTRU waste, by definition, is waste, regardless of source or form, that is contaminated with (1) alpha-emitting transuranium nuclides with half-lives greater than 20 years and concentrations greater than 100 nanoCuries per gram (nCi/g) at time of assay and (2) RCRA-regulated waste. These schedules represent enforceable milestones for the purposes of the FFCAct. More detailed information regarding the preferred treatment options, including additional breakdowns of schedules and target dates is provided in the Background Volume. It is DOE/OAK's intention to develop enforceable milestones only as specifically required by the FFCAct.

### **4.1 MTRU WASTES EXPECTED TO GO TO WIPP**

#### **4.1.1 Strategy for Managing MTRU Waste**

As discussed in greater detail in Section 4 of the Background Volume to this STP, DOE plans to achieve compliance with the requirements of the FFCAct for defense-related MTRU destined for WIPP by using the No-Migration Variance Petition approach described in 40 CFR 268.6. Under this strategy, DOE intends to continue interim storage of MTRU, continue preparation of MTRU wastes for shipment to WIPP, and then ship and dispose of these MTRU wastes at WIPP. Within twelve months after the Secretary of Energy's decision to operate WIPP as a disposal facility, DOE/OAK will submit a supplemental plan outlining schedules and additional activities required to prepare the MTRU waste for shipment to WIPP if not already included in this STP, or in the event that significant changes have occurred as a result of the final RCRA permit or No-Migration Variance Petition determination. In addition, at that time DOE/OAK will provide a timetable for submitting a shipment schedule to WIPP for its MTRU waste. DOE/OAK will coordinate with the DOE Carlsbad area office in developing the shipment schedule to ensure proper receipt of the waste at WIPP.

DOE/OAK will begin discussions with the MDNR regarding alternative treatment options for MTRU waste in January 1998 if the Secretary of Energy does not decide to operate WIPP as a disposal facility by that time, or at such earlier time as DOE determines that (1) there will be a delay in the opening of WIPP substantially beyond 1998, or (2) the No-Migration Variance Petition is not granted by the EPA. DOE shall propose modifications to the STP for approval by MDNR within a time frame agreed upon between DOE/OAK and MDNR. These modifications will describe planned activities and schedules for the new MTRU strategy.

DOE/OAK shall include information regarding progress of MTRU waste management in the update to the STP required by Section 2 of this Compliance Plan Volume. This will include, as applicable and appropriate, the status of the No-Migration Variance Petition, and information related to characterization, packaging, and/or treatment capabilities or plans for MTRU waste to meet WIPP WAC for disposal.

#### **4.1.2 DOE/OAK Potential MTRU Wastes at MURR Expected to Go to WIPP**

Table 4-1 summarizes DOE/OAK defense-related MTRU waste streams located at MURR, all of which are ultimately expected to go to WIPP. Schedules for characterizing the wastes and submitting schedules for offsite shipment of the wastes are shown in Table 4-4(a).

#### **4.2 MTRU WASTES NOT DESTINED FOR WIPP**

There are no DOE/OAK non-defense-related MTRU waste streams at MURR which fall in this category.

| <b>TABLE 4-1</b>  |   |   |
|---|---|---|
| <b>MANAGEMENT PLAN FOR DOE/OAK POTENTIAL MTRU WASTE STREAMS LOCATED AT MURR</b> |   |   |
| <b>Waste Stream No.</b>   | <b>Description</b>  | <b>Management Option</b>                    |
| <b>MTRU, Primarily Organic Debris, CH</b>                                       |   |   |
| MU-W002   | TRUMP-S Analytical Wastes and Equipment Debris Contaminated with Cadmium and Silver | No LDR treatment required; Disposal at WIPP |

| <b>TABLE 4-4 (a)</b>  |                         |
|---|-------------------------|
| <b>SCHEDULE: MTRU WASTE STREAMS SCHEDULED FOR DISPOSAL AT WIPP</b>  |                         |
| <b>Activity</b>   | <b>Waste Stream No.</b> |
|   |                         |
| <b>Offsite Disposal Location</b>  | WIPP                    |
| <b>Target Dates</b>   |                         |
| Characterize waste to confirm identification as MTRU.   | Completed               |
| Provide schedule for offsite shipment of waste to WIPP. This may include schedule dates for requesting the WIPP WAC, submitting a written certification plan, conducting additional sampling and analysis of waste if needed to meet WAC, requesting an acceptable shipping schedule from WIPP, and a date to complete shipment of waste offsite. | 12/30/98                |

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## 5.0 MIXED HIGH-LEVEL WASTE STREAMS

DOE/OAK has not generated or stored mixed high-level waste (HLW) at MURR , nor are mixed HLW anticipated to be generated as a result of DOE/OAK activities at MURR in the future. HLW is defined as 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 transuranic waste and fission products in concentrations requiring permanent isolation.

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**Addendum**

**MILESTONE APPROACH AND ENVIRONMENTAL MANAGEMENT BUDGET  
FORMULATION PROCESS**

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**-ADDENDUM-**  
**MILESTONE APPROACH AND ENVIRONMENTAL MANAGEMENT  
BUDGET FORMULATION PROCESS**

In view of recent budget cuts and future budget uncertainties, the Department of Energy (DOE) faces a significant challenge in maintaining an environmental program that complies with environmental laws, including the Federal Facility Compliance Act (FFCA), in a manner that maximizes use of DOE's resources and addresses the most serious risks first. DOE must work closely with regulatory agencies and stakeholders to develop less costly and more efficient approaches to achieving compliance while recognizing fiscal constraints. DOE is moving forward on several fronts to meet this challenge, including initiatives to improve internal efficiency and productivity, to involve regulatory agencies and stakeholders in a "bottom-up" process for setting environmental management budgets and priorities, and to seek increased flexibility in the appropriation process for DOE's Environmental Management Program. A key element in meeting this challenge is the development of a process for setting milestones that provides accountability, focuses resources on high priority activities, and recognizes fiscal and technical uncertainties.

To meet these objectives, DOE proposes using a two-year rolling milestone approach to implement the schedules provided in the Compliance Plan Volume of the Site Treatment Plan. Under this approach, schedule dates are designated as either "milestones" or "target dates." Milestones and target dates would be established in accordance with available Environmental Management funding for the site. Milestones are enforceable deadlines for near-term activities (i.e., the current fiscal year plus one additional year). Milestones are established for near-term activities because there is greater fiscal and technical certainty about these activities. Target dates are non-enforceable deadlines for longer-term activities and would be converted to milestones on an annual basis. Each year, after receipt of the Approved Funding Program that reflects the final Congressional appropriation for that fiscal year, existing milestones would be reviewed, and adjusted if necessary, based on funding availability, new technical information, and other factors. An additional year of milestones would also be established by converting upcoming target dates to milestones, adjusting the target dates as necessary before converting them to milestones. Affected out-year target dates would also be adjusted as necessary. To the extent practical, this process would coincide with the process

for the Annual Site Treatment Plan Updates and would be conducted in a consistent time-frame across the DOE sites (for example, no later than March 31 of each year).

During the annual review and establishment of milestones and target dates, DOE and the regulatory agencies would consider a variety of factors, including: funding availability; latest information on cost estimates; site priorities identified through consultations among DOE, regulatory agencies, and stakeholders; new or emerging technologies; and other relevant factors.

Because the process for modifying and extending milestones is resource-intensive for both DOE and regulatory agencies, only major project activities required by the FFCAct and other statutes should be designated as enforceable milestones. Other mechanisms, such as submission of the Annual Site Treatment Plan Updates, would provide regulatory agencies with information on progress on enforceable milestones and interim activities.

Target dates would be established using realistic assumptions. DOE and the regulatory agencies must recognize the uncertainties associated with long-term target dates which set forth DOE's strategic vision of how it plans to accomplish the project.

DOE will work with the regulatory agencies to resolve disputes concerning the establishment of milestones. DOE proposes that the parties agree to exhaust all available dispute resolution mechanisms prior to resorting to formal enforcement actions for disputes involving insufficient funding.

As noted above, DOE will provide the regulatory agencies and other stakeholders an opportunity to participate in developing the Environmental Management budget and priorities. Open discussions between DOE, regulatory agencies, and other stakeholders will facilitate the development of a sensible Environmental Management program and budget proposal that uses DOE's resources wisely in light of budget constraints confronting DOE.